Performance and Dynamics of African Firms: A Comparative Analysis of Garment Firms in Kenya and Bangladesh

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Declaration for PhD thesis

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Abstract

Diversification of economic structure has been a central issue of economic development and poverty reduction, and it has become critical in sub-Saharan Africa after a hike of commodity prices strengthened its dependence on the primary sector. This thesis attempts to understand the causes behind the stagnation of the African manufacturing sector based on comparative case studies. We specifically compare the garment industries in Kenya and Bangladesh, which have similar endowments including income per capita and business environment, but contrast in the development of the typical labour-intensive industry.

Our comparison between countries with similar endowments simplifies the causes of the divergent performance, since it effectively controls possible reverse causation. Additionally, the focus on a labour-intensive industry demonstrates obstacles at the early stage of industrialisation. The fact that the Kenyan industry had growth opportunity in the period of analysis, from 2002 to 2008, makes the comparison meaningful. Using firm data and in-depth interviews, the comparison is based on a microeconomic perspective so that it incorporates firm heterogeneity. The main analysis is extended in three chapters. Sources of the competitiveness gap between the two industries are explored in Chapter 4. Chapter 5 demonstrates the dynamics of non-exporters in Kenya, while the dynamics in the export market, namely export participation, are analysed in Chapter 6.

We found that the most influential source of the competitiveness gap is labour cost rather than productivity; the wages in Kenya are far higher than those in Bangladesh. Due to the large cost gap, the Kenyan garment industry experienced a drastic contraction in the liberalized local and export markets. Consequently, Kenyan local firms specialised in the local uniform market, which further constrained industrial dynamics through stagnating productivity growth and discouraging participation to the export market. High labour costs relative to income per capita can be an important cause of the stagnation of the manufacturing sector in some other African countries where the labour cost is as high as it is in Kenya.

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List of Abbreviations

AGOA	African Growth and Opportunity Act
CMT	cut, make, and trim
COMPID	Combating Marginalization and Poverty through Industrial Development
BGMEA	Bangladesh Garment Manufacturers Association
BKMEA	Bangladesh Knitwear Manufacturers Association
EPZ	export processing zone
EU	European Union
FDI	foreign direct investment
FOB	free on board
GDP	gross domestic product
GNI	gross national income
HS	Harmonized System
ILO	International Labour Organization
LDBC	Lesser Developed Beneficiary Country
LDC	Least Developed Country
MFA	Multi-fibre Arrangement
MUB	Manufacturing under Bond
OECD	Organisation for Economic Co-operation and Development
OLS	ordinary least square
PPP	purchasing power parity
RPED	Regional Program on Enterprise Development
SF	stochastic frontier
SSA	sub-Saharan Africa
TFP	total factor productivity
UAE	United Arab Emirates
UNCTAD	United Nations Conference on Trade and Development
UNIDO	United Nations Industrial Development Organization
UK	United Kingdom
UN Comtrade	United Nations commodity trade statistics
US	United States
WTO	World Trade Organization

Chapter 1 Introduction

1. Motivation and Objective

The diversification of economic structure has been a central issue in the theory and practice of economic development since developing countries began gaining independence. Based on empirical evidence, Prebish and Singer argued that the terms of trade in economies that relied on primary commodity exports deteriorated over the long-term (Prebish-Singer Thesis). This supported a strong orientation among developing countries towards industrialisation in the 1960s and 1970s. However, during the era of the structural adjustment programs, the focus on a specific sector – for example, the manufacturing sector – was significantly weakened as the program held a belief in market mechanism, where economic structures are determined according to the comparative advantage dictated by a country's relative resource endowments. After decades of sector-neutral policy, industrialisation has revived again as a development policy underpinned by the resource curse argument advanced in the late 1990s. Sachs and Warner [1995] showed the negative impact of natural resource abundance on economic growth in their cross-country analysis, and a number of studies suggested possible causes for this.[1] Reflecting these arguments, most studies discussing the development strategy of poor countries, in particular sub-Saharan Africa (hereafter referred to as Africa), argue for diversification of industrial structure (Nissanke and Thorbecke [2008, 2010], Sachs [2005], Collier [2007], Commission on Growth and

[1] Literature suggests a number of explanations. While Dutch disease is the most widely acknowledged explanation, recent literature argues that resource dependence deteriorates governance and induces conflict (e.g., Auty and Gelb [2001], Collier and Hoeffler [2004]). Other studies point to the difficulty of macroeconomic management in the face of a large fluctuation in commodity prices (Nissanke [2009], Collier [2003]).

Development [2008], African Development Bank [2007]).

The development of the manufacturing sector in Africa has lagged far behind the other developing regions. Although it was comparable up to the 1970s, the African manufacturing sector has particularly stagnated since trade liberalisation was implemented as part of the structural adjustment program. In contrast, in other developing countries, the manufacturing sector recorded impressive growth; for instance, in developing Asia, the growth began in East Asian countries in the 1970s and then spread over to South East Asia in the 1980s and 1990s. Currently, remarkable growth in the manufacturing sector is recorded in Asian countries with large populations, namely China and India, as well as in low-income developing countries, for example, Vietnam, Bangladesh and Cambodia. However, despite the revival of aggregate growth rates over the last decade in Africa, the growth of the manufacturing sector has not experienced a take-off on a visible scale except in South Africa and Mauritius.

The share of the manufacturing sector in GDP is 14.8% in the African countries, and it falls to 13.2% when South Africa is excluded (2008).[2] This is substantially smaller than the average of developing countries, 21.3% (middle- and low-income countries). The contrast becomes sharper when contribution to exports is compared. While the share of manufacturing products in export is 58.6% in developing countries, it is only 26.2% in African countries (excluding South Africa). Furthermore, the growth rate of the manufacturing sector has been lower in Africa than in other developing countries. The average annual growth rate from 2000 to 2008 was 3.7% in Africa, whereas it was 7.4% in other developing countries (World Bank [2010a]).

The African manufacturing sector is not only small in size, but it also has a unique composition. In most developing countries, particularly in low-income countries, labour-intensive industry has the largest share, which is consistent with the comparative

[2] From World Bank [2010a] and the author's calculation.

advantage of poor countries regarding low-cost labour. In contrast, its share is significantly smaller in African countries. While the share of labour-intensive goods represented by the textile and garment industry in merchandise exports is 9.0% in Asia, it is 1.0% in Africa (2010).[3] This indicates that, despite low income, African countries either do not have a comparative advantage in labour-intensive industry or are not able to realise this advantage. This puzzle has been discussed in line with the development strategy of African countries, and has been challenged by some studies.

Lack of human capital is occasionally pointed out by the empirical literature. Firm-level studies focusing on technological aspects indicate that African manufacturing firms are lacking skilled workers in production and managerial sections (Lall [1999], Biggs et al. [1995], Pack [1993]), while several microeconometric studies show the significant effect of human capital on a firm's productivity and exports (e.g., Söderbom and Teal [2000]). The firm-level studies further argue that the absence of an effective technological policy and little foreign direct investment (FDI) inflow in the manufacturing sector in conjunction with insufficient human capital have hindered the accumulation of technological capability in African firms. Wood and Mayer [2001] point to a lack of human capital in the context of comparative advantage, saying that African countries are endowed with scarce skilled labour relative to land, and hence, they do not have a comparative advantage in the manufacturing sector, which is, according to them, a skilled-labour-intensive industry.

The other lines of argument claim that low-income African countries are not able to realise the comparative advantage in the labour-intensive manufacturing industry. Collier suggests two factors; the low quality of the business environment and multi-equilibrium in manufacturing development. He argues that the African business

[3] From WTO [2012] and the author's calculation. Australia, Japan, and New Zealand are excluded from Asia.

environment destroyed the potential comparative advantage in manufacturing, which is a transaction-intensive industry and hence prone to the quality of the business environment (Collier [2003]). In Collier's later work with Venables, he argues that, under economies of agglomeration, economies that formed agglomeration earlier dominate the market because of their superior productivity to others. They suggest that Asian countries that started industrialisation earlier have built a dominant position in labour-intensive industries over other low-income countries including Africa (Collier and Venables [2007]). African countries need to wait for a sufficient rise of wages in Asia until it cancels out the effect of agglomeration.

While the empirical literature suggests several possible factors, compelling evidence demonstrating critical differences in the African manufacturing development have not yet been provided. Under rapid globalization, growth of industry is determined by the relative performance compared to industries in other countries supplying similar products. In fact, African markets for manufacturing products, for instance clothing and electronic appliances, are dominated by imports, and the share of imports is increasing with the growth of the Asian industry. However, most of the microeconometric studies use the data of African firms only, mostly sourced from the World Bank's Regional Program for Enterprise Development, and hence, their identification rests on heterogeneity within African firms. Recently, a few studies have analysed African manufacturing performances through international comparison, yet their number is still limited. Given possible endogeneity in socioeconomic conditions that affect industrial development, such as business environment, comparative analysis among low-income countries is needed if failure of industrialisation in Africa is to be demonstrated.

To fill the gap in the literature, this thesis attempts to understand the factors behind the stagnation of the African manufacturing sector through a comparative perspective with the manufacturing sector of low-income Asian countries. Specifically, firm

performance and behaviour are compared between Kenya and Bangladesh, focusing on the garment sector. While the garment industry sector is expected to experience growth at the early stage of industrialisation, there is a particularly sharp contrast in growth performances among low-income countries in Africa and Asia. In fact, despite similarity in GDP per capita, the Bangladeshi garment industry far outperforms the Kenyan industry in export performances. Furthermore, since the garment industry employs unskilled labour intensively, the argument by Wood and Mayer [2001] does not apply. In fact, there is a large pool of unemployed unskilled labour in African countries including Kenya, which indicates that the growth of the garment industry is not likely to be constrained by the factor scarcity.[4]

More importantly, investigation in the garment industry enables us to control an important factor of industrial development, namely, the presence of FDI. It is argued that foreign companies' involvement, including FDI, plays an important role in industrial development, particularly in developing countries (Rhee et al. [1995], Lall and Urata [2003], UNCTAD [2002]), and the literature on the African manufacturing sector also suggests that the absence of FDI is one of the causes for the stagnation (Lall and Pietrobelli [2002], Pack [1993]). This also holds for the garment industry, where foreign companies' involvement is a main driver of growth in many developing countries (Lall and Wignaraja [1994]). In Bangladesh, where no competitive garment industry existed until the 1970s, FDI by a Korean firm and intensive training of local workers triggered the growth of garment exports (Rhee and Belot [1989]). After the long absence of significant foreign involvement in Africa until the 1990s, the enactment of the African Growth and Opportunity Act (AGOA) in 2000 by the US government invoked a substantial inflow of FDI in several African countries, including Kenya.

[4] If scarce labour constrains the manufacturing sector through comparative advantage, labour has to be fully employed, as Collier [2003] argues. The large unemployment of unskilled labour that is commonly observed in African labour markets indicates that the growth of an unskilled labour-intensive industry is not constrained by factor endowment.

While it led to the rapid growth of garment exports for several years, its growth trend was disrupted after the liberalisation of international apparel trade in 2005. Therefore, a comparison of the two countries' experiences in this particular sector would illustrate the difference in industry development in the presence of FDI. Given that the garment sector has been one of the few manufacturing sectors experience FDI inflow on a visible scale in low-income Africa, this work provides us with some insights into factors hindering FDI-led growth.

Given the lack of detailed firm-level data of the garment industry with a substantial number of samples in both countries, our analysis is based on the primary data collected in our own fieldwork.[5] Firm surveys were conducted in Kenya and Bangladesh in 2003 and 2009 by the research team (including the author). In addition, a series of structural interviews were also conducted with selected garment firms, industrial associations and relevant ministries in Kenya by the author in 2005 and 2006.

A pessimistic position exists over the issue of whether labour-intensive industry could foster economic growth and poverty reduction. For example, Kaplinsky [2000] argues that competitive pressure continues to be high in labour-intensive industry, given the low barrier of entrance. Particularly after the decisive entry of China and India into the global markets and their increasing dominance, the price of labour-intensive products has continued falling and, accordingly, terms of trade have deteriorated. Yet, an increasing number of studies stress the role of the labour-intensive manufacturing industry for diversification of economies in low-income countries. For example, Sachs [2005], Collier [2007], Commission on Growth and Development [2008] and UNCTAD [2008] note the weakness of the primary sector in generating economic growth, following the resource curse argument. This argument suggests Dutch disease, large

[5] World Bank's Enterprise Survey contains a small number of garment firms in both countries despite the dominant share of the sector in Bangladesh.

fluctuation of commodity price, slower productivity growth in the sector, and an adverse effect on governance and institutions as major explanations for the observed negative relationship between reliance on primary commodity and economic growth. In contrast to Wood's argument, these studies assume that African countries have a potential comparative advantage in labour-intensive industry, and to realise it, they argue for a temporal preferential market access for exporters in low-income countries, as seen in AGOA.[6]

Also, recent empirical literature has revealed the effect of garment employment on poverty reduction. The garment industry provides income generation opportunities, particularly for female unskilled workers, with a higher wage than informal jobs and, occasionally, other formal jobs (Lopez-Acevedo and Robertson [2011]). With the substantial improvement in working conditions promoted by consumers' increased awareness of workers' welfare, garment employment is expected to promote gender equality (World Bank [2012]).

It is noted that there is a significant difference in technology and knowledge requirements between labour-intensive industry and capital- or knowledge-intensive industry (Lall and Urata [2003]), and success in labour-intensive industry cannot guarantee an upgrading to industry with a higher value-added in the subsequent period. However, in most of today's middle-income countries without rich natural resources, the industrialisation process was initiated by the growth of labour-intensive industry. Assuming the gradual nature of technological upgrading, it is not unreasonable to expect that labour-intensive industry can trigger an industrialisation drive in low-income African countries. This thesis focuses on development of the garment industry as a critical initial condition for the subsequent process of industrialisation and

[6] Sachs [2005] and Collier [2007] introduce an increasing return to scale as an explanation for the stagnation of the manufacturing sector in Africa. Instead of "Big Push", they suggest applying preferential market access like AGOA, which will boost investment in labour-intensive industry and help realise economies of scale, so that African products can compete in the export market.

diversification in Africa.

2. Research Questions and Approach

2.1. Research Questions and Hypotheses

In the era of globalization, knowing the competitiveness of African industries relative to those in other countries is crucially important to understanding the failure of manufacturing development in Africa. However, existing empirical studies focus on individual factors affecting competitiveness, such as productivity, business environment or trade costs, and few studies have made comprehensive and systematic analysis of competitiveness to author's knowledge.[7] Despite widespread recognition, the relative competitiveness of African industry and its determinants have not been verified yet. Hence, our empirical analysis starts with the comparative competitiveness of Kenyan garment firms, and research questions are formulated as follows.

> RQ 1: How competitive is the Kenyan garment industry in comparison with the Bangladeshi industry, which is a successful Asian exporter? What are the causes of the gap in competitiveness?

We focus on price competitiveness, since it is most important in low-priced garment products that Kenyan and Bangladeshi industries produce (Lall and Wignarja [1994]), and demonstrate determinants of competitiveness including technological backwardness and poor quality of business environment that are suggested in the literature. The hypothesis under this research question is formulated as follows.

[7] Among the studies comparing production costs as a measure of competitiveness, most of them analyse productivity, transportation costs, utility costs or labour costs separately. See Chapter 2 for details.

Hypothesis 1: Compared with Bangladesh, the quality of the business environment in Kenya does not differ sufficiently to account for the difference of competitiveness. While the technology of non-exporting firms may be obsolete, Kenyan exporters who are affiliates of Asian exporters are not technologically behind Bangladeshi firms. Instead, the difference in labour costs can account for the gap in competitiveness.

Given that the business environment in Bangladesh is evaluated as one of the lowest in the world, it is unlikely that the difference in the business environment accounts for the weak competitiveness of the Kenyan industry. It is also unlikely that the technological capacity of Kenyan exporters is substantially lower than Asian exporters, as all exporters are foreign affiliates that share technology with their parent company in Asia. On the other hand, it may be the case that non-exporting firms, most of which are locally-owned, have poorer technological capacity. In our hypothesis, we suggest that the difference in wages accounts for a substantial part of the competitiveness gap between firms, particularly exporting firms, in Kenya and Bangladesh, given a large difference in formal sector wages between them. It is noted that a high level of unemployment in Kenya indicates that the high labour cost does not reflect factor endowment.

The answer to the first question shows a snapshot of the relative competitiveness of Kenyan firms, while its evolution is also important to see the future of the manufacturing sector in Kenya. If a gap is narrowing, firms are overcoming disadvantage, but if it is widening, the sector is caught in a trap. One of the important sources of dynamism in the garment industry is an inflow of FDI (Lall and Wignaraja [1994]), which not only triggers garment exports but occasionally brings about two

changes in local firms; productivity growth and export participation. Empirical evidence in developing countries reported a positive impact of FDI inflow on productivity of local firms in the manufacturing sector, though the impact is occasionally not significant.[8] Local Kenyan firms may benefit from FDI. Our second research question and hypothesis address these dynamics as follows.

RQ 2: Is the gap in competitiveness between Kenyan and Bangladeshi industry narrowing or widening? In particular, did inflow of FDI induce the productivity growth of local firms?

The significant economic growth of the Kenyan economy that started in 2003 may encourage productivity growth through the realisation of economies of scale or the benefit of the FDI spillover effect. Wage hikes in Asian low-income countries including Bangladesh would also enhance the relative competitiveness of Kenyan firms. However, two things may obscure the positive impacts. Firstly, social conflict from the end of 2007 to 2008 is likely to have adversely affected production, though it could be temporal. Secondly, contraction of production and specialisation in a niche market may have substantially weakened industrial dynamism through creative destructions. Empirical studies on firm dynamics show that firm turnover significantly increased industry-level productivity growth in developing countries including Africa (e.g., Aw et al. [2001], Pavcnik [2002], van Biesebroek [2005b], Shiferaw [2007]). Since local Kenyan firms specialise in the uniform market in which imports cannot easily penetrate, competition may not be significant enough to facilitate the exit of unproductive firms among the Kenyan non-exporters.

[8] See Crespo and Fontoura [2006] for a review of empirical evidence on FDI spillover. Clerides et al. [1998] found a significant FDI spillover effect in the Moroccan garment industry.

Hypothesis 2: Opposite forces work. While the inflow of FDI may induce the productivity growth of local Kenyan firms in the growing economy, specialisation in a niche market may discourage industrial dynamics through creative destructions.

The experience of successful exporting countries suggests that export growth tends to be initiated by inflow of FDI, and is further fuelled by the growth of local exporters that have built their capacity through directly or indirectly learning from foreign affiliates located in the country. Empirical studies argue that such learning plays a critical role in facilitating the export participation of local garment firms that initially had limited export capacity.[9]

Local Kenyan firms had the opportunity to learn from FDI. Particularly until 2004 when exports were growing rapidly, the export market could be a better alternative to the domestic market. Yet in reality, the emergence of local exporters was quite limited. In addition, the majority of local exporters are newly established firms by entrepreneurs without previous experience in the garment and textile industry. Since those new firms have little experience in the garment industry and have to bear sunk entry costs, the standard theoretical model predicts that they are less motivated to start exporting. These results indicate that the pattern of industrial growth realised in the other developing countries may not be replicated in African countries. Although empirical literature generally indicates the low absorptive capacity of African firms (e.g., Lall [1999], Pack [1993], Söderbom and Teal [2000]), it does not investigate the case of local firms learning from FDI.

[9] For the case of the garment industry, see Rhee and Belot [1989], Romer [1992], Lall and Wignaraja [1994] and UNCTAD [2002]. For general cases of learning from FDI, see, for example, Rodriguez-Clare [1996] and Lall and Urata [2003].

RQ 3: What are the constraints for the export participation of local Kenyan firms after a significant inflow of FDI into the sectors in question? Does low absorptive capacity prevent them from learning through positive spillovers from FDI?

Based on the fact that local exporters have a substantial share in many low-income countries, even where the initial capacity of firms is not high, low absorptive capacity may not be a decisive factor behind limited export participation by Kenyan firms. Considering the minimum production scale required for entry into the export market, the credit constraint that is widely observed among Kenyan small enterprises may have discouraged local firms from export participation. Other possibilities are the low profitability and high risk of the export market relative to the local market. In the uniform market, where most local firms are supplying, the margin may be higher and demand is more stable than in the export market, mainly due to weaker competitive pressure. If local Kenyan firms are enjoying the niche market advantage, they have less incentive to start exporting. Hence, the third hypothesis is formulated as follows.

Hypothesis 3: Low absorptive capacity may not be a binding constraint for local Kenyan firms to start exporting. Rather, lack of credit constrained export participation or competitive export market did not motivate local firms to enter.

We explore various causes for the stagnation of the garment industry in Kenya through the three questions formulated above, which touch on both static and dynamic aspects. Hopefully, our attempts to answer these three questions can augment our knowledge of African manufacturing firms.

2.2. Approaches to the Research Questions

We approach the above research questions through a two-country comparison. While the two case study countries have similar GNI per capita ($390 in Kenya and $350 in Bangladesh in 2002),[10] their performance of garment production presents a sharp contrast. Bangladesh has been ranked in the top ten in the export market since the late 1990s, whereas Kenya's export value of garments is less than 5% of that achieved by Bangladesh's firms. By choosing case studies with a similar income level, our study has advantages over other comparative studies in the identification of causes of the differential industrial performances. It is likely that two countries having similar income levels exhibit comparable socioeconomic conditions, such as human capital and business environment. If differences are substantially small, it is evident that they do not cause the gap of industrial development between countries. If those conditions differ, their impacts on industrial growth will be identified with little endogeneity problem. The literature suggests reverse causation from income per capita to business environment (Mauro [1995], Acemoglu et al. [2001]), and the same problem exists between manufacturing performance (e.g., exports or productivity) and business environment since the former strongly correlates with income per capita. In a comparison between Kenya and South Korea, for example, it is not evident to what extent higher manufacturing productivity in South Korea is caused by its better business environment. Between countries with similarity in income level, however, the endogeneity problem is minimised.

A few recent studies on the garment industry have made multi-country comparisons that include some low-income countries using World Bank's Enterprise Survey and/or national industrial surveys (Lopez-Acevedo and Robertson [2011], World Bank

[10] The figures are presented in current US$ using Atlas conversion factor that smoothes exchange rate volatility (World Bank [2011]). The difference became slightly larger in 2008, the last year of our analysis; $760 in Kenya and $580 in Bangladesh, respectively. With the PPP conversion rate, figures become more similar; $1,150 in Kenya and $910 in Bangladesh in 2002, and $1,560 and $1,460 in 2008, respectively.

[2010b]). They clearly have broader comparative perspectives than our two-country comparison, which can illustrate competitive positioning of an individual country in the world market. In exchange of wider coverage, however, analysis is constrained by the survey design that is applied in the datasets. Most of those datasets, in particular African datasets, contain only a small number of garment firms. Additionally, those surveys do no incorporate detailed information of technology transfer and firm networks, including interaction between local and foreign firms, which is necessary for our third research question. Furthermore, the year of the surveys does not match across countries in most cases, and thus, cross-country comparison is not straightforward. As we attempt in-depth analysis of firm performance and behaviour, we chose a two-country comparison using an original survey and interviews.

We take a microeconomic approach based on firm-level data in order to incorporate the heterogeneity of firms that is shown to be an important factor of industry dynamics in the recent theory and empirics (Melitz [2003]). As shown in the following chapters, firm heterogeneity plays an important role in firm turnover and export participation in our Kenyan case. In the absence of firm-level data with a substantial number of garment firms in both countries, the team (including the author) conducted firm surveys in 2003 and 2009, which covered firms employing more than ten employees.[11] The informal sector, which is particularly prevalent in Kenya, was excluded because the firms are less likely to become formal entities (McCormick et al. [1997], Bigsten and Kimuyu [2002]). In Kenya, our fieldwork covered 71 (2003) and 83 (2009) firms, including both exporting and non-exporting firms, based on an exhaustive survey using several available lists of firms. In Bangladesh, 222 (2003) and 232 (2009) firms were covered based on stratified sampling from the member list of the exporters' association. Our

[11] The surveys were designed to collect plant-level data, but most of the Kenyan samples have a single plant.

Kenyan data covered 68.2% of the garment firms that we confirmed were in operation in 2003, though our firm list may not be complete due to unavailability of a comprehensive official list in Kenya. In Bangladesh, our data covered 5.9% of the association members.

Additionally, the author conducted a series of interviews with local Kenyan firms in 2005 and 2006 to supplement detailed information, in particular about export participation. The sample consisted of 28 locally-owned firms, including exporting and non-exporting firms. Also, the author interviewed foreign exporters, retail shops, the industrial association and the related ministries in Kenya during the period. Details of the survey and interviews are presented in Section 3.2 and the Appendix of Chapter 2.

3. Structure of the Thesis

The thesis is structured as follows: After this introductory chapter, the analytical framework applied in this thesis is presented with a literature review in Chapter 2. Chapter 3 introduces a brief history as well as the current situation of garment industries in the two countries. Empirical analyses are presented in the subsequent three chapters (Chapters 4 to 6). The competitiveness of the two industries is compared in Chapter 4 based on the 2003 firm surveys, and factors generating differences are analysed further. The change in the competitiveness gap between the two industries from 2002/3 to 2008/9 is investigated in Chapter 5. Chapter 6 is devoted to exploring export participation by local firms triggered by the inflow of FDI in Kenya. Finally, Chapter 7 concludes the discussion.

Chapter 2 reviews the relevant literature and presents the analytical framework applied to this thesis. We first introduce the theoretical basis to analyse firm growth in

developing countries. Given the dominance of price competition in the low-priced apparel market, international competitiveness is a key for growth not only for exporters but also for suppliers in the local markets. As a basis for investigation of the competitiveness gap between African and Asian firms, corresponding to our first and second research questions, we formally show determinants of price competitiveness. For our second and third research questions about the dynamics of firm growth, we review theories of technology adoption in developing countries, which cover absorptive capacity, firm networks and investment climate.

Evidence from the African manufacturing sector is reviewed based on theoretical implications. Reflecting the growing availability of firm-level data in the region, empirical microeconomic studies have rapidly accumulated since the late 1990s. They suggest a number of factors, among which business environment and human capital are most widely recognised. As mentioned earlier in this chapter, a few studies draw conclusions through a comparison between African and non-African countries, and possible biases yielded by difference in income level between comparators are not carefully considered. To fill the gap in literature, the analytical framework of this thesis is constructed.

In Chapter 3, we present stylised facts observed in the garment industry in Kenya and Bangladesh. An export-oriented garment industry started to grow in the late 1970s in Bangladesh, triggered by the FDI of a Korean firm. A number of local exporters were established soon after the first FDI, and export grew rapidly in the 1980s and 1990s. In the 2000s, the Bangladeshi industry became one of the largest exporters. In contrast, the Kenyan garment industry, once the largest cluster in East Africa, experienced a drastic contraction after trade liberalisation in Kenya in the mid-1990s. Imports from Asia and second-hand clothing from developed countries took a substantial share of the local market in a short time. Export-oriented production started after 2000 when duty- and

quota-free access to the US market was granted under the AGOA. FDI from South and East Asia flowed into the Export Processing Zones (EPZ), and export to the US market recorded a rapid growth. Their export production far exceeded that for the local market and created new employment. However, growth did not continue after the liberalisation of the apparel market in 2005, where quota on major exporters including China and Bangladesh was abolished.

The author's interviews indicate that local Kenyan firms supplying to the local market did not respond positively to the intensified competition. Most of them specialised in the uniform market where imported goods cannot easily penetrate, and only a few firms attempted to enhance their competitiveness or explore buyers in the export market. The reactions of the export-oriented firms were mixed. Many affiliates of foreign firms left Kenya after 2005, whereas those that continued an operation increased production through purchasing factories from the closing firms. Locally-owned exporters who operated as subcontractors of EPZ firms were hit hardest by liberalisation, and most of them closed or switched to the local market.

In Chapter 4, to understand the evolution of the gaps that developed with regard to industrial development, competitiveness in FY 2002 is analysed using the firm-level data in the two countries. As expected, unit costs differ substantially; the average unit cost of Kenyan firms was 2.5 times greater than that of Bangladeshi firms. Given the importance of price in the market for basic apparel products, this gap makes a large difference in relative competitiveness. A productivity estimation using the stochastic frontier technique shows that the firms in Kenya and Bangladesh in our sample do not differ in technical efficiency as a measure of productivity. Against our expectation, this also applies to the local Kenyan firms in the sample. Our estimation using a unit cost function suggests that the difference in unit costs was mostly attributable to labour costs.

These results largely explain the market performance of Kenyan garment firms. Handicapped with the large gap in unit cost, Kenyan garments are not able to compete in the domestic market with imported products from low-cost Asian countries. Hence, local firms have evaded competition by specialising in uniform production rather than striving for productivity enhancement. In the export market, while the temporary available advantages derived from the exclusive duty-free and quota-free access under the AGOA managed to compensate the relatively high cost of Kenyan garments in the US market, the abolition of the quota system in 2005 has partly, though not totally, eroded their competitive edge.

In Chapter 5, productivity changes between 2002/3 to 2008/9 are investigated for local Kenyan firms and Bangladeshi firms. Over six years, the average productivity of Kenyan firms fell significantly, while that of Bangladeshi firms was maintained. In Kenya, the fall in average productivity was mainly caused by firm turnover during the period; that is, relatively productive firms exited, and new entrants were far less productive than the exiting firms. In the Bangladeshi industry, exiting firms exhibited a lower productivity than those that continued operation, which is in line with theoretical implications and empirical results obtained from other countries.

Our investigation into firm exit by applying the duration model shows rather limited evidence of a correlation between productivity and firm survival. Analysing firm survival in two periods, the first from 2003 to 2005 and the second from 2005 to 2009, we find a positive relationship between survival and productivity only in the second period and only among very small firms, while we robustly identify a positive effect of firm age on survival over the two sub-periods. Since the second period included a period of considerable social conflicts due to the disputed Presidential election, our results suggest that firm turnover followed productivity only at the time of the reduced demand. After investigating the details, we conclude that market competition was not

effective enough to facilitate the exit of unproductive firms. Our interpretation is that the high degree of customization in uniforms has precluded the penetration of imports, and this substantially reduced competitive pressure. The competitiveness of the Kenyan garment industry in the local market has been eroded during the six years under investigation; therefore, the prospect of retrieving market share has been reduced.

Chapter 6 analyses firms' choice between markets, that is, local versus export markets. In contrast to difficulties encountered in the local market, export markets presented an alternative for many local Kenyan firms after FDI increased in the garment industry. Our fieldwork indicates that a small number of local exporters emerged after 2000 with the entry of newly established firms. Limited participation is justified if local firms anticipated a slowdown of exports after the liberalisation of the apparel market, but we found that most local firms were not aware of this.

To investigate the non-participation of existing local firms in exporting, we constructed a simple model of export participation by incorporating credit constraints and sunk entry costs necessary for entering into the local market (instead of the export market) into the standard model. Hence, according to the degree of credit constraints, local firms are classified into: 1) those who cannot reach the minimum production scale for exporting (Type 1); 2) those who can reach the minimum scale by giving up supplying to the domestic market (Type 2); and 3) those who can produce for both export and domestic markets (Type 3). By estimating the minimum capital value and credit access for individual firms, we find that the majority of them are regarded as Type 1 firms. There are some firms that could be classified as Type 2, but our estimation reveals that switching to the export market did not yield a sufficient profit gain to compensate for the opportunity cost of switching markets. The non-participation in export markets by local Kenyan firms is mostly explained by these results, though a few firms must have had an incentive to start exporting.

Chapter 7 presents concluding remarks. Through the focus on labour-intensive industry and the comparative analysis with another low-income country, our results have produced a set of different factors from those suggested in the literature for explaining the observed stagnation in the manufacturing sector. The main constraints suggested in the literature – namely, the adverse business environment and the lack of technological capability – did not diverge between the Kenyan and Bangladeshi firms. Instead, labour costs differed significantly, resulting in a substantial gap in production costs. Weak competitiveness hurt the Kenyan garment firms in the liberalised local and export markets, and the industry has experienced a drastic contraction. Consequently, non-exporting firms specialised in the uniform market, but this further constrained the growth of the industry as little competitive pressure resulted in the decline of productivity. While export opportunity emerged during the period of rapid export growth, neither is it available for most local firms with constraints in credit access nor is it more profitable for surviving local firms that specialise in relatively profitable niche markets. While the empirical literature did not analyse labour costs in depth as a factor of international competitiveness, we show that it is an important factor explaining the weak performance of the Kenyan garment sector.

The higher wage observed in Kenya cannot be entirely accounted for by its factor endowment given the presence of a high unemployment rate. Given the critical role assigned to labour-intensive industry in the taking-off stage of industrialisation, our findings at least provide a partial set of explanations for the weakness and stagnation of the manufacturing sector in Kenya. Furthermore, our analysis is useful in accounting for the stagnation of African manufacturing activities at large, where high labour costs relative to income per capita are observed.

Chapter 2 Analytical Framework

In this chapter, we review the relevant literature and present the analytical framework applied to this thesis. We first introduce the theoretical basis to analyze firm growth in developing countries. Given the dominance of price competition in the low-priced apparel market, international competitiveness is a key for growth not only for exporters but also for suppliers in the local markets. As a basis for investigation of the competitiveness gap between African and Asian firms, corresponding to our first and second research questions, we formally show determinants of price competitiveness. For our second and third research questions about the dynamics of firm growth, we review theories of technology adoption in developing countries, which cover absorptive capacity, firm networks and investment climate.

Based on theoretical implications, evidence from the African manufacturing sector is reviewed. Reflecting the growing availability of firm-level data in the region, empirical microeconomic studies have rapidly accumulated since the late 1990s. Utilizing this advantage, we examine their findings about the background of stagnation in the African manufacturing sector and suggest weaknesses of the existing studies.

Finally, the analytical framework is constructed so that this paper fills the gap in the empirical literature. As briefly described in Chapter 1, we approach our research questions by comparing manufacturing firms with similar endowments but different levels of performance. We expect that this approach minimizes the simultaneity problem between firm performance and endowment, which obscures the cause of stagnation in Africa.

1. Firm Growth in Globalization: Theory

1.1. International Competitiveness

Manufacturing goods used to be highly protected by high tariffs in African countries. After trade liberalization was undertaken in many African countries in the 1980s and 90s, competition with imports increased in the domestic market (Lall [1999]). In the garment market in Kenya, competition has become so intense that imported garments and textiles have massively increased in market share and accordingly production of domestic products has declined sharply. In such a competitive domestic market, the growth of a firm depends mainly on international competitiveness even if the firm is supplying only to a domestic market. The competitiveness of a garment product is generally determined by its quality, design, price and lead time. However, the basic garments which firms in low-income countries produce both for domestic and export markets have little product differentiation in quality and design, and so competition is strongly price driven. While the importance of lead time is increasing in the international market recently (Lall and Wignaraja [1994], Nordås [2004]), it is well known that multinational garment firms change production locations frequently in response to changes in factor prices[1].

Price competitiveness is directly related to unit cost. A firm with a lower unit cost can accept a lower price offered by a buyer. Based on the methodology by Nishimizu and Page [1986], it can be shown that unit cost is determined by productivity and factor prices. Suppose that necessary inputs are capital, labour and material. Firm *i*'s unit cost is,

[1] 'Portability' of the production facility of the garment industry is described in, for example, Gibbon [2003].

$$D_i = \frac{w_i L_i + r_i K_i + p_i M_i}{Y_i}, \qquad (2.1)$$

where w: wage, r: rental price of capital, p: price of material, L: labour, K: capital, M: material, Y: output. Technology is defined as

$$Y = f(L, K, M, A),$$

where A is total factor productivity of the technology. We assume that firms performs heterogeneous efficiency in use of technology, and then, production of firms i is expressed as

$$Y_i = f(L_i, K_i, M_i, A_i)\, TE_i, \qquad (2.2)$$

where TE is technical efficiency, which indicates a deviation from the production function with a value between 0 and 1 and it is equal to one only when a firm draws the full potential productivity of technology. Define difference of the unit cost between firm i and j as $\Delta D_{ij}=D_j-D_i$. From (2.1), we can express the rate of difference benchmarked on D_i as

$$\frac{\Delta D_{ij}}{D_i} = \frac{\Delta w L_{ij} + \Delta r K_{ij} + \Delta p M_{ij}}{w_i L_i + r_i K_i + p_i M_i} - \frac{\Delta Y_{ij}}{Y_i}, \qquad (2.3)$$

where $\Delta wL_{ij}=w_jL_j-w_iL_i$, $\Delta rK_{ij}=r_jK_j-r_iK_i$, $\Delta pM_{ij}=p_jM_j-p_iM_i$, and $\Delta Y_{ij}=Y_j-Y_i$. Assuming a well-behaved production function, by rearranging (2.2)

$$\frac{\Delta Y_{ij}}{Y_i} = \alpha \frac{\Delta L_{ij}}{L_i} + \beta \frac{\Delta K_{ij}}{K_i} + \delta \frac{\Delta M_{ij}}{M_i} + \frac{\Delta A_{ij}}{A_i} + \frac{\Delta TE_{ij}}{TE_i},$$

where α, β, δ represents output elasticity with respect to labour, capital and material, respectively. Inserting to (2.3) and arranging it, we get the decomposition of the rate of difference of unit cost,

$$\frac{\Delta D_{ij}}{D_i} = S_L \frac{\Delta w_{ij}}{w_i} + S_K \frac{\Delta r_{ij}}{r_i} + S_M \frac{\Delta p_{ij}}{p_i} + (S_L - \alpha)\frac{\Delta L_{ij}}{L_i} + (S_K - \beta)\frac{\Delta K_{ij}}{K_i} + (S_M - \delta)\frac{\Delta M_{ij}}{M_i} - \frac{\Delta A_{ij}}{A_i} - \frac{\Delta TE_{ij}}{TE_i}, \qquad (2.4)$$

where $S_L = \frac{w_i L_i}{w_i L_i + r_i K_i + p_i M_i}$, $S_k = \frac{r_i K_i}{w_i L_i + r_i K_i + p_i M_i}$, and $S_M = \frac{p_i M_i}{w_i L_i + r_i K_i + p_i M_i}$.

The first three terms are contributions of the difference in factor prices to the difference in unit cost weighted by factor share in the total expenditure. The next three terms pick up the effects of difference in factor allocation. First order conditions for cost minimization require that expenditure share of each input equals output elasticity with respect to labour, capital, and material; that is, $S_L=\alpha$, $S_K=\beta$, and $S_M=\delta$. So (S_L-α) indicates deviation from the optimal factor allocation by firm *i*, and if firm *j* has more bias than firm *i*, this term is negative, which means a reduction in unit cost difference. These terms reflect differences in allocative inefficiency.

The seventh term is the difference in productivity of the technologies that firm *i* and *j* choose. It is different from zero only when two firms are using different production technologies that differ in productivity. The last term captures technical efficiency. It is noted that concept and measurement methodology of productivity incorporates both productivity of technology and technical efficiency, in general. Therefore, even if two firms are using the same technology, a difference in efficiency of technology use creates a difference in productivity between the two firms. Technical efficiency and allocative efficiency (the fourth to sixth terms and the eighth term in (2.4)) compose cost efficiency, which represents the deviation from the minimum cost that the given technology promises.[2]

From the above, the apparent difference in price competitiveness between two firms can be decomposed into differences in factor prices, productivity of technology, and

[2] It is noted that this decomposition assumes constant returns to scale, and therefore, if technology is either increasing or decreasing returns to scale, (dis)economies of scale is included in technical efficiency. For the decomposition appropriately incorporated return to scale, see section 1.2 of Chapter 4.

technical and allocative efficiency. In addition to production costs, trade-related costs can be important in competitiveness, since tariff and transportation costs, though they are reducing, are not negligible in most cases. Trade-related costs matter not only for exporting firms but for those supplying in the domestic market, where the penetration of imports is affected by those costs. In the following subsection, factors affecting technology, efficiency and factor prices are summarized through reviewing the theoretical argument.

1.2. Factors affecting technology, efficiency and factor prices

1.2.1. Technology

Imitation Process

Most technological upgrading in developing countries is through imitation of existing technologies rather than innovation of new ones. This is also the case in the garment industry, where labour-intensive technology is matured and standardized. Neoclassical growth theory once had a simplistic view that imitation by firms in developing countries is costless and automatic, but many empirical studies have found that imitation requires substantial costs and efforts by firms.[3] Tacit knowledge underlying technology is one important cause of imitation costs (Nelson and Winter [1982]), while adaptation efforts to fit technology into developing countries, where natural, social and economic environments differ from the original location, are another cause (Evenson and Westphal [1995]). Theoretical literature on imitation, namely endogenous growth theory, technological capacity approach, and social learning theory, commonly recognize that imitation requires knowledge creation; hence, it involves feature of R&D

[3] Mansfield et al. [1981] found that the cost of imitation was 65% of the costs of innovation in US chemical, drug, electronics and machinery industries. Teece [1977] reported that the cost of technology transfer across countries for multinational firms averaged 19% of the total project expenditure in chemical, petroleum refining and machinery industries.

rather than simply copying. As Romer [1990] suggested, knowledge creation entails externality since it can be copied with trivial (or no) costs. Social learning literature and technological capability approach indicate underinvestment in technology when there exists a tacit element in the use of technology (for example, Foster and Rosenzweig [2010], Chamley [2004], Bell and Pavitt [1993]). Then, institutions internalizing externality, such as a public technical institute or a subsidy for imitation, encourage imitation in developing countries.[4]

Knowledge creation is sometimes characterized as dynamic increasing returns to scale. Some endogenous growth models assume that knowledge is produced more efficiently when more knowledge is accumulated (Romer [1990]), or that knowledge is acquired through learning-by-doing (Young [1991]). Under such assumptions, a country with small initial knowledge does not have a comparative advantage in an industry that is relatively knowledge-intensive (Grossman and Helpman [1991], Young [1991]). Other models assume complementarities of human capital in technology imitation, where similar multi-equilibria may arise. Using a trade model, Keller [1996] showed that developing countries can sustain higher growth rates due to the benefits of imitation only when human capital grows according to the rate of technology inflow from industrial countries. Acemoglu and Zilibotti [1999] assumed that technological changes that take place in developing countries are skill-complementary (skill-biased), and they indicated a persistent productivity gap between developed and developing countries due to a mismatch of skill and technology in the latter. These models indicate that, in a country with little knowledge or human capital, knowledge-intensive technology may not be adopted.

Literature on technological capability and FDI spillover argues that foreign

[4] Romer [1992] argued the case of the Mauritian garment industry, in which governmental supports through tax reduction and relaxation of the minimum wage encouraged foreign firms to invest.

knowledge accompanied by technology supplements local knowledge, as a substitute or complement, and consequently helps imitation by local firms (i.e. Evenson and Westphal [1995], Ernst et. al [1998], Rodriguez-Clare [1996], Lall and Urata [2003]). In particular, foreign direct investment is recognized to speed up imitation even in a country with relatively little knowledge and human capital by supporting learning of local firms through business transactions, demonstrating the operation of the technology in a proximate location, and moving skilled workers trained in a multinational firm to a local firm (Saggi [2002]). It can be interpreted that such intended and unintended supports add a substantial amount of knowledge and human capital to a host country so that cost of imitation significantly falls.

On the other hand, a number of studies have indicated the complementarity of FDI inflow and local technological knowledge. In a sector using more complex technology, foreign investment is induced to a location that has sufficient local capabilities in the related industry as well as a competitive FDI regime (Rodriguez-Clare [1996], Lall and Pietrobelli [2004]). Furthermore, the positive impact of FDI on local firms is realized when the technological gap between FDI and the local firm is not too great and the local firm has the capacity to absorb new technology and knowledge (Wang and Blomström [1992], Kinoshita [2001]). That is, though the presence of FDI eases the imitation of new technology by local firms, some capacity is still required. This can be a high barrier for firms in low-income countries.

The implication of dynamic increasing returns to scale is discussed not only in knowledge creation but also in goods production. Collier and Venables [2007] discussed the comparative advantages yielded by economies of agglomeration. As agglomeration enhances productivity growth, a country that succeeds in forming larger industrial agglomerations than others experiences faster productivity growth; consequently, its comparative advantage is enhanced. They argued that, though African countries have a

comparative advantage in the labour-intensive manufacturing industry, it is dominated by the agglomeration effect in Asian countries in which industrialization started earlier. Theoretical models incorporating multi-equilibria indicate that imitation of technology may be delayed even in an industry with comparative advantages.

Investment in Technology

Imitation entails investment in physical and human capital, and the factors affecting the investment decision also concern the imitation of technology. In growth theory, the business environment is an important determinant of investment rate. If public service related to new investment, i.e. approval of the project, is corrupt or inefficient, the cost of technological investment is pushed up, in some cases, to the extent that an investor gives up the investment.[5] An unstable macroeconomic environment, high tax rate and risk of governmental confiscation decrease expected profits and discourage investment. By constraining the efficiency of new technology, poor infrastructure likewise discourages investment in imitation.[6] This channel is discussed in the next subsection.

The availability of credit is supposed to be crucial to the investment decision, and less attention is paid in the theoretical literature on technology transfer except in the technological capability approach. The theory of investment indicates that, under credit constraints, a firm's liquid assets are limited to cash in hand, which is susceptible to the volatility of sales. Then, a shortage of liquid assets tends to occur frequently, which induces firms to save in order to prepare for future liquidity constraints (precautionary savings), and thus investment is constrained. In particular, when FDI spillover facilitates

[5] The study by De Soto [1989] is a famous example of the serious problem of public service in a developing country. Mauro [1995] showed that the degree of corruption has a significant negative correlation with investment rate using cross-country data.

[6] Hall and Jones [1999] attributed the cross-country difference of human capital to the business environment, claiming that investment in human capital as well as physical capital is significantly affected by the quality of the business environment. Parente and Prescott [2000] argued that government protection of industry insiders that have vested interests in the current technology increase the cost of investment in new technology.

exporting and a large investment is required for local firms, credit constraints affect imitation. Some empirical studies have indicated significant effects of financial systems on spillover (Alfaro et al. [2004], Hermes and Lensink [2003], Javorcik and Spatareanu [2009]).

1.2.2. Efficiency

A number of studies have argued that quality of the business environment affects efficiency of production. For example, *World Development Report 2005* highlighted the business environment as an important condition of economic growth in developing countries (World Bank [2005]). A weak legal institution inflates the transactions costs of contract enforcement. The theory of transaction cost indicates that when transaction cost is sufficiently high, enforcing a transaction is more costly than not enforcing. As a result, some transactions simply do not take place or occur inefficiently, such as through the negligence of workers, low quality of purchased input and non-payment. The imperfect enforcement of transactions results in the inefficient use of resources (for example De Alessi [1983]). A poor and unreliable infrastructure, namely that of transportation, communication and energy supply, depresses the efficiency of production. The high use cost of infrastructure increases cost of production, the failure of service causes the unexpected suspension of production, and the unreliability of service causes firms to increase the stock of material and products to avoid suspension in case of failure. Collier [1998] argued that the poor quality of the business environment hurts the manufacturing sector more seriously than other sectors, since the intensity of transaction is higher in the manufacturing sector. He indicated that in a country with bad business environment, the manufacturing sector tends to lose comparative advantage.

Human capital affects efficiency of use of technology in addition to adoption of

technology. Provided that part of technology is tacit, engineering capacity is required to realize full potential of technology, while managerial capacity can be also important to find the cost-minimum allocation of labour and capital given characteristics of technology and local labour market. Skill of workers, particularly machine operator, is occasionally crucial to achieve efficiency in production. Pack [1987] provided detailed explanation of role of human capital in textile industry in developing countries including Kenya.

A standard theory of firm dynamics indicate that market competition drives firm turnover according to firm's productivity (for example, Hopenhayn [1992]), and hence, it motivates firms to enhance efficiency and technology adoption. Empirical studies on developing countries indicate that trade liberalization accelerated productivity growth within firms and through firm turnover (Robert and Tybout [1996], Pavcnik [2002]). In line with orientation toward trade liberalization since the Structural Adjustment Programme, market competition found to be an important determinant of productivity growth.

1.2.3. Factor Prices

The Stolper-Samuelson Theorem demonstrates the equalization of factor prices, including immobile factors, across countries through free trade. However, this equalization is not realized in practice, partly because complete free trade has not yet been undertaken. Besides, since non-negligible transportation costs and extra marketing costs for exporters differentiate production costs between firms supplying to the export market and to the local market, the realization of factor price equalization is unlikely even when output prices are equalized. [7] Hence, in reality, factor prices differ by

[7] Firm dynamics literature such as Hopenhayn [1992] and Meritz [2003] maintains those assumptions. This implies heterogeneity in technology or productivity between exporters and non-exporters.

country, and they at least partly reflect the factor endowment pattern in each country. In general, since African countries are much less populous than Asian countries, though population growth is increasing recently, factor endowment pattern and the resulted factor prices may differ. As physical and human capital endowments change through the accumulation process, some studies have attributed the difference in factor endowment to policy affecting capital accumulation rather than to natural endowment (Bell and Pavitt [1993]).

In addition to the endowment pattern, imperfection in factor markets may result in price differentials. Market fragmentation and regulations on price and the supply of factors cause bias in market prices, while transaction costs push up prices (Bardhan and Udry [1999]). For example, weak contract enforcement and imperfect information inflate factor costs through asymmetric information between a debtor and creditor and through monitoring problems between an employer and employee.

2. Empirical Evidence in Africa

In the previous section, various factors affecting competitiveness are presented based on the theoretical literature. In this section, we review empirical evidence in African countries.

2.1. Productivity and Its Determinants

2.1.1. Productivity

Studies using firm-level panel data revealed that productivity grew very slowly or even did not grow in many manufacturing sectors in Africa, and this trend is evident in

the long term.[8] Though several studies showed that less productive firms tend to exit, firm turnover did not result in the growth of industry-level productivity (Frazer [2005], Söderbom et al. [2006], Shiferaw [2007]).[9] While chronological change is clear, the relative performance of African firms in the developing countries is somewhat ambiguous. Most studies measuring total factor productivities (TFP) use African firm data (see footnote 8), while studies based on international firm data measure partial factor productivity, such as labour productivity and capital productivity. For example, Blattman et al. [2004] reported that labour productivity of six manufacturing sectors in Tanzania and Uganda is lower than that of India and China, while the Kenya's average is comparable with them. Using the Enterprise Survey Data collected by World Bank, Eifert et al. [2005] compared TFP of six industries in 15 countries in Africa, Asia and Latin America. The study showed that African countries tend to exhibit lower TFP, although some African countries including Senegal, Tanzania and Kenya are comparable with non-African countries. However, those results are crude estimates at best, as the datasets that they used differ in survey year and composition of subsector by a country.

Any relevant analyses of the determinants of productivity indicate the robust impact of export experience (and export share), the skills of workers and, to a lesser extent, experience of technology transfer and foreign ownership on productivity (Table 2-1).[10] The positive effects of exportation, technology transfer and foreign ownership imply the importance of access to foreign technology for productivity improvement. The positive effect of skills is consistent with the theory of imitation, though some studies suggest

[8] Shiferaw [2007] (Ethiopia), Teal [1999] (Ghana), Gerdin [1997] (Kenya, cited in Bigsten [2002]), Adenikinju et al. [2002] (Cameroon, Cote d'Ivoire, Nigeria and Senegal), Söderling [2000] (Cameroon), Mlambo [2002: pp222,227] (Zimbabwe).

[9] Shiferaw [2007] shows that this is due to substantial productivity fall of the firms continuing operation.

[10] A number of studies on productivity determinants in African firms were published in the early 2000s, presumably because African firm-level dataset became available in the late 1990s. After the late 2000s, studies tend to focus on specific factors, e.g. learning-by-exporting, and firm turnover, on productivity. We referred to the studies in the early 2000s in the Table 2-1.

that a manager's skill level does not have a significant effect. Access to credit also has significant correlations with productivity measures, although the number of studies is limited. Manager's ethnicity occasionally has significant impact on productivity, which may indicate role of firm networks in production as ethnic minority such as Asian and European tends to form well-connected networks. These findings are generally consistent with the theoretical implications drawn in the previous section, but they do not necessarily reveal whether those determinants account for the productivity gap between Africa and other regions.

Table 2-1 Determinants of Productivity

	Mlambo [2002] Zimbabwe	Lundvall et al. [2002] Kenya	Mazumdar and Mazaheri [2003: Ch10] Ghana, Kenya, Tanzania, Zambia, Zimbabwe	Adenikinju et al. [2002] Cameroon, Cote d'Ivoire, Nigeria, Senegal	Bigsten et al. [2000b] Zimbabwe, Kenya, Ghana, Cameroon	Sodering [2000] Cameroon	Bigsten et al. [2000a] Zimbabwe, Kenya, Ghana
Dependent Variable	Technical Efficiency	Output	Technical Efficiency	Value Added / TFP growth	Technical Efficiency	Value Added	Value Added
Firm Size	-		+*				
Firm Age	+*	-	+				
Export		+*	+*	+*	+*	+*	
Technology transfer			+*				
Foreign capital	+	-	+*				
Manager's skill	+* (education)		+ (age and experience)				
Workers' skill		+ (share of skilled)	+* (training)	+* (share of skilled)		+* (share of skilled)	+* (education and tenure)
Finance		+*					
Manager's race (African=1)	-*	-*					
Competition	+*						
Location (Capital=1)	+*						
Infrastructure				+*			

Note: Sign means sign of estimated coefficient of each variable. * indicates the coefficient is significant at 10% level or less.

2.1.2. Business Environment

The business environment is one of the factors on which empirical studies have

focused as a source of stagnating economic performance in Africa. The business environments of most African countries have been evaluated as very inefficient by the standards of the world and even of developing regions. Several organizations evaluating business environment and governance rank most African countries at the bottom of the list (i.e. World Bank Institute [2011]). They evaluate that the macroeconomic environment is unstable with high volatility of interest rates and inflation rates, public service is corrupt and inefficient, enforcement legislation is weak, and the infrastructure is poor and unreliable. Empirical studies measuring the effect of the business environment on investment based on international comparisons are limited to the macroeconomic analysis. Cross-country studies have indicated that an unstable macroeconomic environment and corruption have restricted private investment in general (Servén and Solimano [1992], Aizenman and Marison [1995] and Mauro [1995]) and that they partly account for the relatively low investment rate in Africa (Servén [1997]). The adverse effect on GDP per capita has also been demonstrated (for example, Acemogulu et al. [2001], Calderón and Servén [2010]).

In the manufacturing studies, the relationship between the business environment and export performance is most analysed. Using firm data in 18 countries including non-African countries, Elbadawi et al. [2006] reported that country-level quality of institution, represented by a rule of law index and an index for control of corruption, significantly increases the export value of a firm; furthermore, in conjunction with economic geography variables that are distance to buyers and suppliers, institutional quality explains the lower export value of African firms when compared to those in other region. Iwanow and Kirkpatrick [2008] showed that trade facilitation costs, including country-level institutional quality index as behind-the-border costs, fully explain the relatively low manufacturing exports in Africa based on trade data. For the garment industry, descriptive evidence has been reported by World Bank [2010b]. Based

on the comparison of 10 countries in Asia and Africa, the study argued that there is a positive relationship between logistical performance and labour costs across countries, which allows a country with increasing wages, such as China, to be competitive because of its low logistics costs. Though logistical performance in Africa is not lower than in Asian countries, some African countries including Kenya are out of the trend line; they exhibit lower logistical performance for the given wages.

While those econometric results are strong evidence of the importance of the business environment for manufactured exports, it should be noted, however, that the identification of a causal relationship between institutional quality and exports is not easy. Several econometric studies have shown the index of corruption and governance to be dependent on income level (Mauro [1995], Acemogulu et al. [2001]). Given that manufacturing performance is closely related to income level, the significant correlation between the state of the business environment and manufacturing performance indicates a two-way causality.[11] While it is likely that business environment has adversely affected manufacturing performance, it is not yet discovered whether it is a dominant source in Africa.

2.1.3. Knowledge and Human Capital

Several studies have investigated the knowledge and human capital accumulation in African firms utilizing firm interviews and floor-level observations (Pack [1987, 1993], Biggs et al. [1995], Lall [1999], Lall and Pietrobelli [2002]). Those studies commonly indicated that, while there is a large diversity in endowment of knowledge and human capital among African firms, most of them use obsolete technology with old equipment

[11] Elbadawi et al. [2006] noted this problem, but they justify their methodology by claiming that such reverse causality is not significant at the firm level since firms takes their institutional settings as a given. However, it is unlikely that a firm's export performance is independent of aggregated exports, and hence, institutional quality may still be endogenous at firm level.

and inefficient methods. Several studies reported that African firms tend to start with used equipment, and many, particularly micro and small firms, continue to use the same equipment without replacement, which results in quite high average ages of equipment (Biggs et al. [1995], Lall [1999]). They also reported that production processes were poorly managed and that quality control is commonly undertaken but is weak by Asian standards. Additionally, the maintenance of equipment is ex post rather than precautionary, and feasibility studies of new investments are rare. They argued that those are basic practices known widely in the industry, but most managers are not aware of the problems (Pack [1987], Lall [1999]).

Though the lack of competition due to the protective trade regime was partly attributed to such inefficient practices (Pack [1987] and Pack and Paxson [1999]), the improvement of productivity or the development of new products has not been undertaken even in the competitive situation after the import liberalization; thus, the studies argued that a lack of skilled labour and little inflow and spillover of technology have constrained technological change (Biggs et al. [1995], Lall [1999]). The studies reported that the educational attainment in the secondary or higher level in Africa, which is recognized as necessary for manufacturing workers, is lower than in other developing regions, and the provision of training for workers and the employment of technical personnel are insufficient in African firms. The background of this poor training is still unclear, but the studies inferred that it is because of the small size of African firms, credit constraints for workers and firms, ineffective incentives provided by the government and the low average education that exacerbates the rate of return of training (Biggs et al. [1995]).

Bigsten et al. [2000a] has measured the rate of return on the human capital of manufacturing firms in five African countries including Kenya. They reported that the rate of return of education in terms of earning is 10% on average, and the one in terms

of production is 2-4%. These figures imply that the firms are less willing to invest in human capital than the workers. It is still left unresolved why the positive rates of return have not induced investment in human capital.

The studies pointed out that the inflow of technology has been stagnated because few foreign direct investments were directed to the manufacturing sector even after the trade liberalization and after other modes of transfer, i.e. purchase of capital goods and technical licensing, have also been limited. Although the reasons for the lack of foreign investment are not clear yet, the literature suggests that inefficiency of administrative procedures and FDI promotion, poor infrastructure, little local capacity in the related industry, and imperfect information about the local market and partners have made Africa an unattractive location (Lall and Pietrobelli [2002], Rhee et al. [1995]).

It is found that interactions among firms and between firms and technical institutions are limited. The small number of firms in Africa, partly due to the oligopolistic market, reduces the vertical and horizontal linkages, and the large gap between small and large firms makes subcontracting difficult (Biggs et al. [1995], Wignaraja and Ikiara [1999]). Most of the firms have not used public technical institutions for technical assistance and training except the standardization and testing institutions, and the business associations do not work to collect and disseminate technical and marketing information (Lall [1999], Biggs et al. [1995]).

The firm studies reported that the dense and exclusive firm networks formed by minority ethnicities work to enhance the flow of technical knowledge (Biggs et al. [1995]). Measuring the technical capacity of the firms using qualitative information, Wignaraja and Ikiara [1999] showed that the technical capacity of a firm owned by a non-African is significantly higher than that of a firm owned by an African after controlling other variables. As in Table 2-1, some studies also found a significant positive correlation between the ethnicity of the manager and productivity. As most of

the firms owned by Africans are excluded from the firm networks and do not form networks as strong as those by non-Africans, they absolutely lack external sources of knowledge (Biggs et al. [1995]).

Recently, experimental studies on management practice show that small firms, particularly those belong to inform sector, are absolutely lacking basic management practices such as record keeping, organization of workplace and maintenance of machines, and training program substantially raised adoption of those practices (Mano et al. [2011], Shibanuma [2012]). Particularly, Shibanuma [2012] reported spillover of knowledge from participants in training program to non-participants, which led to adoption of practices among non-participants. However, impact on production is not as clear as practice adoption.

2.2. Comparative Advantage and Factor Prices

2.2.1. Comparative Advantage

There has been controversy around comparative advantage in African countries. Adrian Wood argued the potential of industrial growth in Africa from the perspective of comparative advantage based on factor endowment. Wood and Mayer [2001] argued that, because Africa is poorly endowed with skill labour, the manufacturing sector, which requires skilled labour more intensively than the primary sector, has a comparative disadvantage. Presenting a correlation between the pattern of the endowment and the manufacturing exports, they concluded that stagnation of the manufacturing exports in Africa is mainly due to the factor endowment and, therefore, further development has few prospects. Wood [2003] suggested that land-intensive industries such as agriculture and agricultural processing have prospective for growth.

However, this argument has been criticized by several studies. Collier [2003] argued

that if Africa had comparative advantage in land-intensive industries, labour productivity would have been higher due to its scarcity in comparison to labour-abundant countries. The lower GDP per capita in Africa compared to the populous Asian countries is not consistent with the implications of Wood's argument. Instead, he argued that African countries have comparative advantage in labour-intensive industries just as other developing regions do, yet it has not been realized due to problems in the business environment.[12] This controversy suggests practical difficulties in grasping comparative advantage from economic outcomes as there are various biases disturbing the relationship between them. A clear conclusion has not been drawn yet.

2.2.2. Cost of Labour

Evaluations of the wage level in Africa relative to other developing regions drew various results. Studies using a simple comparison of nominal average wages of unskilled workers indicated that wages in low-income African countries are lower than China (export-processing zones) and comparable with India, Indonesia and Vietnam, while they are higher than Bangladesh (World Bank [2010b], Biggs et al. [1996]). The exception is the CFA franc countries, which are clearly higher than all Asian comparators except China. In terms of unit labour costs, the average figures in Senegal and Kenya are higher than China, Thailand and Malaysia (Mbaye and Golub [2003], Blattman et al. [2004]). Those results indicate that African wages are not absolutely lower than those in other developing regions. Given that the GDP per capita of most of African countries is similar to Bangladesh rather than to Indonesia and Vietnam, there seems to be a trend that African wages are higher than those in a country with similar

[12] However, the same reasoning can be applied to Wood's argument; since comparative advantage in a land-intensive industry has not been realized yet, GDP per capita remains low.

GDP per capita. As GDP per capita is a crude measure of average labour productivity, this means that the gap between wage and labour productivity is particularly high in Africa.

Such gap indicates that the relatively high wage is not caused by factor endowment, since scarce labour leads to a high wage through high production per worker. Studies on wage determination exhibit the importance of non-productivity factors, which are more distinct in African countries. For instance, Bigsten and Durevall [2004] shows that relative price of labour to capital and that to land were increased sharply after 1994 in Kenya, and they were significantly diverted from factor endowment[13]. Velenchik [1997] reported that the association of wage with firm size in Zimbabwe is far larger than that in India and Peru, which implies that something represented by firm size (other than productivity) strongly affects wage determination.

Studies also revealed that institutional characteristics in the labour market, namely powerful labour unions, strict labour legislation and high wages in government, raise wages (Rama [2000], Mabaye and Goulb [2003], Velenchik [1997], Teal [1996]). Particularly in CFA franc countries, it is reported that governmental intervention in the market through detailed minimum wage setting, recruitment through governmental agencies and strict conditions for retrenchment had been severe. However, even controlling these institutions, wage has a robust correlation with non-productivity factors, such as firm size and profit (Velenchik [1997], Teal [1996]). Currently, such association is interpreted as efficiency wage and/or rent sharing. For instance, large firms need substantial monitoring for workers and screening for job applicants in Africa, where information is highly imperfect. Then, they may be able to avoid such information costs by paying high wages, which is expected to enhance work incentive

[13] They also found that sharp rise of relative price of labour is not related with the trade liberalization. Their analysis covered from 1964 to 2000.

or increase the application of skilled workers. Some claim that large firms protected by the government share rent with labour (Muzmudar and Mazaheri [2002], Teal [1996]).

2.2.3. Cost of Capital

The literature demonstrated that the credit market is underdeveloped in many African countries, and particularly micro, small and medium firms suffer from severe credit constraint (for example, Aryeetey and Nissanke [1998]). Although the technology is generally obsolete and equipment is quite old in many African firms, investment on physical capital has remained very low. The RPED firm data demonstrated that about half of the sample firms in the seven countries have not invested for last three years, and the median investment rate is nil in several countries (Bigsten et al. [1999]). Given the high rate of return on capital reported by Bigsten et al. [2000a], the extremely low investment rate should be attributed to factors other than productivity of capital.

The effect of credit constraint on investment has been tested by several firm-level studies. Using the data of Cameroon, Ghana, Kenya and Zimbabwe, Bigsten et al. [1999] found a significant correlation between investment rate and profit rate, which is normally interpreted as evidence of credit constraint because the correlation implies the use of cash-flow for investment, but the effects are weak. Fafchamps and Oostendorp [2002] found the same result in Zimbabwe. Under credit constraint, the theory indicates that a firm facing high risk has a high probability of liquidity constraint in the future, and thus it increases savings to avoid shortage of liquidity (precautionary savings) and accordingly reduces investment. While Pattillo [2000] found the effect of precautionary savings in Ghana, Fafchamps and Oostendorp [2002] did not find a relationship between risk and liquidity constraint in Zimbabwe. Since the effect of credit constraint is too weak to explain the gap between the investment rate and the rate of return,

Fafchamps and Oostendorp [2002] and Bigsten et al. [1999] concluded that credit constraint plays only a minor role in investment behaviour.

Studies on ethnic firm networks supported the idea that transaction cost is mitigated in the network so that adverse effects of the business environment and credit constraint differ between African and non-African firms (Fafchamps [2004]). While ethnicity does not affect the availability of bank loans, firms owned by Africans use less supplier's credit and they have more frequently experienced liquidity constraint and delay of investment (Fafchamps [2000], Pattillo [2000], Fafchamps and Oostendorp [2002]). Consequently, TFP is lower and growth is slower in African firms than in non-African firms (Ramachandran and Shah [1999], Barr [2000], Biggs et al. [1995]).

2.3. Geography and Trade Costs

Studies investigating the relationship between geographical conditions and economic growth have suggested that being landlocked and remoteness from major markets affect the volume of trade (Sachs and Warner [1995], Redding and Venables [2004]). While similar cross-country analysis was carried out to explain the effect of geography on manufacturing exports from Africa (for example Elbadawi [1999]), Elbadawi et al. [2006] tackled this topic using firm data in 18 countries. Applying the gravity model, they constructed an index of foreign market access and supplier access which reflects the distance from the firm's location at city-level to foreign markets. Using physical geographical conditions as instruments, they showed that the access index significantly affects firm-level export values; moreover, controlling access index eliminates difference in exports between African and other firms. From this, they concluded that economic geography and the quality of institutions, which are included together, fully explain the smaller export value at firm-level.

Some studies analysed impact of elimination of tariff through AGOA on exports from

Africa to US. Frazer and van Biesebroeck [2010] compared growth of export value after implementation of AGOA between AGOA eligible products and non-eligible products, and also between eligible countries and non-eligible countries by the triple difference approach. They reported large impact on apparel products and lesser but significant impact on agricultural manufactured products. While this result indicates importance of tariff on exports, it also demonstrates that African products are competitive only when it has advantage in market access over other countries which are under tariff.

2.4. Summary and Issues to Be Explored

The availability of firm-level data has been drastically increased since the late 1990s, and accordingly, microeconomic studies on the manufacturing sector have made substantial progress. They have uncovered many important aspects of African firms that were not previously known. They have shown that African firms are technologically behind and endowed with little human capital and technological knowledge, while the inflow of technology and knowledge through FDI and firm network is limited. In accordance with the theoretical implications, these facts can be interpreted to mean that little knowledge endowment and inflow precludes the imitation of new technology. Empirical studies based on international comparison have suggested that poor quality of the business environment adversely affects production efficiency, and disadvantages in geography including being landlocked and being remote to the main markets makes exports less profitable. On the other hand, there is no clear indication for factor prices.

While these findings are possible accounts, they fail to provide a straight answer to the question of why the African manufacturing sector has not been successful for mainly two reasons. Firstly, since most microeconomic studies, particularly early studies, used only African firm data, they cannot identify differences between African and non-African firms. Determinants of firm performance that are found among the African

sample do not necessarily account for the gap in performance with non-African firms. For example, a shortage of human capital may not explain the smaller size of manufacturing exports in Africa when compared to other countries also endowed with little human capital. This potential problem is not negligible as the manufacturing sector is growing in many low-income countries with scarce human capital and poor quality of business environment. Recent developments of empirical studies based on international firm data, though the number is still small, are providing more convincing evidence. This approach is particularly significant in the analysis of business environment and geography, whereas other factors such as human capital, factor prices and factor endowment have not yet been substantially explored from a comparative perspective.

Another problem, however, is that in the comparative studies on manufacturing sector between African and other countries do not carefully control the income levels of countries. This is important for identification of causal relationships. Some determinants of firm performance, such as business environment and human capital, are partly dependent on income level as the growth literature discusses, whereas manufacturing production is also correlated with the national income level particularly in a cross-country comparison. Therefore, manufacturing performance is likely to have a two-way causation with business environment or human capital through income level, and endogeneity bias is a possible problem in econometric analysis. In addition, the effect of determinants may change according to income level. For example, several qualitative firm studies directly compare R&D and human capital accumulation between Africa and middle-income countries in Asia.[14] The size of human capital accumulation is partly dependent of technological level if there are complementarities between human capital and technology. It is natural to assume that a country with a large weight in hi-tech industries has higher returns on investment in human capital, and thus, firms

[14] See section 2.2.3.

provide training more intensively or spend more on R&D than those in a country with weight in low-tech industries.[15] Therefore, their comparison does not tell whether the slower human capital accumulation in African firms causes stagnation of growth. They should be compared with those in other low-income countries, which have similar technological levels.

3. Approaches in this Thesis

3.1. Framework

To fill the gap in the literature, the international comparison of firm performance and imitation process is made between Africa and other developing regions in this thesis. In our compararive study, we weakly control income and technical levels by choosing countries that have similar income levels and focusing on a single industry. Kenya and Bangladesh show similar income levels; as of 2002, GNI per capita in Kenya was 390 US dollars and that in Bangladesh was 350 US dollars (World Bank [2011]). Accordingly, as we will see in Chapter 4, the business environments of the two countries are similarly poor, and the human capital in Bangladesh is not richer than that in Kenya. In a comparison of Kenyan firms with Bangladeshi firms, the effect of the business environment on industrial performance will be identified with little reverse causation.

The garment industry is an appropriate case to demonstrate the difference of industrialization process in low-income countries, as it is one of the first manufacturing sectors that begins growing in an agrarian economy. Given little progress of industrialization in Africa, obstacles in its early stage are more relevant for African

[15] In fact, technological capability approach supports that accumulation differs among sectors according to the complexity of technology (Bell and Pavitt [1993]).

countries than those in the later stages. The focus on the garment industry provides with strength in that it is the sole case of large-scale FDI in the manufacturing sector in low-income African countries. Since 2000, Kenya has received a substantial volume of foreign direct investment in the garment sector, which are far larger than total of local garment industry. Although this growth trend was disrupted in 2005 due to the termination of MFA, until 2004 the Kenyan garment industry was in a similar situation as that of other garment-exporting LDCs in the early stage of growth. As the evidence indicates, the contribution of foreign investment is crucial in the sector, and there are few cases in LDCs that have made development without foreign investment. There had been quite small foreign investments until recently in Africa, and hence, it cannot be known whether the stagnation of the manufacturing sector is due to the low initial endowment in absence of FDI or to firm behaviour with respect to imitation. By examining a sector with sufficient inflow of FDI, we can eliminate the lack of foreign investment as a source of the stagnation.

An alternative research framework may be to compare various manufacturing industries across several countries with heterogeneous income levels as applied in some empirical literature. Such a framework has the advantage that established results are more robust in the sense that they are drawn from a larger number of countries and industries than our two-country and single-industry comparison, as long as possible endogeneity problem is properly dealt with. We would rather consider heterogeneity of industry in this thesis. While capital-intensive and knowledge-intensive industries differ with labour-intensive industry in need of human capital, firm's capacity and status of business environment, critical problem of the industrialization in Africa is slump of labour-intensive industry. Therefore, multi-industry comparison is likely to obscure

identification of the obstacles in development of labour-intensive industry in Africa.[16] Given limitation of the data such as small number of subsample in individual industry, we think that controlling industry-level heterogeneity is not feasible in the existing dataset.[17]

It is possible to make single-industry and multi-country comparison using international firm data. World Bank [2010b] and Lopez-Acevedo and Robertson [2011] analysed the garment industry using the Enterprise Survey and national industrial surveys of 12 countries in the former and 9 countries in the latter. They clearly have strength in broader comparative perspectives, which can show competitive positioning of an individual country relative to other exporters. Possible problem in this methodology is heterogeneity of product quality among garment exporting countries. Though it is much smaller than between-industry heterogeneity, still there exists substantial difference between middle-income exporting countries such as Mexico and low-income ones. Limited number of samples in the existing datasets makes control of heterogeneity difficult.[18] Furthermore, those international datasets do not necessarily contain information that we need, for example, efforts to adopt new technology or interaction with foreign affiliates, foreign buyers and suppliers.

Assuming gradual process of industrialization, focus on the garment industry does not lose effectiveness of our investigation for obstacles in early stage of the industrialization process in Africa. However, we realize that our framework does not capture the process of inter-industry upgrading. Evidence indicates that success of the garment industry does not necessarily lead to the development of other industries.

[16] Provided that human capital and business environment is generally more important in capital- and knowledge-intensive industry, bias is likely to be overestimation of the adverse effect of lack of human capital and supportive business environment on labour-intensive industry.
[17] General solution is including sector dummies and their interactions with covariates. However, due to small number of subsample in individual sector, interactions are often dropped.
[18] In addition, sample size is small in particularly African countries; in World Bank [2010b], Lesotho, Mauritius and Swaziland contain from 15 to 29 firms, respectively.

Therefore, the implications drawn from this analysis do not fully account for the upgrading process. On the other hand, we admit that two-country comparison possibly confines applicability of our results to other countries, but in exchange of it, we can utilize rich information collected by original surveys and fieldworks that are designed for our purpose.

The analysis comprises two parts. As we will see in detail in the next chapter, the stagnation of the garment industry in Kenya is due to a lack of sustaining growth in both domestic and export markets. After the trade liberalization in the middle of 1990s, imports from Asia have drastically increased; consequently, local garment firms have lost significant shares in the domestic market. In the export market, FDI flowed into the country and the supply had grown rapidly after 2000 with preferential access to the US market, but that growth trend disappeared after the termination of MFA in 2005. This event partially dampened the advantage of Kenyan firms in contrast to the continued growth of Asian exporters including Bangladesh. This evidence implies that the Kenyan garment industry is less competitive than the industries in Asia. The first part of the analysis investigates the competitiveness of Kenyan firms in comparison with Bangladeshi firms. Based on the estimation of cost frontier function and productivity, competitiveness represented by unit cost is compared, and cost difference is decomposed to possible factors: productivity, factor prices, economies of scale and efficiency of factor allocation (allocation efficiency). Assuming that Bangladeshi firms represent a competitive producer in the world market, this analysis provides consistent assessment of the relative competitiveness and productivity of African firms. Furthermore, utilizing repeated cross-sectional firm data, the evolution of industry-level competitiveness and productivity (weighted average of unit cost and productivity) is analyzed to uncover the dynamics of the industry. In a competitive market with

heterogeneous firms, it is expected that firm turnover leads to the improvement of competitiveness of the industry as a whole through the growth of good performers and the exit of poor performers. Through measurement of the productivity change of firms that survived, exited and entered during the period, this exercise demonstrates whether the trade liberalization has brought about dynamic firm turnover and improvement of performances.

Given that the growth of local garment firms has been realized through exporting in many developing countries, the limited export participation by local firms has clearly constrained the growth of the Kenyan industry. The second part of the analysis involves the export participation of local firms after the emergence of FDI. Following the theory related to technology transfer and export participation, the knowledge flow from foreign to local firms, local firms' absorptive capacity, and incentives of exporting are investigated. Based on interviews with managers of foreign and local exporting firms, knowledge flow and firms' learning processes are described, and local firms' absorptive capacity is evaluated. In the analysis of incentive structure, a model of export participation is proposed by modifying a standardized model (e.g. Roberts and Tybout [1997]) so as to incorporate credit constraint and sunk cost for domestic market (instead of export market) considering the situation of the Kenyan industry. The validity of the model is tested using firm data in Kenya and Bangladesh. While the limited export participation may be explained by assuming that local firms predicted the fall of exports from Kenya after the MFA termination, our interview confirmed that most local firms (even local exporters) did not notice it, and hence, their behaviour was not affected.

3.2. Source of Information

Two types of original information were collected by the author and collaborators. Firm data of the Kenyan and Bangladeshi garment industries were collected in 2003 and

2009 by the Institute of Developing Economies, University of Nairobi, Institute of Policy Analysis and Research, University of Dhaka, and Bangladesh Institute of Development Studies. Furthermore, a 2003 survey was conducted under the Combating Marginalization and Poverty through Industrial Development (COMPID) project of the United Nations Industrial Development Organization. The survey included 76 firms (2003) and 83 firms (2009) in Kenya and 222 firms (2003) and 232 firms (2009) in Bangladesh. It is noted that the survey covered firms with more than 10 employees, which are mostly in the formal sector. The focus on the formal sector permeates throughout this thesis given findings in the literature that informal micro firms are less likely to grow and become part of the formal sector (van Biesebroek [2005b], McCormick et al. [1997], Bigsten and Kimuyu [2002]). Without growth, micro firms are unlikely to compete in domestic and export markets, so they are not included in our scope to avoid complication of the analysis.

The number of firms in the sample 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.[19] The Kenyan sample from 2003 consists of 5 local exporters, 17 foreign exporters and 54 local firms supplying to domestic (Table 2-2).[20] On the contrary, all Bangladeshi firms in the sample are exporters, and only two of them are foreign-owned; the rest are domestically

[19] See Appendix 2.1 for details of the sampling method and data construction, and Appendix 2.2 for the questionnaire of the 2003 survey. While the surveys collected detailed input and output information with firm's characteristics, they contain relatively little information of credit use; they only have ratio of debt to equity and source of debt at the time of survey. This makes us difficult to infer about credit accessibility of sample firms in the survey. Interview data, described in the next paragraph, has relatively rich information on credit access for last five years. Therefore, the analyses based on the survey data (mainly in Chapter 4 and 5) less attentive to credit access than the analysis using the interview data (in Chapter 6).

[20] We define a firm exporting more than 50% of its products as an exporter. They all exported to US or EU market, while the firms exporting less than 50% supply to African market mainly.

owned.

Additionally, in-depth firm interviews were conducted for Kenyan local firms by the author in September to October 2005 and in November to December 2006 in order to collect qualitative and quantitative information about the imitation process of local exporters as well as the absorptive capacity, credit access and incentives of local non-exporters to start exporting. Interview sample includes 10 local exporters and 18 local non-exporting firms (Table 2-2). We have identified 19 local exporters based on the firm survey in 2003 and introduction by firm managers that we interviewed. Fortunately, since firm owners were closely linked to each other, we think that we have covered most of the local exporters that existed between 2001 and 2006.[21] All known local exporters were contacted, and 10 firms including closed firms accepted our interview (Table 2-A1). On the other hand, the sample of local non-exporters was chosen randomly based on the firm list that was used in the 2003 survey. Interviews were conducted with top managers or owners as long as they were available, and in their absence, administrative staffs that understood management (for example, general manager) were interviewed. A list of interviewed firms is in Appendix 2.3.

For supplementary information, 5 EPZ foreign firms, small garment retail shops in a market, 3 supermarkets, the Export Processing Zones Authority, the Ministry of Trade and Industry and the Kenyan Association of Manufacturers, industrial association, were interviewed.

[21] Some local exporters had already closed down when the author conducted the interview.

Table 2-2 Sample Size of Interview and Survey

	Kenya				Bangladesh	
	Survey		Interview (2005-6)	Population	Survey	
	2003	2009			2003	2009
Total	76	83	33		222	232
Local non-Exporting Firms	54	73	18	120-150* (2003)	-	-
Local Exporting Firms	5	1	10	19** (2001-06)	220	232
EPZ firms	17	9	5	35 (2003) 19 (2009)	2	0

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

Appendix to Chapter 2

Appendix 2.1. Sampling Method of Firm Survey

1. Surveys in 2003

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 was no comprehensive firm list. Integrating several incomplete lists, including those 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 each in Nairobi, Mombasa, Nakuru, Thika and Eldoret was compiled. Because this list included 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 from 71 firms out of the 104 firms in operation. Since neither the characteristics of the population nor those of the remaining 33 firms are known, it is difficult to determine whether or not our samples have bias, except that there were fewer responses from EPZ firms than other firms. However, mean values of gross output and employment are similar to those obtained from the World Bank Investment Climate Survey in 2003, which include 18 local garment firms and two EPZ firms.[22]

In the Bangladesh survey, samples were selected from the member list of the Bangladesh Garment Manufacturers and Exporters Association (BGMA) using a

[22] The average of gross output (total sales from manufacturing goods in 2002) of 18 local firms in the garment sector is US$586,550, and the average of employment is 65.4. The average labour cost per worker is 1204.1US$ for local firms (transformation to US dollar is by the author). These values are very close to our statistics in Table 1. The author thanks World Bank for access to the data.

stratified sampling method. Another industrial association, the Bangladesh Knitwear Manufacturers and Exporters Association (BKMEA), which mainly consists of knitwear producers, was not included in order to retain accordance with the Kenyan sample that was mainly composed of woven wear producers. Of the 2,891 member firms, data was collected from 222 firms. For details of the sampling procedure, see Fukunishi et al. [2006].

2. Surveys in 2009

The surveys in 2009 traced the sample covered in 2003 and also added new sample. Addition is to compensate a large number of attrition primarily due to plant closure and to capture entrants which started after the first survey. In Kenya, the followed sample was captured by the firm list that we used in 2003, and additional sample was randomly selected from several incompletes firm lists created by the Kenyan National Bureau of Statistics, the Export Processing Zones Authority, and the Kenyan Association of Manufacturers. In Bangladesh, the followed sample was identified based on our 2003 firm list, and stratified sampling from based on firm size from the Bangladesh Garment Industry Association (BKMEA) member list is used to select additional sample. BKMEA is one of the two garment exporter's associations, where the other is Bangladesh Knitwear Manufacturers Association.

In the Kenyan sample of 83 firms, the number of the followed firms is 34 and that of added firms is 49 (Table 5-1). The Bangladeshi sample contains 114 followed firms and 116 added firms, and in total 230 firms are included. The added sample consists of entrants (entering firms) between 2003 and 2009 as well as firms having continued operation (continuing firms) since 2003 but not covered in the first survey.

The relatively small number of the followed sample is primarily due to attrition by exit. Among the sample in 2003, 39.5% (30 firms) of Kenyan firms and 39.0% (88

firms) of Bangladesh firms stopped operation or changed business line out of garment production by 2009. Closure was confirmed by visit. Non-response to the survey also reduced number of followed firms. In Kenya, 12 firms did not answer to the survey questions and 2 firms did not in Bangladesh. In addition, 18 firms in the Bangladeshi sample were not even confirmed operation status. Attrition of these firms and addition of new sample made dataset highly unbalanced.

Appendix 2.2. Questionnaire of the 2003 Survey

Institute of Developing Economies
Japan External Trade Organization

And

Institute for Development Studies, University of Nairobi

The purpose of this survey is to better understand the current situation of garment producing firms and to promote garment production in Kenya. Information of your company will be treated as strictly confidential and the information you provide will be used for research only. Neither you nor your company's name will be used in any document prepared based on this survey. This questionnaire is supposed to be filled by a single factory. If your company has multiple factories, please fill in separate answer sheets for other factories.

Schedule No. /__/__/__/ CO1

Basic Information

Name of the Company _____
Legal Status of the Company _____ CO2
Codes: 1 = Sole Proprietorship; 2 = Partnership; 3 = Private Limited Company; 4 = Public Limited Company
5 = Other (Specify_____)

Address (Physical and mailing)
Office: _____Town_____ CO3
Factory: _____Town_____

Telephone	**Fax**
Office: _____	Office: _____
Factory: _____	Factory: _____

E-Mail _____

Contact Person: Name _____ Designation _____
(It is ideal that the contact person fills this questionnaire.)

Name of the Field Investigator _____Date /__/__/__/__/__/__/ CO4

2. History of the Company

Year of establishment of the company in Kenya _____ A2.1
Year in which operation started _____ (month; if it started in 2002-3) A2.2 ( ) <1 yr
Number of workers when operation started _____ A2.3
Month that fiscal year starts _____ A2.4

3. Company Characteristics

How do you describe your company? A3.1a
(1) Independent (2) Holding Company (3) Subsidiary of domestic firm
(4) Subsidiary of foreign firm
Name of the Group (if applicable) _____ A3.1b

Subcontractor (CMT) (1) Yes (2) No A3.2

Do you belong to: (1) Export Processing Zones (2) Manufacturing under Bond
(3) Neither A3.3

4. Sources of Finance

What were the percentages of equity and debt of your company by July 2003? (Adds to 100%)
Equity _____% A4.1a Debt _____% A4.1b
What is the breakdown of equity in terms of:
family ____ % A4.2a other domestic _____% A4.2b
foreign ____% A4.2c [country _____ A4.2d]

What were the sources of debt of your company by July 2003? (adds to 100%)
Financial Institutions ____% A4.3a Informal _____% A4.3b
Family _____% A4.3c Others_____% A4.3d

5. Management

Who is the most influential decision-maker on business of your company?
Name _____(*Not for coding*)
Designation _____ A5.1a Age _____ (in Years) A5.1b

Academic Qualification _____ A5.1c
(Code: 1.less than Standard 8; 2. Standard 8 or KCPE; 3. Form 4 or KCSE; 4. Post secondary or higher, 5.Other [Specify:_____])

Previous Occupation _____ (multiple answers allowed) A5.1d;
(Code: 1: same company; 2: employee in other textile firm; 3: employee in other non-textile firm; 4: government officer; 5: others (specify _____))

How long has s/he been involved in your company? _____ years A5.2
How long has s/he been involved in garment industry? _____ years A.5.3

Is s/he Kenyan? (1) Yes (2) No.
A5.4
If yes, what is the ethnic group? (1). African (2)Asian(3) Other (Specify _____) A5.5
If no, what is the country of origin? _____ A5.6

6. Production

Which production process does your company undertake? A6.1
1. Knitting Fabrics; 2. Knitting Sweaters/Socks; 3. Dyeing;
4. Sewing (T-shirts, Polo-shirts, Woven Shirts, Blouses, dresses, trousers, etc.)
5. Other (specify)_____

Production Level (FY2002-2003)

 # For Firms less than one year operation, ask expected production for the first year as well and fill in parentheses.

Knitting Fabrics A6.2

Types of Fabrics	Fabrics Produced		Yarn Used		
	Quantity (kg or m)	Price (Kshs/kg or m)	Country of Origin	Quantity (kg)	Price (KShs/kg)

Fabrics Type. 1: Single Jersey; 2: Rib; 3: Fleece; 4: Pique; 5: Lacoste; 6: Interlock; 7: Others

Weight of fabrics per meter (_____kg/m)

Dying A6.3

Fabrics Dyed		Fabrics Used			Dye Used		
Quantity (m)	Price (KShs/m)	Country of Origin	Quantity (m)	Price (KShs/m)	Country of Origin	Quantity (kg)	Price (KShs/kg)

Knit Garments **For subcontracting products, check "S.C." box** A6.4

Types of Garments	Goods Produced		Material Used				S. C.
	Dozens	Price per Dozen	Material (yarn or fabrics)	Quantity (kg or m)	Country of Origin	Price (KShs/kg or m)	

Type of Garments: 01 T-shirts; 02 Other Shirts; 03 Sweaters; 04 Trousers and Slacks; 05 Ladies' Tops; 07 Dress; 08 Nightwear and Pajama; 09 Underwear; 10 Socks; 11 Other Knit Garments (Specify in the table)

Woven Garments **For subcontracting products, check "S.C." box** A6.5

Types of Garments	Goods Produced		Material Used			S. C.
	Dozens	Price per Dozen	Quantity (m or kg)	Country of Origin	Price (Kshs/m or kg)	

Type of Garments: 12 Men's Shirts; 13 Blouses; 14 Trousers and Slacks; 15 Skirts; 16 Dress; 17 Nightwear and Pajama; 18 Underwear; 19 Suit-type Coat; 20 Uniform, 21Other Woven Garments.

7. Market

Where did your company supply garments for FY2002-03? (Garments Only) A7.1

Types of Garments	Sold		
	To Which Country	Quantity(dozen)	Value(Ksh)

Types of Garments: See legends in 6.4-6.5 above.

8. Equipment

What kind of and how many sewing and knitting machines did your company have at the end of July 2003? Please fill the following table for all machines in operation by their type and vintage.（number of 'lease' equipment in parentheses）

A8.1a-A8.10i

No.	Type	Numbers	Year Made	Year Bought	Purchase Price	Operation Rate (%)	Total Replacement value	Total Resale value
8.1								
8.2								
8.3								
8.4								
8.5								
8.6								
8.7								
8.8								
8.9								
8.10								

Sewing machines: 01=Straight lockstitch; 02=Overlock; 03=Others,
Knitting machines: 11=Circular Knitting; 12=Flat Knitting; 13=Socks Knitting; 14=Linking,
Other machines: 21=**Generator**; 22= Dyeing; 23=Printing; 24=Fabrics Finishing, 25=Embroidery, 26=Others (specify in above table, i.e. Pressing, Cutting).

9. Employment, Wage Level and Working Conditions

Employment: How many workers of the following categories were employed on average in FY2002-2003? (the number of part-time employees in parentheses)

A9.1.1a-A9.1.11h

(numbers)

	Experience Designation	less than 1 year		1-5 years		6 years +		Total	
		Male a	Female b	Male c	Female d	Male e	Female f	Male g	Female h
Administration Section	Managerial/Executive								
	Other Officers								
Garment Section (Sewing and knitting sweaters/socks)	Engineer								
	Designer								
	Supervisor								
	Operator								
	Helper								
	Other(Specify_____)								
Other Production Sections (knitting fabrics, dying, and finishing)	Engineer								
	Supervisor								
	Operator								
	Helper								
	Other (Specify_____)								

#1 Ask "average" number of employees all through the year considering casual workers.
#2 Numbers of workers not for production (i.e. security, messenger) should be filled in the line of "Others" in "Other Production Section".
#3 In case workers are working in both sections, fill numbers in "Garment Section" lines and refer to "working in both sections" in right margin.

Change in Employment: How many workers have increased/decreased since FY 2000?
+ / -- _____ persons ( ) A9.2
# If the firm started operation after 2000, fill number compared with earliest year and specify that year.

Wage Level: What were the average monthly wage rates (including allowances) of the following categories of workers in FY2002-2003? A9.3.1a-A9.3.11h

(Kshs.)

	Experience Designation	less than 1 year		1-5 years		6 years +		Total Wage Bill	
		Male a	Female b	Male c	Female d	Male e	Female f	Male g	Female h
Administration Section	Managerial/Executive								
	Other Officers								
Garment Section (Sewing and knitting sweaters/socks)	Engineer								
	Designer								
	Supervisor								
	Operator								
	Helper								
	Other(Specify_____)								
Other Production Sections (knitting fabrics, dying, and finishing)	Engineer								
	Supervisor								
	Operator								
	Helper								
	Other (Specify_____)								

Total = total wage paid to each category (= wage * number of employees)

Incentive Payment in Wage: A9.4
Piece Rate (1) Yes (Share in total remuneration _____ %) (2) No A9.4a
Attendance Bonus (1) Yes (Share in total remuneration ____%) (2) No A9.4b

Change in Wage: what percentage has the wage for a first-year operator (or helper) changed since FY 2000? + / -- _____% ( ) A9.5

Working Days: How many days in FY2002-2003 did your company operate?___ days. A9.6

Working Hours: How long did a typical worker work in each shift (including overtime) on average in FY2002-2003? A9.7.1-A9.7.9

(hours)

	Shift A	Shift B	Shift C
Knitting Section (e.g. knitting fabrics, sweaters/socks)			
Sewing Section (e.g. woven and knit garments)			
Other Production Section (Dyeing)			

How many of your workers are permanent? _____ A9.8

10. Skill of Workers

Education: What is the education requirement for the following categories of employees?
Supervisor ___ A10.1a Operator ___A10.1b Helper ___A10.1c
(Code: 0. No requirement; 1.Standard 8 or KCPE; 2. Form 4 or KCSE; 3. Post Secondary or higher; 4. Other (Specify_____))

What is the average educational level? A10.2
Supervisor _____A10.2a Operator ____A10.2b Helper _____A10.2c
(Code: 1.less than Standard 8; 2. Standard 8 or KCPE; 3. Form 4 or KCSE; 4. Post Secondary or higher, possibly D/N)

Experience: What is the experience requirement in years for the following categories of employees?

Supervisor ___A10.3a Operator ___A10.3b Helper ___ A10.3c (possibly 0)

What is the experience requirement in years for the following categories of employees?
Supervisor ___A10.4a Operator ___A10.4b Helper ___ A10.4c

Training: Does your company have any formal training scheme for employees?
(1) Yes (2) No. ***(If NO, move to A10.5)*** A10.5a
If yes, (1) Formal in-house training_____ times/year; ___ days A10.5b
(2) Formal outside training _____ times/year; ___ days A10.5c
If so, where was this being obtained? _____ A10.5d

Promotion: How many current supervisors in the sewing section were sewing-machine-operators before they became supervisors? ____ persons A10.6a

How long does it take for a helper to be promoted to a sewing-machine-operator on average?
____ months A10.6b

Division of Labor: In sewing process, does your company adopt division of labor ?
(1) Yes (2) No A10.7

11. Problems in Business

Delay in Delivery: How many times have you experienced delay in material delivery for last three months? _____ times A11.1a

How many times have you experienced problems with quality of materials in the last three months? _____ times A11.1b

Delay in Payment: How many times have you experienced delay in payment for your sales for last three months? _____ times A11.2a

How long after sale is a customer obliged to pay? _____ days A11.2b

On average, how many days does it take to collect payment for your sales from the due date?
_____ days A11.2c

Blackout: How many days did your company experience an electric power failure during working hours in last three months? _____ days A11.3

What other problems have you experienced since the beginning of this year? A.11.4
_____
_____
_____
_____

12. Policy Related Issues

Did your company have a bonded warehouse during FY2002-2003?
(1) Yes (2) No A12.1

Did your company receive a duty drawback concerning exported component of imported materials during FY2002-2003? (1) Yes (2) No A12.2

Was the advance income tax deduction on export earnings applied to your company during FY2002-2003? (1) Yes (2) No A12.3

Was tariff exemption on imports of capital machinery for export-oriented sector applied to your last purchase? (1) Yes (2) No A12.4

Were any preferential interest rate to export oriented sectors applied for loans granted to your company during FY2002-2003? Yes No

13. Flow Data for 2002-2003 **A13**

Items	Value (1000Kshs)	
A: Gross Value of Output		13.1 cross check with A6.2-5
B: Industrial Costs		
B1: Costs of materials (yarn, fabrics, etc.)		13.2 cross check with A6.2-5
B2: Costs of fuel and electricity (production)		13.3
B3: Wage and Salary for workers		13.4 cross check with A9
B4: Payment to subcontracting		13.5
C: Non-industrial Costs		
C1: Utilities (water/telephones/waste discharge)		13.6
C2: Transportation		13.7
C3: Printing Stationery		13.8
C4: Insurance Payment		13.9
C5: Interests		13.10
C6: Rent		13.11
C7: Depreciation		13.12
C8: Dividend or Withdrawals		13.13
C9: Others		13.14

Last edited on Aug.25, 2003

Appendix 2.3. List of Interviewed Firms

Table 2-A1 Interviewed Firms (excluding EPZ firms)

	Year started Operation	Process	Employment	Sales (mil Ksh)	Sewing machine
1	1999	Sewing	10	1.2	7
2	1985	Sewing	237	82	113
3	1977	Sewing	275	40	180
4	1996	Sewing	8	2.1	6
5	1994	Sewing	50	23	30
6	1996	Sewing	13	1.1-2.4	13
7	1968	Sewing	225		100
8	1975	Sewing	25	5	20
9	1982	Spinning, Weaving, Knitting, Sewing	700	678	21
10	1963	Weaving, Knitting, Sewing	350	265	121
11	1990	Sewing	13		22
12	1981	Sewing	35	27.5	100
13	2003	Sewing	80	40	90
14	1998	Sewing	63	85.6	50
15	1978	Sewing	50	50	88
16	1978	Weaving, Sewing	77	50	30
17	1996	Sewing	124	71.2	91
18	1987	Sewing	145	180	104
19	1989	Printing, Sandblasting	175	36.1	42
20	1972	Sewing	800	265.2	350
21	2004	Sewing	270	34.0	133
22	2005	Sewing	170		110
23	2005	Sewing	340	34.1	550
24	2004	Sewing	45(230*)	18.5	139
25	2004	Sewing	70	6.5	60
26	2006	Sewing	180	na	225
27	1997	Sewing	347	56.2	302
28	2004	Sewing	233	17.8	216
	Average of non-Exporter	(1-18)	137.8	100.1	65.9
	Average of Exporter	(19-28)	281.5	58.55	212.7

Note: Information of the firms stopped operation indicates record when firms were operated.
*: Information in the parenthesis is when it was taking CMT (This firm has shifted to the local market after 2005).

	Market	Investment since 2000 (mil Ksh)	Bank Credit use**	Ethnicity of Owner	Interviewed
1	Kenya 100%	0.16	0	African	2006
2	Kenya 100%	9	0	Asian	2006
3	Kenya 60%, Africa 35%, UK 5%	10	1	Asian	2006
4	Kenya 100%	0.23	0	African	2006
5	Kenya 80%, Africa 20%	1.7	0	Asian	2006
6	Kenya 100%	0.04	0	African	2006
7	Kenya 100%	>3.5	1	Asian	2006
8	Kenya 100%	0		Asian	2006
9	Kenya 60%, Africa 40%	0		Asian	2006
10	Kenya 99%, UK 1%	>0	1	Asian	2005, 06
11	Kenya 100%	0		African	2006
12	Kenya 100%	0		Asian	2006
13	Kenya 80%, Africa 20%	0	1	Asian	2006
14	Kenya 100%	>0	0	Asian	2006
15	Kenya 100%	0		Asian	2006
16	Kenya 80%, Africa 20%, EU<1%	16	1	Asian	2006
17	Kenya 90%, EU10%	0.436	0	European	2005
18	Kenya 90%, EAC10%	0		Asian	2005
19	USA 61%, UK Swiss 11%, Kenya 28%	5	0	European	2006
20	USA 17%, EU 26%, EAC 43%, Local 15%	>0	1	Asian	2006
21	USA 100%	14	0	African	2005, 06
22	USA 50%, EU 50%	10.5	1	African	2005, 06
23	USA 100%	22.5	0	African	2006
24	Local, Mauritania, Burkina Faso (USA 100%*)	12	1	African	2006
25	USA	6	0	African	2006
26	USA 95%, Japan 5%	5.5	0	African	2006
27	USA 100%	3-40	1	African	2005
28	USA 100%	23.4	0	African	2005

Appendix 2.4. Questionnaire of Interview

Questionnaire for Local Exporting Firms

This questionnaire is a follow-up of the garment industry survey in 2003 and 2005 conducted by Institute of Developing Economies, Japan, and Institute of Development Studies, University of Nairobi in the view to understand the difficulties and prospective of the industry in Kenya. This questionnaire is specifically designed to understand the impact of foreign investment on Kenyan local firms. All information will be used only for academic study and individual data will be strictly confidential against any requests.

Date: _____

Firm visited: _____

Person interviewed: Name_____ Designation_____

1. Basic Information

Q1 Origin of Capital	Kenya, Other country (_____)
Q2 History of Company	Established in _____ , US/EU Export started in _____
Q3 Number of Employment	2005-06 _____ 2004-2005 _____ 2002-03 _____ Export section: _____
Q4 Export Sales	2005-06 Total Value: _____ Market: USA____% EU____% Other ( ) _____% Concession: AGOA_____% EU-ACP_____% No concession_____% Products:_____ 2004-05 Total Value: _____ Market: USA____% EU____% Other ( ) _____% 2002-03 Total Value: _____ Market: USA____% EU____% Other ( ) _____%
Q5 Export Type	FOB:_____% CMT_____%
Q6 Name of Buyers (Type of Order)	1. Name: _____, Country:_____, CMT / FOB 2. Name: _____, Country:_____, CMT / FOB 3. Name: _____, Country:_____, CMT / FOB
Q7 Source of Material	
Q8 Total sales	2005-06 _____, 2004-05 _____ 2002-03 _____
Q8a Equipments	Straight lockstitch: number _____ Overlock: number _____ Flatlock: number _____ Cutting machine: number _____

2. Background of Manager

QA How long have you been working in the garment industry? _____

QB What did you do before you work in this industry? _____

QC What is academic qualification?

(1) less than Standard 8 (2) Standard 8 or KCPE (3) Form 4 or KCPE (4) Bachelor

(5) Master or PhD (6) Other _____

QD Do you have any other business now? (1) Yes (2) No

If **YES**, what is it? And how much is annual sales? Is it making profit?

_____

3. Motivation of starting export

Q9 What made you thought of starting export to US/EU markets (multiple answers)?

(1) Supplementing reduction of domestic sales, (2) Diversification of the markets,

(3) Diversification of business line, (4) Other

Q10 Do you have experience of garment export to ANY countries before you started export to US/EU market? (1) Yes (2) No

Q11 If **YES**, to which country? _____ when? _____

Q12 In your firm sales, export to US and/or EU markets is regarded as

(1) a main market (2) a minor but promising market, (3) a minor market with no prospect of growth,

(4) other

_____

QE Where did you obtained information of the export market? (multiple answers)

(1) Local firm [assembler / supplier / buyer; exporter / non-exporter]

(2) Foreign firm [assembler / supplier / buyer; Kenya / abroad _____]

(3) Industrial organization [KAM / FKE / other _____]

(4) Government [Ministry of Trade and Industry / EPZA / Export Promotion Council / other _____]

(5) Own experience _____

(6) Other sources _____

QG When you started export, what kind of uncertainty did you feel? (multiple answers)

(1) Demand (order) in the future (2) Price change in the future (3) Logistics

(4) Market access [MFA / AGOA / EU-ACP / other _____]

(5) Necessary investment (6) Necessary training/learning (7) No uncertainty (8) Other

_____

QH **When you started export**, how did you evaluate profitability of export market in comparison with the domestic market (or your business)? Please reply with range.

_____% to _____%, no idea

QI **When you started export,** how did you think price in the export market would change in near future (particularly after 2005)?

_____% to _____%, no idea

QJ **When you started export,** how did you think volume of order in the export market would

change in near future (particularly after 2005)?

_____% to _____%, no idea

QK **When you started export,** how long did you think you need for adjusting your firm to export production?

1 month or less _____ 3 months _____ 6 months _____ 1 year _____ 1.5 years _____

2 years or more _____

QL **Actually**, how much is export business profitable in comparison with the domestic market (or your business)? _____%

QK **Actually,** how long did you need for adjusting your firm to export production?

1 month or less _____ 3 months _____ 6 months _____ 1 year _____ 1.5 years _____

2 years or more _____

4. Knowledge Acquisition

4.1. Production

Q13 How do you layout the machines and workers in export section?

Product (select one):

Men's Shirts (long Sleeve), Polo-shirts, T-shirts, Other (_____)

Number of sewing machine in one line: _____

Number of operator in one line:_____, Number of helper in one line:_____

Capacity of the line:_____ piece per 8 hours

Sales value of product: _____ per piece

Unit Cost _____ per piece

Material Cost _____per piece

Wage Operator _____, Helper _____

Q14 Is it changed from the layout in domestic section? (1) Yes (2) No

---

Q15 Did you provide systematic training for workers in export section? (1) Yes (2) No

Q16 Does it differ from the one used in a domestic section? (1) Yes (2) No

---

Q17 Did you make changes in quality control? (1) Yes (2) No

Q18 If **YES**, how did you change?

Q19 Did you change anything else in production system?

(maintenance of machine, organizational change etc.)

Q20 How did you get production knowledge necessary for export? (multiple answers)

(1) Local firm [assembler / supplier / buyer; exporter / non-exporter]

(2) Foreign firm [assembler / supplier / buyer; Kenya / abroad _____]

(3) Industrial organization [KAM / FKE / other _____]

(4) Government [Ministry of Trade and Industry / EPZA / Export Promotion Council / other _____]

(5) Own experience _____

(6) From expatriates who have experience of garment export

(7) Other

_____

Q21 If you choose **anything except (5) and (6)**, how did they give you advice?

(i.e. They designed production line for your firm, made worker training, showed their production line, provided concrete advice on production system in your firm etc.)

_____

Q22 If you choose **anything except (5) and (6)**, did you made any modifications to apply the learned knowledge to practice? (1) Yes (2) No

Q23 If **YES**, what modification did you make?

_____

4.2 Marketing

Q24 How did you find the buyer(s) whom you are now dealing with? (multiple answers)

(1) Local firm [assembler / supplier / buyer; exporter / non-exporter]

(2) Foreign firm [assembler / supplier / buyer; Kenya / abroad _____]

(3) Industrial organization [KAM / FKE / other _____]

(4) Government [Ministry of Trade and Industry / EPZA / Export Promotion Council / other _____]

(5) Personal connection _____

(6) From expatriates who have experience of garment export

(7) Other

_____

Q25 How did you find the supplier(s) whom you are now dealing with? Choose from the above lists (multiple answers).

_____

4.3 Logistics

Q26 Do you need knowledge about the bonded warehouse system, letter-of-credit system, and custom clearance? (1) Yes (2) No

Q27 If **YES**, how did you get (how are you learning) such knowledge? Choose from the above list (multiple answers).

_____

Q28 How long do you have on average from taking order to delivering products?

_____

Q29 Did you experience delay of delivery? (1) Yes (2) No

Q30 If **YES**, how many times since you start export? _____

What was the problem? (multiple answers)

(1) Delay of production, (2) Delay of material delivery, (3) Delay of custom clearance,

(4) Delay of transportation, (5) Other

_____

4.4 Efforts to Learn Knowledge

Q32 How long did it take from planning to starting export?

_____

Q33 Do you employ expatriates? (1) Yes (2) No

Q34 If **YES**, when and how many? when _____ number _____

Which country are they from? _____

What is their work? (multiple answers)

(1) Production administration, (2) Production line design, (3) Worker training,

(4) Equipment maintenance, (5) Marketing (finding a buyer),

(6) Sourcing material (finding a supplier),

(7) Logistics control (custom clearance, shipping), (8) Finance,

(9) Others (_____)

Q35 Whose help is crucial in starting export?

_____

Q36 In what point have you felt difficulties in starting exports?

_____

Q37 Do you think you need more knowledge? (1) Yes (2) No

Q38 If **YES**, what knowledge do you need more?

_____

5. Investment and Finance

5.1 Volume of Investment

Q39 How much investment have you made to start export?

Total Value _____

Equipment

Sewing machine: Number_____, Year Bought_____, Total Value_____

Cutting machine: Number_____, Year Bought_____, Total Value_____

Pressing machine: Number_____, Year Bought_____, Total Value_____

Embroidery machine: Number_____, Year Bought_____, Total Value_____

Others: Type_____, Number_____, Year Bought_____, Total Value_____

Factory building*

_____

Computer, telecommunication*

_____

Stock investment

_____

Worker training / Leaning by yourself

_____

5.2 Finance of Investment

Q40 How did you finance the investment? (Multiple answers)

(1) Bank credit, (2) Money lender, (3) Credit association, (4) Credit from the buyer

(5) Own or family savings, (6) Debt from relatives or friends, (7) Other

_____

Q41 Is there any condition for borrowing? (both to those who could borrow and not borrow)

(1) Collateral (what), (2) Amount (how much), (3) Referral (to whom),

(4) Transaction history, (5) Other

_____

Q42 Did you prepare sufficient finance for initial investment? (1) Yes (2) No

Q43 If **NO**, what do you need to invest additionally and how much?

_____

5.3 Use of Credit

QL What were the percentage of equity and debt of your company?

Equity _____% Debt _____%

QM What are the sources of debt?

(1) Bank credit _____% (2) Money lender _____% (3) Credit association _____%

(4) Credit from buyer _____% (6) Debt from family or friends _____%,

(7) Other ( ) _____%

If **(1)-(4) are all zero**, go to QN. Otherwise, go to QO.

QN Have you used credit for last 5 years? (1)Yes (2) No

If **YES**, from what source?

(1) Bank credit _____% (2) Money lender _____% (3) Credit association _____%

(4) Credit from buyer _____% (7) Other ( ) _____%

If **YES**, was it sufficient? (1)Yes (2) No

If **NO**, why did you not use credit?

(1) No need of investment (2) Sufficient own fund (3) Fund from related company (4) Cannot borrow

(5) Other _____

QO How much can you borrow up to? And at what interest rate? (same in 2003?)

Q48 Have you experienced the serious shortage of business fund? (1) Yes (2) No

Q49 If **YES**, how frequently? _____

Q50 If **YES**, how did you deal with it?

(1) Asked for reschedule of payment to a supplier, (2) Asked for advance payment to a buyer

(3) Asked for postpone of wage payment, (4) Gave up orders, (5) Used personal or family fund

(6) Sold assets

QP Do you or your family own land or car? (same when started exports?)

---

6. Network with Other Organizations

QQ Have you participated to trade fair or exhibition for last 5 years? (1) Yes (2) No

If YES, how many times?

Local _____ times

African _____ times

International _____ times

QR Who do you regularly exchange information with?

		Market		Technical	Other
		Output	Input		
Assembler	Local _____ _____	L F	L F		
	Foreign _____ _____	L F	L F		
Buyer	Local _____ _____	L F	L F		
	Foreign _____ _____	L F	L F		
Supplier	Local _____ _____	L F	L F		
	Foreign _____ _____	L F	L F		
Governmental Organization	_____ _____	L F	L F		
Industrial organization	_____ _____	L F	L F		
Other	_____ _____	L F	L F		

Output market information: price / growth / design / buyer / government regulations / other
Input market information: price / design / supplier / government regulations / other
Technical Information: equipment / technique / any other?

QS **Before you started export to US market**, who did you regularly exchange information with?

		Market		Technical	Other
		Output	Input		
Assembler	Local _____	L F	L F		
	Foreign _____	L F	L F		
Buyer	Local _____	L F	L F		
	Foreign _____	L F	L F		
Supplier	Local _____	L F	L F		
	Foreign _____	L F	L F		
Governmental Organization	_____	L F	L F		
Industrial organization	_____	L F	L F		
Other	_____	L F	L F		

Output market information: price / growth / design / buyer / government regulations / other
Input market information: price / design / supplier / government regulations / other
Technical Information: equipment / technique / any other?

7. Prospects of Exports to US/EU Market

7.1 Profitability

Q54 Is export production profitable for your firm? (1) Yes (2) No

Q55 How much profit did you manage to obtain from export?

FY2005-06 _____ FY2004-05_____

Q56 If **Not profitable**, what are problems? (multiple answers)

(1) Order is small, (2) Order is volatile, (3) Price is low, (4) Transportation cost is high, (5) Other

_____

QT How do you expect future of the export market?

Price change: _____% to _____%, no idea

Profitability change: _____% to _____%, no idea

7.3 Other problems

Q57 What kind of problems do you face in export? (multiple answers)

(1) Lead time is not long enough, (2) Quality requirement is strict, (3) Order volume is large,

(4) Payment is late, (5) Other

_____

Q58 If you choose **(1)**, what is a specific problem? (multiple answers)

(1) Transportation takes long time, (2) Custom clearance is slow,

(3) Lead time is too short to produce orders, (4) Other

7.4 Prospect

Q59 Do you expect US market (either FOB or CMT) will be your main market?

(1) Yes (2) No

Q60 If **NO**, why do you not expect?

_____

Chapter 3　Garment Industry in Kenya and Bangladesh

1. World Garment Trade

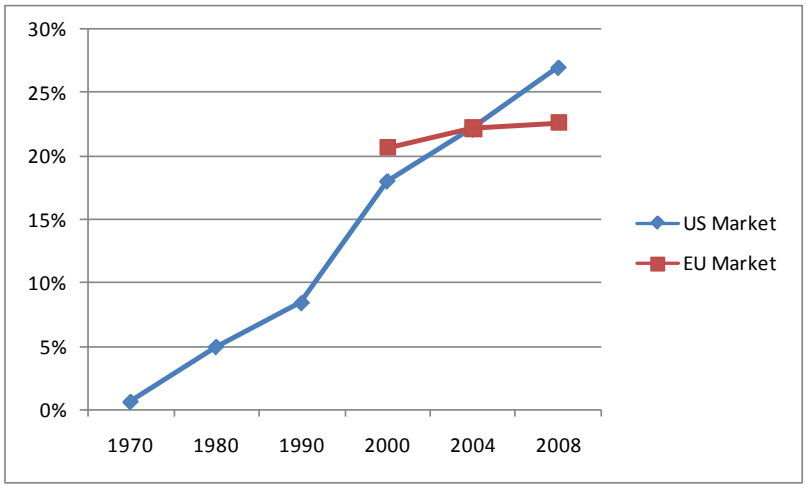
1.1. Rise of Low-Income Countries

The world garment trade has been driven by the markets of developed countries, which are the largest and dominant importers. The import value of the US, the European Union and Japan accounted for 77.8% of the total world imports in 2010 (WTO [2011]). Though some of them are traded within the developed countries, in particular within the EU, most of the trade flow is from developing countries to developed countries. This fact is basically consistent with the theory of comparative advantage, given the factor endowment pattern of developing countries being relatively rich endowment of low-skilled labour. Further corroborating the comparative advantage, garment export has been rapidly increasing in low-income countries among developing countries. Figure 3-1 indicates the share of imports from the low-income countries classified by the status as of 1995 in the US apparel import value, and it excludes imports from China to avoid its dominant effect on garment trade. While it was less than 1% in 1970, the share increased rapidly during the 1990s and 2000s and finally reached 27.0% in 2008. If import from China is included, it accounts for 61.7% of total US imports. In the EU market, the share of imports from low-income countries is as high as the US market. Even without China's impact, the growth and presence of garment export from low-income countries is evident in the world garment market.

The growth of low-income countries entails the exit of middle- and high-income exporters from the world market. Until the 1990s, relatively rich East and Southeast

Asian countries and some Latin American countries were in the top 15, and after 2000 they gradually stepped down and were replaced by the low-income countries such as Indonesia, India, Vietnam, Bangladesh and so on (Table 3-1). This indicates not only a shift of production location, but a rise of labour costs in the original locations, and furthermore smooth adoption of technology in the new locations. Such a shift of production and transfer of technology to low-income countries was realised mainly through FDI. The direct investment of Korean, Hong Kong's and Taiwanese garment firms was most impressive in the 1990s, and in the 2000s Chinese, Indian and Southeast Asian firms joined in investment in low-income countries. In Indonesia, Vietnam and Cambodia, investment from Korea, Hong Kong and China has been significant, while in Africa, the investment of Indian and Mauritian firms as well as East Asian firms comprise the garment exporting industry. It is argued that the technology of the garment assembly process, particularly that of low-priced products, is simple and matured; efficient production is possible with unskilled workers and poor infrastructure if management skill is provided (Lall and Wignaraja [1994]).

Figure 3-1 Share of Low-income Countries in US/EU Apparel Imports



Note: The countries defined as low-income in 1995 by World Bank except China.
Source: Calculation by author using UN Comtrade

Table 3-1 Top 15 Garment Exporters to the US Market

	1970	1980	1990	2000	2004	2008
1	Japan	Hong Kong	Hong Kong	China	China	China
2	Hong Kong	Other Asia	China	Mexico	Mexico	Vietnam
3	Other Asia	Korea	Korea	Hong Kong	Hong Kong	Indonesia
4	Korea	China	Other Asia	Korea	Honduras	Mexico
5	Italy	Mexico	Philippines	Dominica	Vietnam	Bangladesh
6	Philippines	Philippines	Italy	Honduras	Indonesia	India
7	Canada	Japan	Dominica	Indonesia	India	Honduras
8	U.K.	Italy	Mexico	Other Asia	Thailand	Cambodia
9	Mexico	India	India	Bangladesh	Bangladesh	Thailand
10	Israel	Singapore	Indonesia	Thailand	Dominica	Italy
11	Germany	France	Singapore	India	Korea	Pakistan
12	France	Macao	Malaysia	Philippines	Guatemala	Hong Kong
13	Spain	Dominica	Thailand	Canada	Philippines	Sri Lanka
14	Austria	Sri Lanka	Bangladesh	Italy	Italy	El Salvador
15	Singapore	UK	Sri Lanka	El Salvador	El Salvador	Malaysia

Source: UN Comtrade
Note: Low-income countries in 1995 were highlighted.

The shift of production sites is accelerated by the development of fragmentation in garment production. While the garment assembly process is labour-intensive, spinning and weaving processes are more capital-intensive and the designing process is knowledge-intensive. Due to this, the separation of each process realises cost-minimising production, though coordination of the processes generates transaction costs particularly when they are located a long distance from each other. The recent development of international communication and transportation has made geographical separation of each process feasible at longer distances. Buyers in developed countries create detailed specifications of products and place orders with trading companies that are mostly located in East Asia. Trading companies assign textile firms and assembly firms from all over the world, and place orders with them (Gereffi and Frederick [2010], UNCTAD [2002]). The more communication and transportation are developed, the further the locations trading companies have in their choice and the higher the cost reduction they can realise.

Though the shift of production sites to low-income countries is consistent with factor

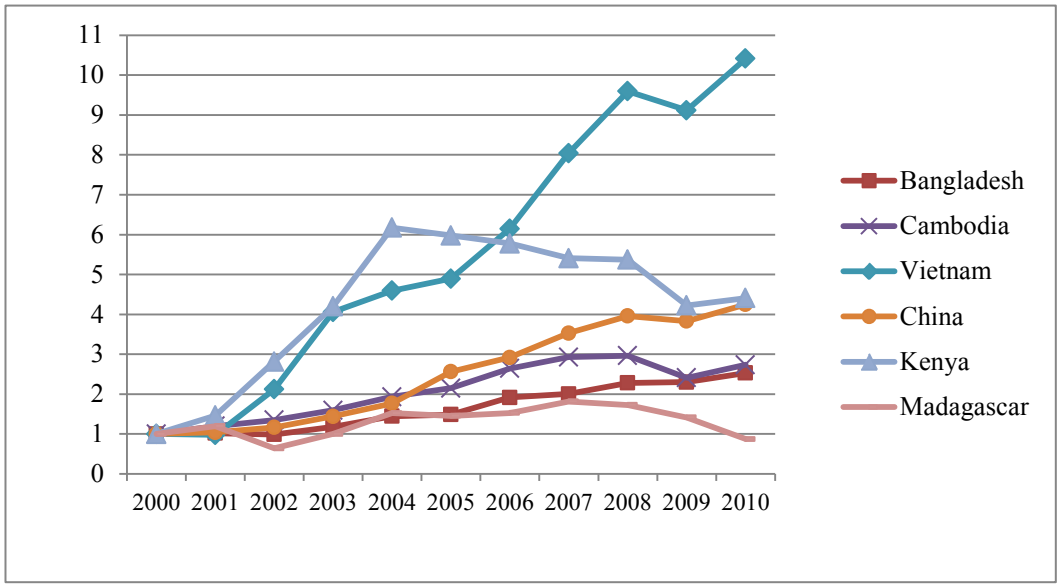
endowment, it is also driven by the market institution. Garment export to the US and the EU markets had been under the Multifibre Arrangement (MFA), which contained a quota on main exporting countries. Though the quota was increased every year, it was binding for 17% of products imported in the US in 2004 (Harrigan and Barrows [2009]). Low-income countries were a good alternative location for garment firms searching for countries with non-binding quotas. Given such institutional background, the rapid development of export from low-income countries was not always regarded as reflecting their true competitiveness, and in fact, some prediction after the MFA phase-out indicated loss of low-income countries as well as the significant growth of China and India (e.g., Nordås [2004]).

The MFA terminated at the end of 2004 as part of trade liberalisation under the WTO regime. Although a quota remained for the largest exporter, China, in the form of a voluntary quota until 2007 in the EU market and 2008 in the US market, items under the quota were limited and significant trade liberalisation was observed (Kowalski and Molnar [2009]). Theory predicts that elimination of the quota leads to price decline through increase of exports from a low-cost country, and in fact, price fall was significant. Harrigan and Barrows [2009] estimated that the export price of quota-binding products fell by 32% in China and by 10% from other exporters after controlling for change of product quality. Apparel markets in industrial countries are typical cases of a buyer-driven market, with oligopoly on the demand side and a huge number of garment producers on the supply side (Gereffi and Memedovic [2003]). In addition, relatively lax quality control of products enables buyers to switch suppliers without incurring a large cost, and hence, a retail company has strong control over price, quantity, specification of products and delivery (Gereffi et al. [2005]). Under such a market structure, buyers in the US market demanded lower prices given the increased

availability of low-cost suppliers after the MFA phase-out.

Figure 3-2 shows the change of garment export around 2005. As predicted, export from China and India grew and African countries (including Kenya) experienced reduction. However, many low-income exporters, such as Vietnam, Bangladesh and Cambodia maintained a growth rate as high as before 2004. This indicates that those Asian low-income countries are competitive at lower prices, while most African countries are not. Trade liberalisation led to a different impact among low-income countries.

Figure 3-2 Export Value of Garments to US and EU market (Indexed on 2000=1.0)



Source: UN Comtrade
Note: Based on Import Value of US and EU

1. 2. Development of the Bangladeshi Garment Industry

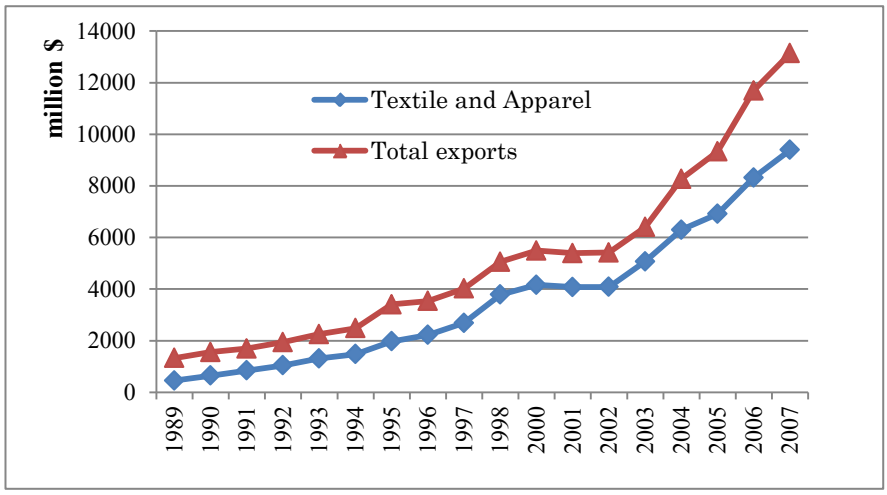
The development of the Bangladeshi garment industry started relatively early among low-income countries. As Rhee and Belot [1989] documented, a Korean textile firm provided intensive training to workers of a Bangladeshi garment firm in the late 1970s, when no significant garment industry for the export market existed. In 1980, the first

firm started export to the US market, and since then the number of garment firms rapidly increased and export value grew throughout the 1980s and 1990s (Figure 3-3, Razzaque and Raihan [2008]). One unique feature of the Bangladeshi industry is that local firms contribute a lot to the development of the industry. After the first firm started exporting, many local firms were established and followed its success (Rhee and Belot [1989], Mostafa and Klepper [2009]). Based on the growth of local firms, the Bangladeshi garment industry has been ranked in the top ten exporters in the world since the late 1990s, and it was the 8th and the 3rd largest exporter in the US and the EU markets in 2004. In that year, 3975 garment firms employed about 2 million people (BGMEA [2009]).

The export price of Bangladeshi products is lower than other exporters including low-income countries (Figure 3-4). While this indicates that the industry concentrates on basic products, it is also cost-competitive given that other low-income countries export basic products, too (Lopez-Acevedo and Robertson [2011: Ch.4]). It is known that apparel labour costs in Bangladesh are among the lowest in the world. Presumably because of such cost competitiveness, the export price did not significantly change and export growth continues after the MFA termination (Figure 3-3).[1] As a result, the number of garment firms in Bangladesh increased to 4825 and employment was 3.1 million in 2008 (BGMEA [2009]).

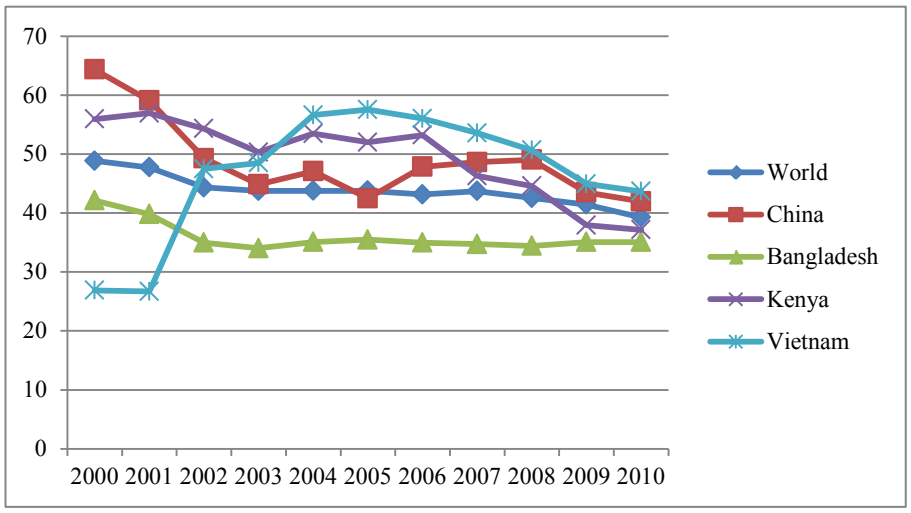
[1] According to the World Trade Atlas, the export price for the US market was $35.08 per dozen in 2004 and $34.07 in 2010, and that for the EU market was 28.18 Euro per dozen and 28.37 Euro, respectively. Calculation is based on the products reported in dozen.

Figure 3-3 Export Value of Garments from Bangladesh



Source: UN Comtrade (Bangladesh Report)

Figure 3-4 Export Price to US Market ($/dozen)



Note: Based on the products reported in dozen.
Source: World Trade Alas (US report of import values)

The growth of the sector has made a significant impact on the economy. Since 1990, garment products have been the top and dominant exporting item and they have had more than a 70% share since 2000 (Figure 3-3). Steady economic growth has been recorded in the 1990s and 2000s, and the annual growth rate of GDP per capita is 3.4% for the two decades (World Bank [2011]). Given the labour-intensive characteristics, the impact on labour is significant. It is argued that it provided an income generation opportunity for rural female workers who do not have many employment opportunities

(Murayama [2008], Razzaque and Raihan [2008]). Despite the low apparel wage in Bangladesh relative to that in the other exporters, the studies find that the wage of the most unskilled worker is well above the national and international poverty lines, and the garment industry pays significantly higher than other formal sectors conditional on workers' characteristics (Fukunishi et al. [2006], Lopez-Acevedo and Robertson [2011]). It is noted that the gender wage gap is not significant within a position, though the share of males becomes greater for a more skilled, and hence, better paid position (Fukunishi et al. [2006]). *World Development Report 2012* indicated that mass employment of female workers has changed the social norm in terms of gender in Bangladesh, raising women's public mobility and access to public institutions.

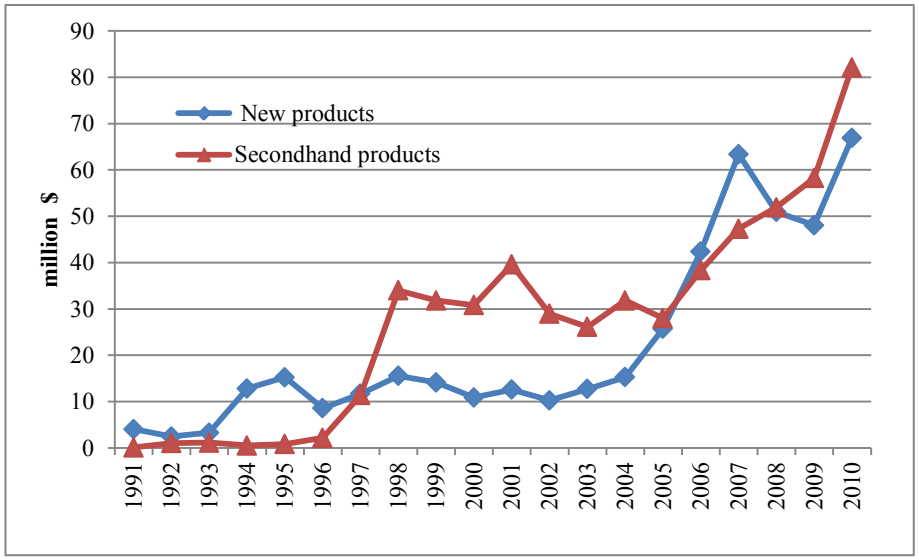
2. Overview of Kenyan Garment Industry

After independence in 1964, the Kenyan government adopted an import-substitution industrialization strategy, and accordingly, implemented a set of protectionist trade policies. Through high tariffs on imports and over-evaluation of local currency, local firms were protected from competition with imported products. In the beginning, these policies led to significant growth of the manufacturing sector, and manufacturing value added grew by more than 10% annually until the early 1970s, but it significantly decelerated in the 1980s and the growth rate fell as low as 2% in the early 1990s (World Bank [2011]). As the import-substitution strategy turned out to be a failure, like the other developing countries that adopted the same course, trade liberalization has been requested as a part of the Structural Adjustment Program by the World Bank and IMF since the 1980s. Though the Kenyan government delayed implementation, it finally

started it in the early 1990s.

While the garment and textile industry in Kenya was the largest supplier and exporter in East Africa when it was protected, trade liberalization changed its position drastically. Figure 3-5 shows the import value of garment products including secondhand clothing.[2] It indicates that the import value of new garments grew sharply in 1994, and it stayed between US$10 and 20 million until 2006. On the other hand, import of secondhand clothing has shown a drastic rise since 1997, and in 2001 it reached to US$40 million. Though secondhand imports decreased thereafter due to the increased tariff, the value still maintains a level around US$30 million dollars. Import value grew further after 2005, and it exceeded US$100 million in 2008.

Figure 3-5 Import Value of Garment



Source: United Nations Commodity Trade Statistics (Kenya Report)

Given the low quality of production statistics compiled by the Kenyan government, it is difficult to produce a reliable estimate of the relative size of import value to domestic

[2] Figures are from UN Commodity Trade Statistics. In these statistics, there is significant discrepancy between the import value reported by the Kenyan government and the export value of counterpart governments. Not only the problem of mismeasurement but also smuggled imports is a possible reason, since smuggling is prevalent in Kenya. Hence, these figures are likely to be underestimated.

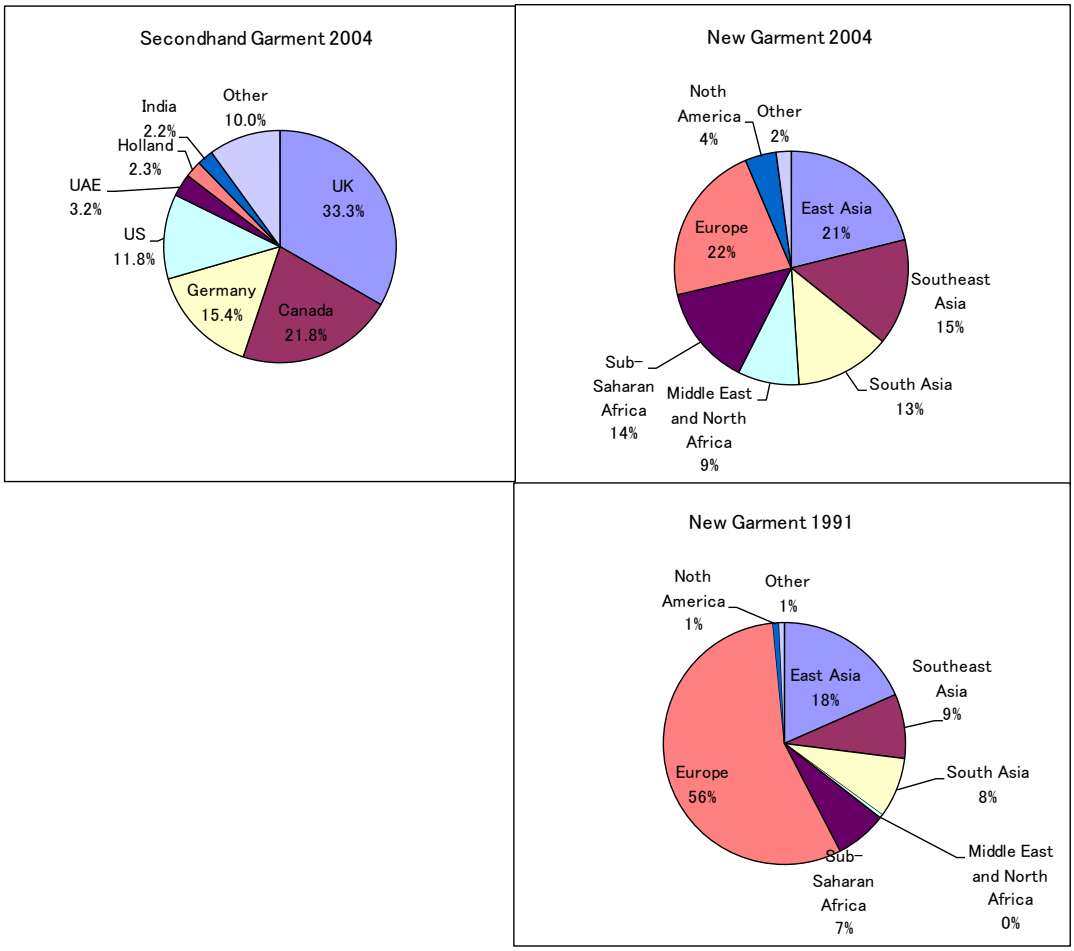
production.[3] Based on the estimation using our 2003 survey, import value between 1998 and 2003 was larger than domestic production by 1.1 to 1.8 times.[4] Given the substantial smuggling reported (Ogawa [2005]), this estimate indicates that import value was at least as large as domestic production.

Trade statistics show that almost 90% of secondhand imports are from developed countries, which indicates that most secondhand clothing is donated by consumers in rich countries (Figure 3-6). The source of imported new clothing differed from secondhand. While before trade liberalization the majority of imports were from European countries, in particular from the UK, the share of imports from South Asia, Southeast Asia, and Africa has increased since the liberalization. In 2004, Asian products claimed the largest share, at 50%, and European products' share was reduced to 23%. In particular, growth of imports from China, India and United Arab Emirates (UAE) is significant, of which China is the largest exporter to Kenya with a share of 18%. Growth of Asian products accelerated recently, and in 2010, they account for 81% of import value. Kenyan garment firms are currently competing with firms in developing countries instead of those in developed countries.

[3] The production value compiled by the Central Bureau of Statistics (Kenya Central Bureau of Statistics [1995b-2004b]) shows an unnaturally large jump in several years, and besides, it is not consistent with the export value for the US and EU markets which in the US and European government statistics.

[4] Domestic production is estimated to be KSh2.2 to 2.6 billion (US$28.9 to 34.2 million), which does not include production by firms with fewer than 10 employees.

Figure 3-6 Origin of Garments Imported in Kenya



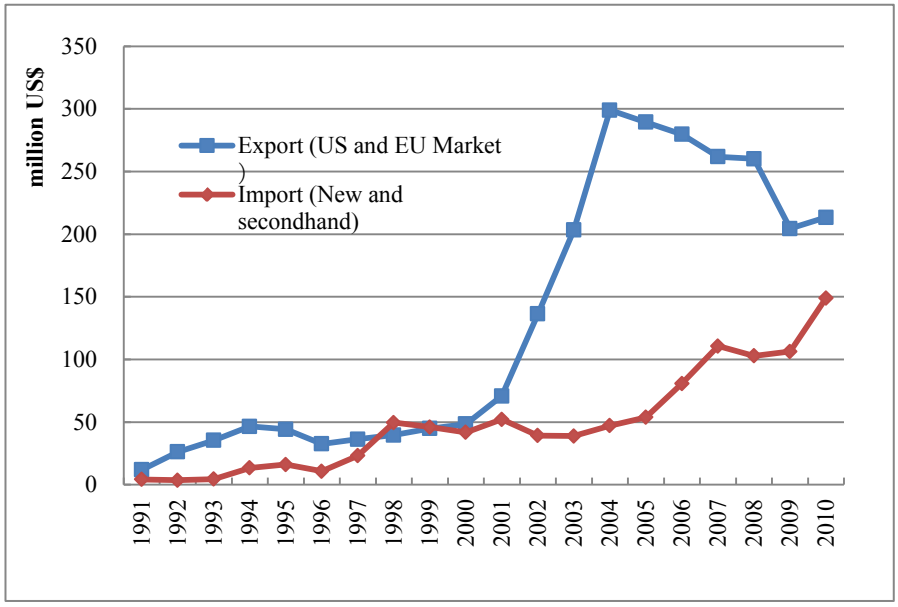
Source UN Comtrade

Growth of exports was not observed until 2000, although it was one intention of trade liberalization. In the year 2000, the US government enacted the African Growth and Opportunity Act (AGOA) which removes tariffs on a broad range of products imported from SSA countries satisfying certain political and economic conditions. The act contains a distinctive feature particularly with regard to garment products. While under the MFA, the main exporters were forced to observe export quotas, but AGOA stipulates a much less stringent quota, which makes garment export from Africa practically quota-free.[5] More importantly, AGOA applied generous rules of origin for less developed beneficiary countries (LDBC), which allows the use of fabrics and yarn made

[5] Duty free access to US market is granted to import from African countries not exceeding 7% of US total import of garments. This is much greater than the actual African share in the market.

in a third country.[6] This rule makes AGOA much more attractive than the other preferential trade agreements such as the Cotonou Convention. This new trade scheme has made significant 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 6.3 times between 1999 and 2004 (Figure 3-7). Since export value is estimated to be equal to the four to five times of production for the domestic market, it produced a drastic change in the structure of Kenyan garment production.

Figure 3-7 Export and Import Value of Garments



Source: UN Comtrade (US and EU report for export and Kenya report for import)

Rapid growth in exports is largely spurred by the firms registered as an Export Processing Zone (EPZ) firm, whose exports accounted for 85% of exports to the US. After enactment of AGOA, new investments in the garment industry have flown into EPZs, and in 2004, 30 garment firms produced US$222 million and employed 34,600 workers (Table 3-2). EPZ firms produce mainly low-priced basic wear on orders from US buyers. All firms are funded by foreign capital from the Middle East (Bahrain,

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

UAE), South Asia (India, Sri Lanka) and East Asia, while some firms are joint ventures with domestic capital as well. They use imported fabrics from East and South Asia, and hence only the garment assembly process is located in Kenya.

Table 3-2 Evolution of Exporting Firms

		2000	2001	2002	2003	2004	2005	2006	2007	2008
EPZ Firms	Number of Firms	6	17	30	35	30	25	25	22	19
	Employment	6487	12002	25288	36348	34614	34234	31813	28006	25776
	Export (mil US$)	30.19	54.66	103.48	145.95	221.98	194.40	204.91	204.52	226.83
Local Exporter	Number of Firms	0	4	6	8	16	10	4	-	-

Source: (EPZ, 2000-2004) Kenya Export Processing Zones Authority [2002-5], (EPZ, 2005-2008) Kenya National Bureau of Statistics [2009], (Local Exporter) Authors fieldwork.

Note: Export value is exchanged in US dollar by the author using the period average rate in *International Financial Statistics*.

After trade liberalization, adverse effects on production appeared initially, and with about a 10-year lag, these adverse effects were supplemented by exporting. Our survey data and export statistics from the Export Processing Zone Authority demonstrated that total production value of the garment industry in 2003 is estimated to be between KSh13.3 to13.7 billion (equivalent to US$175.1 to US$180.4 million), of which more than 80% was produced by EPZ firms (Table 3-3). Since EPZ firms exported almost all their products, it is noted that the majority of products of the Kenyan garment industry were exported in 2003.

Table 3-3 Overview of the Garment Industry in Kenya

	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 (2003)	35	36348	11083	1038.5	316.7 ($4.0 mil)	100.0	100.0
Local Firm (2003)	*120-150*	*8000-9500*	*2200-2600*	88.2	42.9 ($0.5mil)	27.6	16.9
Local Exporting Firm (total between 2000-06)	19	—	—	231.1	60.0 ($0.75mil)	100.0	0

Source: (EPZ Firm) Kenya Export Processing Zones Authority [2004], (Local Firm) Firm survey in 2003, (Local Exporter) Author's interview.

Note: Figures shown in italic are estimated firm the firm survey in 2003.

However, after 2005, the growth trend disappeared suddenly. Termination of the MFA reduced the relative advantage of Kenyan garments by removing the quotas of other exporting countries. Export value was reduced by 3.1% in 2005, and it continues to fall slightly, with export value in 2008 at 10% below the level in 2004 (Figure 3-7), though the world apparel trade was continuing to grow after 2005. In the export market as well as the domestic market, Kenyan firms are competing with firms in developing countries, in particular Asia.

Firm managers and industrial associations evidenced the exit of a significant number of firms after trade liberalization, but government statistics did not capture this change clearly.[7] The garment firm survey conducted in 1989 by University of Nairobi reported that 2,200 firms, including those in the informal sector, operated in Nairobi at that time, of which 63 to 74 firms employed more than 10 workers (Ongile and McCormick [1996]).[8] On the other hand, our survey in 2003 found 48 firms with more than 10 employees in Nairobi, and hence, it is estimated that the number of firms decreased by 23% to 35% in the largest cluster in Kenya. We estimate that about 120 to 150 local firms with more than 10 employees operated in the country in 2003 (Table 3-3). In contrast, growth of firms exporting to the US and EU markets is somewhat clear. Since 1997, 35 EPZ firms were established according to the list compiled by the EPZ Authority. Local subcontractors were also set up, and based on our field work, 15 new firms were established after 2001 and 4 existing local firms started to subcontract for EPZ firms. Since the MFA phase-out, the number of exporters has been reduced, and at the end of 2006, 24 EPZ firms and 6 local subcontractors continued operation. In 2008,

[7] Statistics on the number of firms by (Kenya Central Bureau of Statistics [1995b-2004b]) display unnatural behaviour, such that exactly the same rate of change is reported for all size categories.
[8] Ongile and McCormick [1996] reported a number of firms with more than 11 workers and one with 7 to 10 workers. Using their report on employment, we postulated the above possible range.

EPZ firms further decreased to 19 (Table 3-2).

The Kenyan garment industry experienced drastic ups and downs after trade liberalization. An upsurge in imports adversely hit the Kenyan garment industry, which was contracted significantly in the late 1990s. However, this downward trend altered due to the rapid growth of exports after 2000, and the scale of production now exceeds that before liberalization. Still, since this recovery was generated by foreign firms, local firms scarcely benefited from the growth of exports, and consequently, their production was barely augmented. They are competing with imports from developing countries, in particular Asia, and secondhand products from industrial countries. On the other hand, competition in the export market is also becoming more intense since the MFA termination because competitive rivals now include Asian firms. For the last decade, Kenyan garment firms have been competing with firms in developing countries rather than with those in industrial countries.

3. Competition in the Markets

In the previous section, the competitive position of the Kenyan garment industry was depicted using industry-level statistics. In this section, firm-level information on market competition is described based on interviews with local and EPZ firms and with domestic retailers conducted in 2005 and 2006.

3.1. Domestic market

In interviews with 28 firms, questions about competition in the domestic market were asked of 18 local non-exporting firms and 3 local exporting firms that also supply to the

domestic market.[9] Of the managers of the 21 firms, all replied that competition was becoming fierce, and 14 managers raised secondhand imports as the main reason. However, they stated that their products cannot compete with imported new products as well as secondhand products. For example, at the three local non-exporters, the production cost of men's shirts ranged from KSh210 to KSh300, and wholesale prices were between KSh300 and KSh500, but imported new products were sold as low as KSh250 in the market according to the author's observation (2006). Likewise, the production cost of men's suits at a local non-exporting firm was KSh2200, while the retail price of the same type of imported product started at KSh1800. Managers explained that the retail price of an imported product was occasionally lower than their production cost, and hence, they were not able to compete with imported products.

Retail prices of imported new products, secondhand products and domestic products were compared in retail shops in Gikomba market and three supermarkets that include the largest chain in the country. In Nairobi, small shops in markets, specialty retail shops, and supermarkets are the main retail shops that sell general clothing. A market in Nairobi is a cluster of small shops targeting low-income consumers, and Gikomba market is one such market. Garment shops in it are mainly selling secondhand products or low-priced imported new products. Specialty shops and supermarkets target middle and high-income consumers, and their main items are imported new products. In any type of shop, most of items sold are imported products, except underwear and baby wear. Domestic products are rarely sold in market shops, and they have only a 5% share in the largest supermarket chain in Kenya.[10] Low and medium-priced imported garments come from mainly China and India, while high-priced products are from Europe.

[9] A list of interviewed firm is in Appendix 2.3 in Chapter 2.
[10] Based on an interview with the director of a supermarket's clothing division.

Based on the characteristics of retail shops, Table 3-4 compares retail prices of three products. The price of men's imported shirts (new) displays a wide variation, ranging from KSh250 to KSh3,000, while the price of secondhand shirts is much lower, though those in good condition and with popular brand name were sold at a higher price than the cheapest imported new shirts. Prices of domestic products ranged from KSh450 to KSh600, which lies on the low-price side of the price band, though not at the lowest end. The same pattern can be seen for T-shirts. Given that quality is roughly related to price, imported new garments have wide variation from very low to high quality, while domestic garments are limited to low quality. The director of the clothing section in the largest supermarket chain stated that domestic products' quality in fabrics, sewing, and packaging is not as good as imports within same price range. It indicates that given similar quality, prices of domestic products are higher than imported products.

3.2. Export market

Among our interview sample, 13 firms exported more than 50% of their products to the US/EU markets, of which 5 firms were foreign-owned EPZ firms and 8 firms were locally owned.[11] While six local exporters were newly established after AGOA and operated as subcontractors to EPZ firms, two local exporters supplied to local market before AGOA and started subcontracting for EPZ firms after the growth of the EPZ sector.[12] It is noted the latter two local exporters continued to supply products domestically. In contrast, all EPZ firms and six local exporters exported almost all their products to the US market. As the main market for Kenyan exporters has been the US market since 2000, we focus on competition in the US market in this section.

[11] See Table 2-2 for structure of our interview sample.
[12] See Appendix 3.1 and section 1.2 in Chapter 6 for detail of local exporters in Kenya.

Table 3-4 Retail Price (Kenya Shilling)

	Gikomba Market	Supermarket
Men's Shirt (New, Imported)	250-600	400-3000
(New, Domestic)	Not sold	450-600
(Secondhand)	50- (300- for those in good condition)	Not sold
T shirt (New, Imported)	200-500	700-
(New, Domestic)	Not sold	400-600
(Secondhand)	50-300	Not sold
Jeans (New, Imported)	400-1000	—
(Secondhand)	150- (600- for those in good condition)	—

Source: Author's fieldwork
Note: Retail price is occasionally determined by negotiations in a market, there is reasonable price range. The above figures were obtained through negotiation by a native person.

The sudden and rapid growth after 2000 and the stagnation after 2005 clearly suggest that the advantage of Kenyan garment products in the US market is heavily based on AGOA. It provides duty-free and quota-free access to the US market, while other exporters, including those applied the general system of preference (GSP) needed to pay tariffs and operated under quotas. Though duty-free access is still an advantage for Kenya and other AGOA beneficiary countries after the MFA termination, the market reaction indicates that their competitiveness has been weakened. Managers in EPZ firms responded that they experienced a reduction in orders and a fall in prices starting from the last quarter of 2004. They stated that the drop in orders was most significant in early 2005, and later that year when the Chinese voluntary quota became effective, orders began to recover gradually, though prices continued to fall. According to managers' responses in interviews, prices fell by 16% to 30% by 2006.

Trade statistics show somewhat different facts of price changes. The average unit price decreased only by 0.8% in 2005 and it was offset by increase of price in 2006 (Figure3-4). Since those changes in average unit price incorporate effect of changes of product share, for instance increased share of low-priced product lower the average unit price without price changes, we see unit prices within the product narrowly defined by 10-digit HS using World Trade Atlas data. The result of the regression of year dummies

on price with product fixed-effect indicates that prices did not significantly change in 2005 and 2006 (Table 3-5). We further analysed price change after the MFA termination until 2010 by including a post-MFA dummy which takes one for the observations after 2005.[13] It also indicates that price change within 10-digit HS is not significant (Table 3-5). However, it should be noted that trade statistics represent prices of actual order, while manager's response was based on buyer's offer. As price of major exporting countries fell significantly (Harrigan and Barrows [2009]), offered price must have lowered. Managers' responses are not necessarily exaggerated.

As Kenyan exporters still have the advantage of duty-free access after 2005, the reduction of orders for Kenyan exporters implies that their production cost is higher than that of the other growing exporters by at least the tariff rate, or they have other disadvantages, e.g., slow delivery time. It is sometimes argued that delivery from African producers takes longer than from Asian producers due to difficult logistics and slow customs clearance.

Table 3-5 Estimation of Within-product Price Changes

	1 2004-2006	2 2002-2010
year dummy		yes (not reported)
2005	-0.039	
	(0.058)	
2006	0.061	
	(0.063)	
post-MFA dummy		0.006
		(0.072)
cons	3.836	3.898
	(0.036)	(0.042)
product fixed effect	yes	yes
R2	0.011	0.016
N	556	1473

Note: Heteroschedasticity robust standard errors are in the parentheses.

[13] This estimation does not identify causal relationship between MFA termination and unit price, since a post-MFA dummy may capture underlying trend of unit price after 2005 that is irrelevant with MFA termination.

Intensified competition hit local exporters most severely. All local exporters started production for the export market as subcontractors when exports were growing rapidly. EPZ firms use subcontractors when the volume of orders exceeds their capacity or orders include process for which they do not have equipment (e.g., embroidery and sandblasting). With reduction of orders, EPZ firms are likely to stop subcontracting out and instead use their own production lines. All interviewed managers at local exporters responded that subcontracted orders sharply declined since late 2004, and at the time of interview in 2005, many of them had suspended operations. Consequently, only 4 firms continued to subcontract, 2 firms switched to supplying the domestic market, and 13 firms closed down in December 2006.

4. Firm Strategies to Cope with Competition

Intensified competition does not necessarily lead to reduction of production. It may stimulate creative destruction. Does reduction of production in the Kenyan garment industry mean that they did not make enough creative efforts for survival and growth? From information gained through interviews, firms' strategies to cope with competition are described in this subsection.

4.1. Local non-exporting firms

In our interview sample, 20 local firms had operated since the 1990s when the massive inflow of imports started. We found that 18 firms continued to supply domestic and African markets, while 2 firms started to export to the US/EU markets.

Table 3-6 shows measures taken by local firms that continued supply to domestic and neighbouring markets. The measure most frequently taken is “changing of production line” by 12 firms, which is followed by “strengthening marketing” (11 firms), “productivity improvement” (7 firms), “reduction of cost” (5 firms), and “starting export (to African market)” (3 firms). In doing so, 7 firms contracted their production scale, and 2 of them were changing their business line. Among the firms that changed their production line, 11 firms out of 12 changed from consumer clothing to school and corporate uniforms and/or promotional wear (e.g., T-shirts and polo shirts with a company’s logo distributed as a gift). Uniforms and promotional wear are less likely to compete with imports, since they need to reflect the specific needs of customers. As a result, 16 firms out of the 18 local non-exporting samples specialized in uniforms, promotional wear and baby wear among which imported products are less common. With changing their production line, those firms searched for new buyers and consequently “strengthening marketing” was chosen by 11 firms.

Productivity improvement was pursued mainly through hiring expatriates. Cost reduction included a change in the source of fabrics from domestic to foreign (mostly China and India) suppliers by four firms, and one firm engaged in energy saving. The most positive measure taken by local firms is employment of expatriates, but this did not lead to innovation or stating of export. Challenging export market was not popular choice. While three firms started exporting to East African countries, eight firms declined an offer to subcontract for EPZ firms. They explained that the volume of orders from EPZ firms was so large that they would have to allocate their entire production capacity to subcontract orders, and many of them would need to expand their capacity. This would mean they would lose orders from their domestic customers. In addition, the profit from subcontracting was relatively low, and so subcontract was not attractive to

them.

Table 3-6 Measures to Cope with Competition (Local firms operated since 2000)

Productivity Improvement	7
Training of workers (excl. OJT)	0
Renovation of production system	2
Renewal of equipment	3
Introduction of incentives	3
Hiring expatriates	5
Cost Reduction	5
Wage cut	0
Increases of casual worker	0
Switching supplier	4
Saving energy use	1
Introduction of New Products	12
New design	0
Change of product line	12
Change of quality	3
Marketing Development	11
Original branding	1
Search of new buyers	11
Export Markets	3
East African Community	3
Other Africa	3
US/EU	0
Reduction of Production	7
Downsizing	7
Change of business	3

Note: 16 local firms supplying mainly to the domestic market.
Source: Interview by the author.

Many respondents replied that it was impossible to compete with imports, which is consistent with our investigation of retail price. They also rejected exporting to the US/EU market as a profitable alternative, and accordingly, their response is to avoid competition rather than to enhance competitiveness. In contrast to them, two local firms started to subcontract after 2000. These two firms started to export to the UK market in 1992 and added supply to the US market by taking subcontract orders. The markets of these firms were diversified, and firm T (Table 3-A1) supplied the EU (36%), US (subcontract, 54%) and domestic market (10%), while firm B supplied East Africa

(43%), UK (25%), US (subcontract, 17%), and domestic market (15%). These firms arranged technical training by a foreign firm or expatriates when they started to export to the UK, which included quality control, training of workers and logistics. They explained that their export experience helped production for the US market, though the US market differs from the EU market with respect to volume (large volume), lead time (shorter) and price (lower). They also employed expatriates with experience in production for the US market, added capacity and installed advanced machines.

4.2. Exporting firms

Exit is a more available measure for EPZ firms than for local firms, as most of them are subsidiaries of a firm group which has production sites in several countries. They tend to occasionally move the location of their production sites in order to minimize cost, and thus, if production in Kenya becomes less attractive than alternative locations, they may close down and shift to another country. The temporary income tax waiver given to EPZ firms also drives the frequent closings, since moving to another country becomes the more favourable choice as a firm approaches 10 years of age, which is the end of the waiver. In fact, the number of EPZ garment firms declined from 35 in 2003 to 19 in 2008.

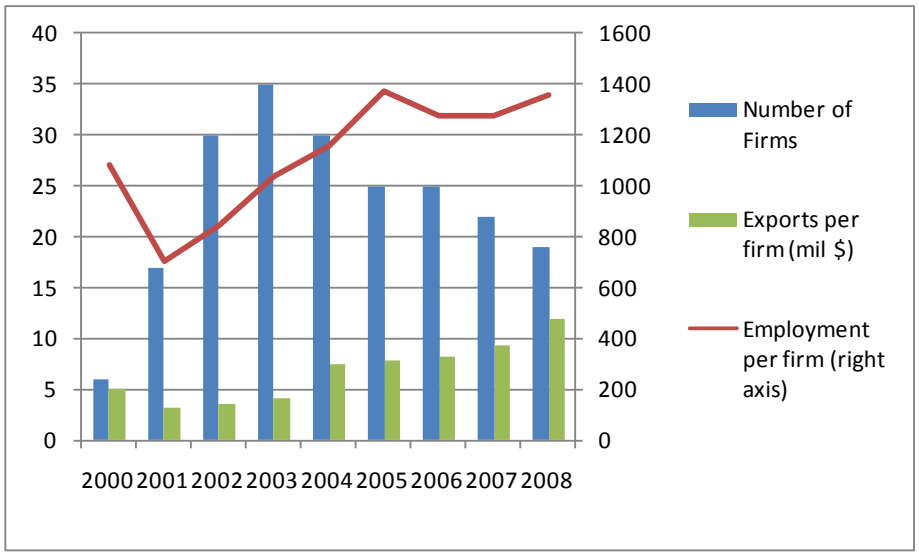
However, decline in the number of firms did not lead to proportional reduction of production and employment. Reduction of production and employment was much more moderate than the fall in the number of firms, and this indicates that the size of the remaining EPZ firms increased. Figure 3-8 indicates that employment per firm after 2005 was larger than that in 2004, and export per firm grew even after 2005. From interviews with EPZ firms and an industrial association, it was found that the remaining EPZ firms bought the production facilities of those that closed down. It may suggest

that EPZ firms remaining in Kenya are pursuing economies of scale to deal with the fall of export prices.

Another strategy was taken by one EPZ firm. This firm started processing the pleat-preserving function for trousers, which makes pleats stay on trousers after washing. The manager explained that production in Kenya became much less profitable due to the fall of export prices after the MFA phase-out, and their headquarters decided to introduce the pleat-preserving processing in the Kenyan factory in order to raise the product's price. This evidence indicates that the production cost in Kenya is too high in the low-priced product segment and that upgrading of product quality is needed for Kenyan exporters to stay in competition.

Though many local exporters closed down or changed to the domestic market, they first made efforts to survive in the export market. Since the profit margin of subcontractors is generally not more than that of the direct contractors with buyers (which is called FOB), maintenance of a high utilization rate is required for subcontractors to profit. The drop in subcontract orders in late 2004 hit their business severely, and some local exporters attempted to obtain FOB orders. Three or more local exporters jointly participated to a trade fair in the US seeking FOB orders, but they were not successful. Two firms attempted to increase FOB contracts in the EU market.

Figure 3-8 Number and Size of EPZ firms



Source: Kenya Export Processing Zones Authority [2005] (2000-2004), Kenya National Bureau of Statistics [2010] (2005-2008)

Appendix to Chapter 3

Appendix 3.1. List of Local Exporters

Table 3-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
A	India, UK	in operation	Working in the same company	Started UK export in 1992, US export in 2002
B	No expatriate	in operation	Textile trader in West Africa	Started US export in 2004
C		(Closed 04/05)		Started US export in 2003
D	Bangladesh, Sri Lanka	in operation [mainly domestic]	Garment firm	
E		Closed 04/05		
F		Closed 04/05		
G		Closed 04/05	Garment firm [relative of a local firm owner]	
H*		(Closed 04/05)		
I*		(Closed 04/05)		
J	Sri Lanka	Closed 06	Textile trading, Min of Defense	
K	India	in operation [mainly domestic]	Owner of supermarket, Banker	
L*	Sri Lanka	(Closed 04/05)		
M	Sri Lanka	Closed 06	Cargo business in East Africa	
N		Closed 06		
O		Closed 06	(wife of former president)	
P	Sri Lanka	in operation	Shoes trading business	
Q	Sri Lanka	Closed 06	Horticulture trading, Min of Treasury	
R	India	Closed 06	HR manager of EPZ, HR manager of bank	Took over firm O
S	India	in operation	Min of Local Government, Engineering consultant	Took over firm M

Chapter 4 Competitiveness and Productivity: Comparison with Bangladeshi Firms

As seen in the previous chapter, Kenyan garment is not competitive in both domestic and export markets. For understanding of its competitiveness relative to exporters in Asia, unit cost as a measure of competitiveness is compared between Kenyan and Bangladeshi firms, and its determinants are examined in this chapter. In the garment market, competitiveness is determined primarily by quality, delivery and price, while price and delivery are most important for the low-priced products that Kenyan and Bangladeshi firms are producing. Although it is not the sole determinant, price is crucial to the competitiveness of products.

As shown in chapter 2, unit cost is determined by productivity, factor prices, efficiency of factor allocation and scale of production. Some studies compared those factors between Asian and African firms, but they demonstrated only part of difference of competitiveness and its determinants. For example, studies based on the World Bank's enterprise survey compare the partial factor productivities (labour and capital productivity) of African and Asian firms (for example, Biggs et al. [1995], Blattman et al. [2004], Shah et al. [2005]), but they are only a crude measure of productivity when the firms face different factor prices and use different technologies. A few studies have explored the impact of factor prices on competitiveness, and they focused on unit labour cost gauged typically as labour costs per value added (Lindauer and Velenchik [1994], Mabye and Golub [2003], Blattman et al. [2004], Shah et al. [2005]). While they indicated a relatively high wage to labour productivity in Africa, it does not tell precise

contribution of wage and productivity to unit cost. Therefore, the background of the competitiveness gap between the industries in Africa and the other regions has not been systematically explored. Through estimation of unit cost function, we consistently explore the competitiveness gap between Kenyan and Bangladeshi firms.

In the next section, a framework for an inter-regional comparison of firm performances is described, including the methodology used for measurement of productivity and identification of its impact on competitiveness. The results of the empirical analysis are shown in the second section, and conclusions are presented in the last section.

1. Framework and Methodology

1.1. Productivity Measurement

Technical efficiency is estimated from the pooled samples of Kenya and Bangladesh using the stochastic production frontier model. In this methodology, production frontier represents the maximum output that technology exhibits given the quantity of inputs, and actual production of an individual firm may be less than the frontier due to technical inefficiency and a random shock on production. Assuming a Cobb-Douglas form[1], a standard production function is expressed as

$$Y_i = \alpha\ K_i^{\beta 1} L_i^{\beta 2} * TE_i * error_i,$$

where Y: output, K: capital, L: labour, TE: technical efficiency between 0 to 1, *error*: stochastic errors with mean at one, and i represents an individual producer. For a firm operating on the frontier, technical efficiency is equal to one, and for those off the

[1] Cobb-Douglas form has advantage to allow specifying cost function parameters based on production function parameters. We prefer avoiding directly estimating a cost function without reliable information on capital price to applying more flexible functional form such as translog.

frontier, it is between 0 and 1.

To understand the effect of labour quality, human capital is incorporated in the function. While the literature suggests a shortage of skilled labour in the African manufacturing sector, production workers in Kenyan garment firms seem to deal with a larger variety of tasks than do workers in Bangladeshi firms, and accordingly, indicators of human capital (i.e., share of skilled labour and average tenure) are higher in Kenyan firms than in Bangladeshi firms (as will be discussed in the next section). If our indicators correctly represent labour quality, negligence of human capital is likely to overestimate technical efficiency of Kenyan firms. So, firstly as a rough measure of human capital, labour is separated into skilled labour, *Ls*, and semi-skilled labour, *Lu*. Secondly, following Hall and Jones [1999], the number of semi-skilled workers is adjusted by their average skill, represented by workers' education and tenure, as $h_i Lu_i$ where $h_i = e^{\pi_1 Tenure + \pi_2 Education}$. The number of skilled workers is not adjusted due to lack of data. This formulation is similar to the Mincerian earning function in the labour literature, and if earning is related with individuals' productivity, application of the Mincerian function will be justified.[2] Then, the production function turns to be,

$$\begin{aligned} Y_i &= \alpha\, K_i^{\beta 1} Ls_i^{\beta 2} \left(h_i Lu_i\right)^{\beta 3} * TE_i * error_i \\ h_i &= e^{\pi_1 Tenure + \pi_2 Education} \end{aligned} . \qquad (4.1)$$

Estimation is based on log form.

$$\ln Y_i = \beta_0 + \beta_1 \ln K_i + \beta_2 \ln Ls_i + \beta_3 \ln Lu_i + \beta_3(\pi_1 Tenure + \pi_2 Experience) - u_i + v_i , \qquad (4.2)$$

where β_0=exp(α), 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 a truncated normal distribution, $N^+(\mu,$

[2] Although wages of all the sample firms differ by tenure but not by education, we followed a standard formulation. Söderbom and Teal [2004] and Fraser [2005] used a similar estimation model for African firm data.

σ_u^2), and the error component, v_i, is assumed to be normally distributed with mean zero, N(0, σ_v^2). Separation of v_i and u_i from regression residuals ($\varepsilon_i = -u_i + v_i$) follows the methodology by Jondrow et al. [1982], which utilizes the conditional distribution of u given ε derived from the distributional assumption on u and v.[3] To have a consistent estimation of efficiency between Kenyan and Bangladeshi samples, an assumption of a common production frontier must be held.

Value added was used instead of gross output as output, because many of the sample firms accept subcontract orders in which material is provided by a buyer. Given that output is measured in value (which will be transformed to a quantity index by a deflator), the subcontractors' gross outputs do not include material value, and thus, use of gross output underestimates their outputs. Bruno [1978] justified the use of value added in a production function when the share of material to gross output is constant (Leontief type) and material price is determined in a competitive market. To measure efficiency of transformation from inputs to output precisely, capital value is adjusted by the utilization rate.

There are two potential problems in the estimation. As we have only cross-sectional data, a distributional assumption on the inefficiency component in residuals (u) must be made. Choice of the distribution may affect estimates of function parameters and technical efficiency, but we do not have prior knowledge. So, two distinct distributions, half normal and truncated normal distribution, were assumed, where the latter is more flexible. Also, following Olson et al. [1980], the production function was estimated without distributional assumption by OLS, and then, technical efficiency was obtained by the method of moments approach. Although the distributional assumption is held in

[3] Estimation is based on the maximum likelihood estimation. Loglikelihood functions and estimation methodology of u are in the Appendix.

the second step, the possible bias in parameter estimates will be avoided.[4]

Secondly, the endogeneity problem on input choice, first discussed by Marschak and Andrews [1944], may arise if a firm determines the amount of input, particularly labour, knowing its own productivity which is unobservable for us. The fixed effect model and some estimation procedures, for example those by Olley and Pakes [1996] and Levinsohn and Petrin [2003], have been suggested, but they are not applicable to cross-sectional data. So, alternatively we take a nonparametric approach based on the index number theory, which is free from the endogeneity problem. 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. Since, unlike the stochastic frontier model, total factor productivity is deterministically drawn, measured TFP includes random shocks on production as well as measurement errors.

1.2. Contribution of Efficiency to Competitiveness

With efficiency measures, we then want to know the contribution of efficiency to competitiveness. In the garment market, competitiveness is determined primarily by quality, delivery and price, while price and delivery are most important for the

[4] Details of the methodology are explained in the Appendix.

low-priced products that Kenyan and Bangladeshi firms are producing (Lall and Wignaraja [1994]). Although it is not the sole determinant, price is crucial to the competitiveness of products. Assuming a price taker, lower unit cost is, less vulnerable to price volatility firms are.[5] Thus, price competitiveness is represented by unit cost, and we attempt to know how much of the difference in unit costs between Bangladeshi and Kenyan firms is explained by inefficiency.

Exploiting the duality of the Cobb-Douglas function, the cost function can be obtained from the production function and cost minimization condition. With the production function (4.1), a firm minimizes cost, $C_i = r_iK_i + ws_iLs_i + wu_i(h_iLu_i)$, 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 adjusted by skill (h_i). It is assumed that the firm may misallocate inputs, and then actual cost becomes greater than minimum cost (allocative inefficiency). The first order conditions of cost minimization with allocative inefficiency are expressed as

$$\begin{aligned} \frac{K_i}{Ls_i} &= \frac{\beta_1 ws_i}{\beta_2 r_i} AE_{1i} \\ \frac{K_i}{h_i Lu_i} &= \frac{\beta_1 wu_i}{\beta_3 r_i} AE_{2i}, \\ \frac{Ls_i}{h_i Lu_i} &= \frac{\beta_2 wu_i}{\beta_3 ws_i} AE_{3i} \end{aligned} \qquad (4.3)$$

where AE_{ni} is an allocative efficiency multiplier with respect to factor n, satisfying $AE_{ni} > 0$ for all n, and it is equal to one when factor allocation is optimal given the factor price ratio.

From the above four equations, the conditional input demand functions are given by

[5] In the following chapters, we argue that competition is not significant in the uniform market, which most of local Kenyan firms are supplying. Though this indicates possibility that they are not a price taker, local Kenyan firms would be so in the local market of other products where competition with imports is significant. Since we evaluate competitiveness of local Kenyan firms relative to imported products in this chapter, price-taker assumption is reasonable.

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

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

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

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

$$\hat{C}_i = r_i K_i + ws_i Ls_i + wu_i (h_i Lu_i) = A\, r_i^{\frac{\beta 1}{\beta}} ws_i^{\frac{\beta 2}{\beta}} wu_i^{\frac{\beta 3}{\beta}} \hat{Y}_i^{\frac{1}{\beta}} TE_i^{\frac{-1}{\beta}} \overline{AE_i}\,, \qquad (4.4)$$

where $A = \beta \left(\alpha \prod_n \beta_n^{\beta n} \right)^{\frac{-1}{\beta}}$ n=1,2,3, $\hat{Y}_i = \alpha\, K_i^{\beta 1} Ls_i^{\beta 2} (h_i Lu_i)^{\beta 3} TE_i$ (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 of the equation (4.4) compose the cost frontier function, and the last two terms represent dispersion of actual cost from the frontier; they are the costs of technical inefficiency and allocative inefficiency, respectively.[6] $\overline{AE} \geq 1$ 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.

Note that the cost expressed in (4.4) accounts only for utilized inputs, since capital in the production function is adjusted by the utilization rate. Thus, actual cost is greater than the cost given by (4.4) if the firm has idle capital (which in fact most of firms do), and this also should be included in the cost of allocative efficiency. Adding the cost of idle capital, η, in multiplicative form, the actual cost is described as

$$C_i = \hat{C}_i \eta_i\,,$$

[6] In the frontier analysis literature, costs of technical and allocative inefficiency are jointly termed as cost (in)efficiency (see for example, Kumbhakar and Lovell [2000]).

where $\eta \geq 1$. Dividing the cost by predicted output, the unit cost is expressed by factor prices, production scale, and inefficiency.

$$D_i = \frac{C_i}{\hat{Y}_i} = A\, r_i^{\frac{\beta 1}{\beta}} ws_i^{\frac{\beta 2}{\beta}} wu_i^{\frac{\beta 3}{\beta}} \hat{Y}_i^{\frac{1-\beta}{\beta}} TE_i^{\frac{-1}{\beta}} \overline{AE}_i \; \eta_i .$$

A comparison of unit cost between Kenyan and Bangladeshi firms and the contribution of each component to this difference are of interest to us. By taking the ratio of the unit cost of firm *i* to firm *j*, we have the following identity.

$$\frac{D_i}{D_j} = \left(\frac{r_i}{r_j}\right)^{\frac{\beta 1}{\beta}} \left(\frac{ws_i}{ws_j}\right)^{\frac{\beta 2}{\beta}} \left(\frac{wu_i}{wu_j}\right)^{\frac{\beta 3}{\beta}} \left(\frac{\hat{Y}_i}{\hat{Y}_j}\right)^{\frac{1-\beta}{\beta}} \left(\frac{TE_i}{TE_j}\right)^{\frac{-1}{\beta}} \frac{\overline{AE}_i \cdot \eta_i}{\overline{AE}_j \cdot \eta_j} \qquad (4.5)$$

The first to third terms on the right-hand side are the contributions of the difference in factor prices to the difference in unit costs, and the fourth term represents the contribution of scale economy. The fifth term is the contribution of technical inefficiency followed by that of allocative inefficiency.

Use of the production function for cost decomposition has an advantage in that the effect of technical efficiency and allocative efficiency can be measured separately, and in a more practical aspect, rental price, which is often unobservable, is not needed for production frontier estimation. 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. With our methodology, possible measurement error in rental price affects only allocative efficiency estimates but not parameter estimates and technical efficiency. Decomposition of unit cost using the production function was proposed by Nishimizu and Page [1986], and our methodology differs from theirs in incorporating stochastic efficiency and allowing cross-sectional

comparison.[7] Also, while Nishimizu and Page [1986] assumed zero profit, non-zero profit is allowed in the above procedure.

To have decomposition by (4.5), a cost function must be known. It is noted that the cost function (4.4) is deterministic because the stochastic error is absorbed by $\hat{Y} = Y/error$. Parameters and technical efficiency are given by the production function, and the cost of allocative inefficiency, $\overline{AE}$, is calculated from *AE*, which is estimated by the equation (4.3). From the definition, η is given by dividing *C* by $\hat{C}$. With this information, the difference of unit costs of two firms can be decomposed to factor prices, scale economies and inefficiencies.

1.3. Data

Firm data were collected in Bangladesh and Kenya in 2003 under the UNIDO COMPID project. The sample was drawn from firms with more than 10 employees, and the data was collected from 222 firms in Bangladesh and 71 firms in Kenya. The number of samples reflects the size of the industry in each country; the Bangladeshi industry has more than 3,000 firms, and the Kenyan industry is estimated to consist of 120 to 150 firms.[8] While the Bangladeshi sample was drawn by the stratified sampling method, 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.[9] Excluding outliers and those with insufficient information, 165 firms in Bangladesh and 47 in Kenya were retained for analysis. While all Bangladeshi samples export to US/EU markets, only seven firms do so in the Kenyan samples. Among them, five firms are multinational firms established after 2000, and they are registered as Export Processing Zone (EPZ)

[7] Nishimizu and Page [1986] decomposed the growth rate of unit cost based on time-series data, while we decompose the ratio of unit costs across observation units.
[8] Estimation by the author for the firms employing more than 10 employees.
[9] The last census of Kenyan industry was carried out in 1977. See Appendix 2.1 in Chapter 2 for the sampling method and Appendix 2.2 fir a questionnaire.

firms in order to utilize the advantages of AGOA.

Output values were collected in local currency. Although purchasing power parity (PPP) is the standard instrument for converting value in local currency to a quantity index, utilizing it as an international price deflator, we have used the exchange rate instead of PPP due to the following reasons. All products of Bangladeshi firms and multinational firms in Kenya are exported and priced in US or EU markets, and thus, conversion by exchange rate is appropriate. On the other hand, most Kenyan local firms supply their domestic market, but comparisons of prices in the Kenyan and US/EU markets showed that exchange rate is a more consistent international price deflator than PPP.[10] Since usage of the exchange rate results in a higher price for Kenyan products than the PPP, deflation by the exchange rate leads to a smaller output quantity index for Kenyan local firms and results in lower technical efficiency estimates than deflation by the PPP.

Capital value and the number of employees are used as input. Capital value covers only equipment and it was constructed using the perpetual inventory method and converted by the exchange rate.[11] Use of the exchange rate is reasonable, provided that all equipment is imported in both countries. Land and premises were omitted to avoid possibly large measurement error since they were occasionally purchased long time ago. Such omission implies that we assume perfect complementarities between equipment and land and premises that were used for production. As for labour, operators and helpers are classified as semi-skilled worker and others including supervisor, engineer, and officers are treated as skilled worker.

Regarding factor prices, wages are obtained as labour costs per worker, while capital rental price is not explicitly observed. Rental price can be estimated from capital service

[10] See Appendix 4.1.3 for details of an international price deflator.
[11] See Appendix 4.1.2 for details of capital value construction.

cost, which is available in the dataset, but reported capital service cost does not include interest and/or dividends for owners' contribution to capital purchases. Therefore, the rental price was estimated from the arbitrage condition of investment. Assuming the same rate of return on all investments and perfect foresight, the arbitrage condition is

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

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 the same for all samples, $p_i = p$. Arranging the arbitrage condition, the rental price is given as

$$r_{i,t} = \left(R_i + \delta - \frac{p_{t+1} - p_t}{p_t} \right) p_t . \qquad (4.6)$$

For Bangladeshi and Kenyan local firms, the real interest rate of each country was used for R_i. For EPZ firms which often finance investment in a home country, the real interest rate of India, where many of them originate, was used. The asset price change was calculated from the US deflator, and thus, it is common to all observations. Given that all equipment is imported, asset price, p_t, is assumed constant for all observations, and is normalized at $p_t = 1$. Consequently, the rental price of capital varies with the nationality of the firms and does not consider individual price variation according to, for example, credit constraint.

This may cause a downward bias in estimation of allocative efficiency for firms suffering severe credit constraint (these firms may be misestimated as less efficient than they actually are). To check the bias, alternative rental price is estimated from the reported capital service cost and compared with the one based on the equation (4.6). The two estimates are similar and the main results of the analysis are not altered (see Appendix 4.1.4). Note that estimates of production function parameters and technical

efficiency are not affected by the estimates of rental price.

2. Empirical Analysis

2.1. Overview of the Statistics

Basic production statistics of the sample firms are described in Table 4-1. The table shows that, on average, Bangladeshi firms are about five times larger than Kenyan local firms in terms of output, while Kenyan EPZ firms are the largest among the three groups.[12] This probably reflects nationality of ownership; all Kenyan EPZ firms are owned by foreign capital while almost all Bangladeshi firms are locally owned.[13] In terms of inputs, Kenyan firms are more capital intensive than Bangladeshi firms on average, and this is consistent with the relative factor prices, as we will see later. This also indicates that Bangladeshi firms are highly profitable; the average share of profit to value added is about 70%, while the profit share of Kenyan firms, including EPZ firms, is much less.[14]

From the author's field observations, differences appear in the production systems of Kenyan local firms (non-exporters) and other firms (exporters) in two aspects. Exporters to US/EU markets have highly decomposed assembly lines where machine operators specialize in small tasks, while Kenyan local firms have less decomposed lines, or sometimes no assembly line in the sewing process. In such cases, one operator sews a whole product. Secondly, the number of floor-level workers per sewing machine in

[12] It is also noted that standard deviations of output are large. This means that there is large variation in firm size within the groups as well as between them, yet the averages of gross output and value added of Kenyan local firms are significantly different from those of Bangladeshi firms at 1% level.
[13] Refer to Chapter 3 for detail of ownership.
[14] Profit was obtained by subtracting capital and labour costs from value added, and hence, it includes tax and any other costs not stated in a questionnaire. It can be a reason of relatively high profit share, though similar figure is reported in Bakht et al. [2009] studying the Bangladeshi garment industry. Kenyan EPZ firms were waived from corporate tax as a part of the incentives.

Table 4-1 Production and Cost Statistics by Group (mean and standard deviation)

	Bangladeshi Firms	Kenya Local Firms	Kenyan EPZ Firms
Gross output (1000US$)	2977.7 (2247.7)	549.8 (1115.5)	13800.0 (21100.0)
Value added (1000US$)	1554.1 (1261.5)	261.5 (720.3)	8739.4 (15100.0)
Number of workers	535.2 (250.7)	78.5 (161.5)	892.4 (376.9)
Capital value (1000US$)	121.1 (85.1)	45.2 (91.0)	716.8 (809.8)
Utilized capital value / worker	372.4 (289.4)	428.2 (475.6)	618.6 (575.5)
Share of skilled workers	0.128 (0.055)	0.283 (0.165)	0.054 (0.025)
Average tenure of semi-skilled workers (years)	2.31 (0.77)	3.99 (1.91)	2.00 (1.37)
Average education of operators (years)	5.00 (2.25)	9.62 (2.55)	9.60 (2.19)
Profit/VA	0.715 (0.228)	0.252 (0.502)	0.481 (0.486)
Unit cost (= $\frac{1}{\text{Profit/VA}}$)	0.266 (0.220)	0.655 (0.437)	0.620 (0.606)
Labour cost per worker (US$)	469.0 (225.6)	1330.5 (688.3)	1064.7 (432.6)
Labour cost per skilled worker	1384.5 (663.0)	2884.7 (2181.3)	4043.7 (2698.4)
Labour cost per semi-skilled worker	346.4 (164.4)	937.7 (382.8)	877.1 (308.5)
Rental price (estimated)	0.184 (0.000)	0.171 (0.000)	0.144 (0.000)
Labour productivity (US$)	3099.6 (2270.6)	3035.7 (2855.2)	9556.9 (16935.9)
N	165	42	5

Note: Standard deviations are in parentheses.

Kenyan local firms is lower than that of exporting firms.[15] This means that they allocate fewer helpers to assembly lines, and thus, operators in Kenyan local firms have to cover a wider range of processes than those in exporting firms. Accordingly, Kenyan local firms display the longest average tenure of operators and the highest share of skilled workers among all the firms (Table 4-1). This may indicate that labour is substituted by the skill of workers as well as capital. Kenyan EPZ firms, on the other

[15] 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 (The number of sewing machines is adjusted by the utilization rate, and workers are restricted to those working in the sewing section so that the figure reflects the production characteristics in the sewing process).

hand, maintain a highly decomposed assembly line where the number of workers per machine is lower than at Bangladeshi firms. They install new, high-tech equipment (i.e., specialized and computerized sewing machines), and thus, labour seems to be substituted by machines.

Unit cost is defined as capital and labour service costs per value added, where capital service cost includes only equipment. The average unit cost of a Kenyan local firm is 2.46 times higher than that of Bangladeshi firms. This is partly explained by the labour cost per worker, given that the labour cost in Kenyan local firms is 2.84 times higher, while the rental price and average labour productivity is almost the same between the two groups. Cost statistics of EPZ firms show a similar trend, although their unit cost and labour cost are slightly lower.

The cost structure is consistent with the market performance of the garment industry in the two countries. With high production costs, Kenyan firms cannot compete with imports in the domestic market. In the export market, increased competition due to abolishment of the quota system has led to stagnation of Kenyan exports, while the Bangladeshi industry has kept growing. Cost statistics clearly show that the Bangladeshi industry outperforms the Kenyan industry in the liberalized export market.

Cost statistics also show that wages in Kenyan firms are strikingly high. Due to relatively high wages, Kenyan firms have employed more capital and skill than their Bangladeshi counterparts, but capital intensity does not raise labour productivity sufficiently to cancel the high labour cost.[16] Simple statistics, however, do not indicate whether this is because wages are too high to be offset by capital-labour substitution or because mismanagement led to misallocation of factors (too little capital) and lowered the efficiency of production. The sources of the unit cost difference will be approached

[16] Due to one outlier, the average labour productivity of Kenyan EPZ firms is higher than others. Median value is 2789.4, which is comparable with averages of Bangladeshi and local Kenyan firms.

in the following sections.

2.2. Measurement of Technical Efficiency

The main production activity in the garment assembly process includes two types of work: sewing and knitting. While woven garments such as woven shirts and trousers are produced using only the sewing process, knitted garments like T-shirts and sweaters are made using the knitting process and occasionally the sewing process. To reflect the technological difference, a dummy variable, *Sewing*, is included in the estimation model to distinguish the firms using the sewing process from those using only the knitting process. The heteroskedasticity test indicates group-wise heteroskedasticity around the process dummy, *Sewing*,[17] and then, the auxiliary models are added to estimate σ_{ui} and σ_{vi}, as $\ln\sigma_{ui} = \boldsymbol{\delta_1}(1, Sewing_i)$ and/or $\ln\sigma_{vi} = \boldsymbol{\delta_2}(1, Sewing_i)$. Significant correlation is reported only for σ_{vi}. A dummy for Kenyan local firms, *Klocal*, is also added to pick up possible differences in productivity according to production systems.

The benchmark model assuming a half normal distribution for inefficiency has yielded significant coefficients on inputs, and variance of inefficiency (σ_u) is also significantly different from zero at the 5% level (Column 1 in Table 4-2). The estimated coefficient for capital is 0.15, and those for skilled and semi-skilled labour are 0.50 and 0.43, respectively. The elasticity and marginal productivity of skilled workers is greater than that of semi-skilled workers.[18] Constant returns to scale cannot be rejected at the 10% level. The Kenyan local dummy is also not significant, and this implies that Kenyan local firms are not technically different from the others. In Column 2, the assumption of a half normal distribution of inefficiency was replaced by a truncated normal distribution that allows a mode of distribution having any positive values. The

[17] See Appendix 4.3 for the test results.
[18] Marginal productivities for skilled and semi-skilled workers calculated at the sample mean input and output levels are $12,838 and $1,262, respectively.

result is quite similar to the benchmarked model with a slightly larger coefficient for capital. It is noted that variance and the mode of inefficiency (σ_u and μ) do not significantly differ from zero, that is, there is no statistical support for a truncated normal distribution. The OLS estimate which does not require a distributional assumption on inefficiency is reported in Column 3. It yielded a lower parameter for capital and a higher parameter for semi-skilled workers, but these are relatively small differences. Overall, parameter estimates are stable over the variation of estimation models.

The result that the production system dummy, *Klocal*, was insignificant suggests that the production system of Kenyan local firms is technologically equivalent to that of exporters.[19] This is reasonable because a short assembly line is more efficient when production scale is small. The two systems share the same technology but differ in the optimal size of production. We predicted, from the field observation, that labour is substituted by skill of workers in Kenyan local firms. Parameter estimates suggested that skilled workers show higher marginal productivity than the semi-skilled, while tenure and education remained insignificant. Given the higher intensity of skilled labour in Kenyan local firms than in others, the estimates supported our prediction.

[19] A different coefficient on inputs for Kenyan local firms is also rejected at the 10% level. See Appendix 4.3 for the result.

Table 4-2 Results of Estimation of the Production Function

Dependent variable: ln Value Added

	1	2	3	4	5	6
	Stochastic Frontier	Stochastic Frontier	OLS and Method of Moment	Stochastic Frontier	Stochastic Frontier	Stochastic Frontier
Distribution of *u*	Half Normal	Truncated Normal	Half Normal	Half Normal	Half Normal	Truncated Normal
lnK	0.154* (0.073)	0.182* (0.071)	0.119 (0.092)	0.159* (0.074)	0.158* (0.073)	0.110 (0.072)
lnLs	0.495** (0.114)	0.481** (0.112)	0.470** (0.136)	0.496** (0.115)	0.447** (0.109)	0.441** (0.112)
lnLu	0.434** (0.114)	0.452** (0.118)	0.545** (0.137)	0.475** (0.106)	0.479** (0.105)	0.525** (0.114)
Tenure	0.035 (0.043)	0.028 (0.042)	0.003 (0.058)	0.031 (0.043)		
Education	0.025 (0.023)	0.032 (0.022)	0.040† (0.023)	0.019 (0.021)		
Sewing	0.199 (0.131)	0.332* (0.130)	0.162 (0.122)	0.215 (0.133)	0.201 (0.133)	0.315* (0.130)
Klocal	-0.209 (0.237)	-0.195 (0.268)				
Cons	7.987** (0.663)	7.421** (0.655)	7.892** (0.644)	7.693** (0.579)	8.060** (0.509)	8.297** (0.583)
σ_v^2		0.260** (0.067)	0.210** (0.030)			0.174** (0.057)
σ_u^2	0.855* (0.340)	6.085 (13.776)	1.162** (0.130)	0.839* (0.368)	0.842* (0.364)	1.607 (1.197)
$\sigma^2=\sigma_v^2+\sigma_u^2$		6.345 (13.800)	1.371 (0.160)			1.781 (1.213)
$\gamma=\sigma_u^2/\sigma^2$		0.959 (0.086)				0.902 (0.065)
μ		-8.115 (22.349)				
	Auxiliary Equation 1: Dependent var: $\ln\sigma_v^2$					
Sewing	1.226* (0.619)			1.167* (0.583)	1.198* (0.541)	
cons	-2.268** (0.625)			-2.191** (0.562)	-2.206** (0.501)	

Auxiliary Equation 2: Dependent var: μ						
M-edu						-1.071 (0.873)
M-exp						-0.011 (0.033)
Delivery						0.058 (0.057)
Sales Collection						-0.018 (0.023)
Blackout						0.019 (0.015)
Blackout*Generator						-0.028 (0.022)
cons						0.498 (1.294)
Constant returns to scale: χ^2 stat, p-value	1.08 [0.299]	1.85 [0.174]	4.49 [0.035]	4.25 [0.040]	2.54 [0.111]	
Average technical efficiency	0.546 (0.170)	0.601 (0.190)	0.503 (0.196)	0.549 (0.168)	0.549 (0.168)	
N	212	212	212	212	212	182

Note: Standard errors are in parentheses (Heteroscedasticity robust SE is reported for OLS estimates). P-values for the test of constant returns to scale are in square brackets. **, * and † indicate that the coefficient is significantly different from zero at, respectively, the 1%, 5% and 10% levels.

Based on the above results, technical efficiency is recalculated excluding the Kenyan local dummy from the estimation model to avoid that insignificant but negative effect of the dummy which gives overestimation to Kenyan local firms (Columns 4 and 5 in Table 4-2). Group-wise heteroskedasticity is kept controlled as negligence yields a bias in estimates of technical efficiency (Kumbhakar and Lovell [2000]). The average of technical efficiency is 0.55 (Columns 1 and 2 in Table 4-3). These estimates are comparable to the results of other studies measuring the technical efficiency of the garment industry.[20] The sample is divided into Bangladeshi, Kenyan local and Kenyan EPZ firms, and group averages of the technical efficiency are also listed. A comparison demonstrated that the difference among the three group averages is small in both

[20] The studies of the Columbian and Indonesian textile and garment industries reported that the average technical efficiency is 0.55 and 0.63, respectively (Tyler and Lee [1979], Hill and Kalirajan [1993]). The studies of African textile and garment industries reported a mean technical efficiency ranging from 0.40 to 0.69 (Biggs et al. [1995], Mazumdar and Mazaheri [2003], Mlambo [2002], Lundvall et al. [2002]).

models. In particular, the averages of Kenyan local firms and Bangladeshi firms are very close, and the difference is not significant at the 10% level in all the estimates. Because of control of labour quality of semi-skilled workers, the average technical efficiency of Kenyan local firms in Column 2 is slightly smaller, while it is opposite for the Bangladeshi average. The distribution of technical efficiency indicates that outliers do not affect the averages (Figure 4-1).

Table 4-3 Average Technical Efficiency and Relative TFP

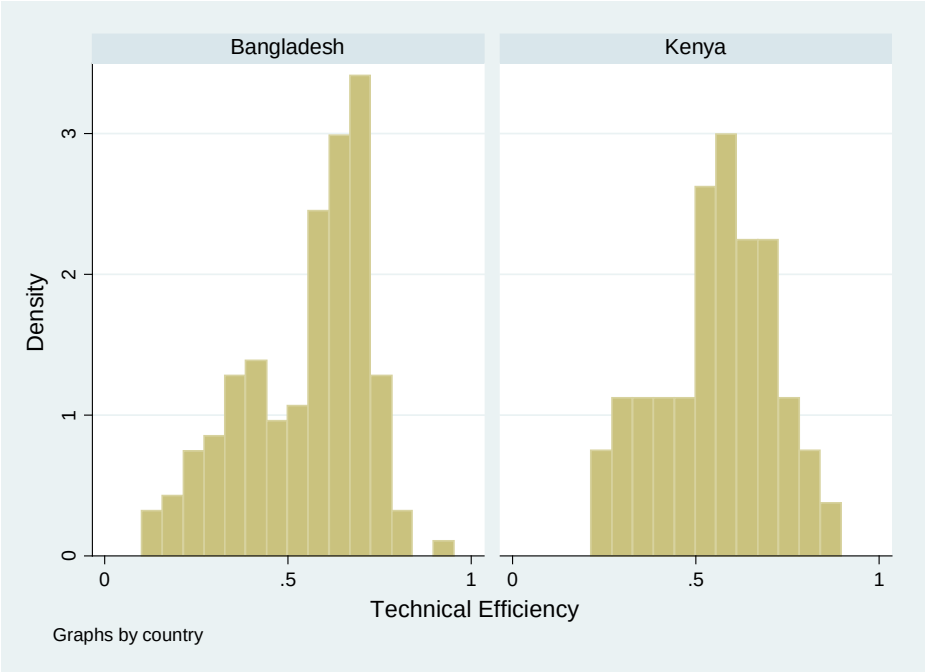
	1	2	3	4
	Technical Efficiency			
	Stochastic Frontier	Stochastic Frontier	OLS, Method of Moment	Relative TFP
Dependent Var	ln Value Added			
Independent Var	ln*K*, ln*Ls*, ln*Lu*, *Sewing*	ln*K*, ln*Ls*, ln*Lu*, *Tenure*, *Education*, *Sewing*		
Total	0.549 (0.168)	0.549 (0.168)	0.503 (0.196)	-0.134 (0.805)
Bangladeshi Firms N=165	0.547 (0.172)	0.550 (0.171)	0.507 (0.197)	-0.153 (0.816)
Kenyan local firms N=42	0.553 (0.145)	0.546 (0.150)	0.488 (0.181)	-0.097 (0.662)
Kenyan EPZ firms N=5	0.584 (0.233)	0.574 (0.238)	0.516 (0.299)	0.185 (1.513)

Note: Base models of Columns 1 to 3 are shown in Columns 5, 4, and 3 in Table 4-2, respectively. Standard deviations are in parentheses.

Alternative methodologies did not alter the relationship of average efficiencies by the firm group. The method of moments approach based on OLS residuals yielded lower technical efficiency overall (0.503), but the average of Kenya local firms does not significantly differ from the Bangladeshi average (Column 3 in Table 4-3). For relative TFP by the index number approach, Kenyan local firms marked a higher score partly, the averages of the two groups are not significantly different (Column 4). In terms of transformation of input to output, Kenyan local firms are on average as efficient as the Bangladeshi firms that have remained competitive in the US and EU markets for more

than two decades.

Figure 4-1 Density Distribution of Technical Efficiency



Estimation also indicates that the technical efficiency of firms participating in the global production network is not higher than those not participating. This result appears inconsistent with the literature on FDI spillover and learning-by-exporting that showed a technological advantage in the firms in the global production network. This may not be surprising because, as mentioned above, exporters are not necessarily technical leaders in the production system for the domestic market. In addition, the average technical efficiency of Kenyan local firms may have been increased by the shrinkage of the industry during the past decade, which accelerated the exit of inefficient producers. Yet, this does not necessarily mean that local firms can start production for the export market immediately. From the author's field interviews, local firms attempting to enter the export market have learned about the design of production lines, quality control, and market linkages from EPZ firms and expatriates. Participation in the global production

network requires substantial learning by firms, as argued in the literature. Our results indicate that Kenyan local firms manage their own production systems as efficiently as Bangladeshi exporters do, but our results do not imply that Kenyan firms are capable of supplying the export market without further learning.

The impact of the business environment and managerial skills, which are proposed as the reason for the poor performance of the African manufacturing sector, were investigated. Firm-level information on the business environment and managers' characteristics was collected (Table 4-4). This information shows that delays in material delivery occurred most frequently in EPZ firms, probably because of importation of Asian fabrics, and time required for sales collection is longest in Kenyan local firms. The most frequent electrical blackouts are reported by Bangladeshi firms. Overall, no clear difference was detected in the business environments of the two countries. This is consistent with the fact that Bangladesh is ranked as one of the worst countries in terms of governance (e.g., World Bank Institute [2011]). Regarding managers' characteristics, managers of exporting firms have a higher educational level, whereas those in Kenyan local firms have longer experience.

Table 4-4 Business Environment and Managers' Characteristics by Group

	Delay of Delivery (times)	Days to Collect Sales	Blackouts (days)	Post-Secondary Education Dummy	Experience in Garment Industry (years)
Bangladeshi Firm	1.1 (3.4)	21.5 (15.2)	17.6 (32.8)	0.96 (0.18)	10.5 (7.0)
Kenyan Local Firm	2.6* (3.6)	62.7* (80.0)	9.4 (8.2)	0.68* (0.47)	15.4* (9.4)
Kenyan EPZ Firm	4.0 (5.0)	22.5 (28.7)	4.3 (1.8)	1.00 (0.00)	14.7 (6.1)

Note: Delivery delay and blackouts in the last three months were surveyed. Standard deviations are in parentheses. * indicates figures statistically different from the Bangladeshi average at the 5% level.

The impact of the above on technical efficiency was tested. Following the method by

Kumbhakar et al. [1991], an exogenous variable is assumed to be correlated with efficiency through the mode of its distribution (μ) as

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

where $u_i \sim N^+ (\mu_i, \sigma_u^2)$, $v_i \sim N (0, \sigma_v^2)$.[21] $\mathbf{W}_i$ is a vector of the variables related with managers' characteristics and business environment, namely managers' education dummy (*M-edu* =1 for post-secondary education and equals 0 otherwise), years of managers' total experience in the industry (*M-exp*), frequency of delivery delay (*Delivery*), days to collect sales (*Sales Collection*), days of blackout (*Blackout)* and the interaction of blackouts with the possession of a generator (*Blackout*Generator*). The result is shown in Table 4-2 (Column 6). The coefficients of all the variables except *Sales Collection* have the expected sign, where a negative sign means that an increase in the variable leads to reduction of inefficiency and higher technical efficiency. However, they are not statistically significant at 10%. Business environment and human capital appear to have a weak association with productive performance. This may be interpreted as meaning that, due to simple and mature technology, production of low-priced garments is less sensitive to the business environment and does not necessarily require high education and experience. Insensitivity of production efficiency to human capital and the business environment allows many firms in low-income countries to compete in the world market.

2.3. Decomposition of Unit Cost Difference

Based on the estimates of technical efficiency, allocative efficiency, and parameters

[21] This method can avoid the unrealistic assumption that exogenous variables (*Wi*) are irrelevant to output, which is necessary when technical efficiency is estimated without these variables and directly regressed on them (Kumbhakar and Lovell [2000]). The estimation is based on the likelihood function that includes $\varphi \mathbf{W}_i$.

of the production function, unit cost difference and its decomposition are estimated by the equation (4.5). The production function estimate is based on the model without workers' tenure and education and the Kenyan local dummy (Column 5 in Table 4-2) because of the persistent insignificant coefficients. So, human capital weight in the equation (4.5), h_i, is assumed to be one.

The first column of Table 4-5 shows the estimations of each component of the equation (4.5) based on the mean values of Bangladeshi and Kenyan local firms, benchmarking on the Bangladeshi mean (which is a denominator). This indicates that the mean unit cost of Kenyan local firms is 2.39 times higher than that of Bangladeshi firms.[22] The following figures in the column are the contribution of factor prices, scale economies and inefficiencies, and if it is greater (smaller) than one, the component contributes to an increase (decrease) in the unit cost of Kenyan local firms relative to Bangladeshi firms. The difference in semi-skilled wages between the two groups makes the greatest contribution, inflating Kenyan unit cost by 56.2%, followed by skilled wage, which pushes up the cost by 31.2%. Jointly, semi-skilled and skilled wages increased the cost of Kenyan local firms by 104.9% (1.562*1.312 = 2.049). This is primarily because of the large difference in wages between the two groups and the relatively large contribution of labour to production. The average of semi-skilled and skilled wages in Kenyan local firms is higher than the Bangladeshi average by 2.7 times and 2.1 times, respectively (Table 4-1).

The relatively small size of production of Kenyan local firms increased the cost by 14.4% due to scale economy.[23] Technical inefficiency actually contributed to a decrease

[22] Table 5 indicates the difference in unit costs between the hypothetical average Kenyan and Bangladeshi firms endowed with average characteristics. Thus, this difference varies slightly from the one obtained from the average unit costs of Bangladeshi and Kenyan local firms in Table 1.

[23] It is noted that the scale effect does not significantly differ from zero, given that increasing returns to scale are not statistically supported in the production function estimate (Column 5 in Table C). Likewise, the effects of technical and allocative inefficiencies do not significantly differ from zero as the group

in relative costs, by 8.0%, because the average of Kenyan local firms is slightly higher. Allocative inefficiency contributed to increase the cost by 15.6%, and the rental price contributed slightly to lower the cost by 1.1%. These two contributions are prone to a possible measurement error in rental price, but estimation using the alternative rental price estimates based on the reported data generated only slight changes in them.[24] The comparison based on the average demonstrates that the large gap in the unit costs between the two groups mainly results from the difference in wages, and to a much lesser extent, from scale economy and allocative inefficiency. The joint contribution of technical and allocative efficiencies is a 6.4% increase (0.920*1.156 = 1.064), which is almost neutral to the cost. The same picture emerges when comparing EPZ firms with Bangladeshi firms (the last column in Table 4-5).

Table 4-5 Decomposition of the Difference of Unit Cost

		Kenyan Local Mean / Bangladeshi Mean	Kenyan EPZ Mean / Bangladeshi Mean
Unit cost (a)	D_i/D_j	2.389	2.475
Rental price (b)	$(r_i/r_j)^{\beta 1/\beta}$	0.989	0.965
Skilled wage (c)	$(ws_i/ws_j)^{\beta 2/\beta}$	1.312	1.525
Semi-skilled wage (d)	$(wu_i/wu_j)^{\beta 3/\beta}$	1.562	1.531
Scale economy (e)	$(Y_i/Y_j)^{1/\beta-1}$	1.144	0.956
Technical inefficiency (f)	$(TE_i/TE_j)^{-1/\beta}$	0.920	0.926
Allocative inefficiency (g)	$AE_i\eta_i/AE_j\eta_j$	1.156	1.305
Process effect § (h)		0.969	0.951

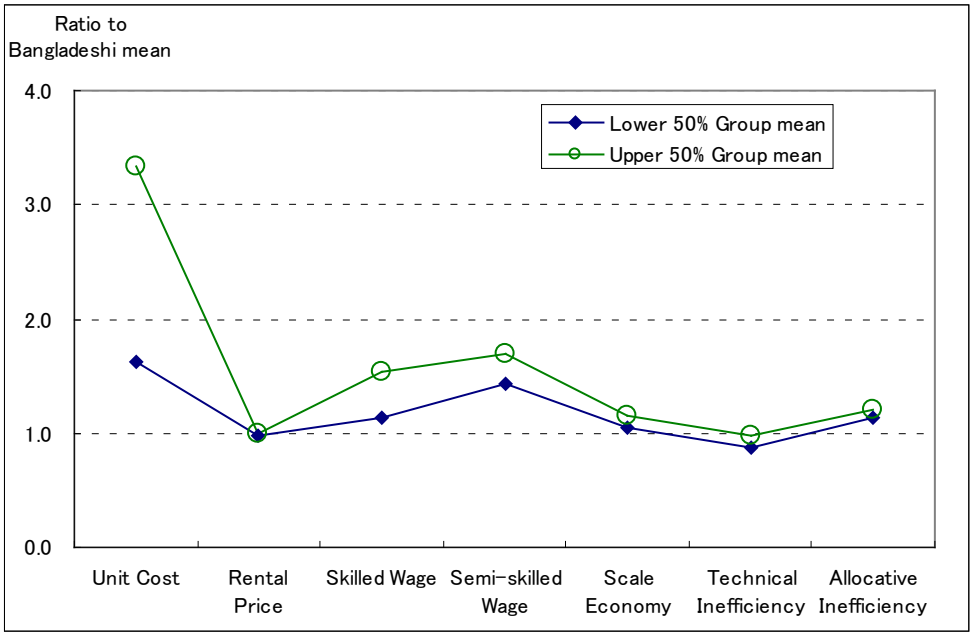
§: 'Process Effect' captures the difference in constants of the cost function (A in the equation 4.4) by the process dummy (*Sewing*).
Note: As indicated by the equation (4.5), a=b*c*d*e*f*g*h.

Kenyan local firms are separated into two groups according to unit cost (lower 50% and upper 50%) and compared with the Bangladeshi mean, respectively (Figure 4-2). Comparing the two groups, the lower 50% group is found to produce at half the

averages are not significantly different, while the wage effects are significant.
[24] With the alternative rental price, the contribution of allocative efficiency is 1.136 (13.6% increase) and that of rental price is 1.004 (0.4% increase). See Appendix 1.5 for details.

cost of the upper 50% group. The former has a lower value for all the components except the rental price, and in particular, the contribution of wages for both skilled and semi-skilled workers is substantially lower than in the upper 50% group. While better performers have higher technical and allocative efficiencies, cost reduction is brought about mainly by lower wages.

Figure 4-2 Contribution to Unit Cost Difference by Two Groups of Kenyan Local Firms



Note: Ratios to the Bangladeshi mean. See text for the grouping of samples

A wage table of the sample firms indicates that wages of semi-skilled worker differs by tenure but not by education and gender (Fukunishi et al. [2006]). Given the considerable difference in the average tenure between Kenyan local and other firms, a part of the wage gap can be attributed to the difference in tenure. Although the average tenure was not significantly correlated with production, netting out its effect on wage will exclude the possible effect of skill on wage. Wages excluding the tenure effect were compared. The Mincerian wage function was estimated,

$$\ln w_i = \rho_0 + \rho_1 Tenure_i + \rho_2 Sewing_i + \rho_3 Klocal_i + \rho_4 Kenya_i + \varepsilon_i ,$$

where *Kenya* is a country dummy. The process and Kenyan local dummies (*Sewing* and *Klocal*) are to incorporate a possible systematic difference in wage due to the process and production system. The country dummy is expected to capture the difference in the labour markets in the two countries.

The regression yielded significant coefficient estimates for tenure, the process dummy, and the country dummy (Table 4-6). It indicated small elasticity for tenure; a one-year increase in tenure leads to an increase in wage of 5.2%, while change in the country dummy from zero to one is associated with a doubling of wage. That is, most of the wage difference between Kenyan and Bangladeshi firms is associated with country specific factors, such as labour market conditions. Based on this result, wage excluding tenure contribution was calculated, and its impact on unit cost was obtained (Table 4-7). As expected, this does not cause a substantial change in the contribution of wages.

Table 4- 6 Result of Wage Function Estimation

Dependent Variable	Log of Semi-skilled Wage
Tenure	0.052†
	(0.028)
Sewing	-0.237**
	(0.071)
Klocal	-0.098
	(0.192)
Kenya	1.072**
	(0.183)
_cons	5.798**
	(0.092)
R^2	0.498
N	212

Note: Heteroskedasticity robust standard errors are in parentheses. **, * and † indicate that the coefficient is significantly different from zero at, respectively, the 1%, 5% and 10% levels.

A World Bank report on the Kenyan manufacturing sector noted the high wage level. It reported that the unit labour costs of Kenyan industries are higher by 20% to 50% than those of India and China (Blattman et al. [2004]). Our result showed that difference

is greater when compared with low-income Asian countries, with which Kenyan firms are competing in the domestic and export markets. More importantly, our result demonstrated that such a difference is engendered mostly by the wage difference, while technical and allocative efficiencies plays minor roles. Most of the wage difference was not attributed to skill.

Table 4-7 Semi-Skilled Wage Conditioned by Tenure

	Average (US$)	Contribution to Unit Cost Difference
Bangladeshi Firms	307.1 (145.3)	-
Kenyan Local Firms	759.5 (302.7)	1.502
Kenyan EPZ Firms	802.1 (329.0)	1.546

Note: exp ($\ln w_i - \rho_1 Tenure_i$) is calculated for individual firms. Standard deviations are in parentheses. The second column indicates the ratio to the Bangladeshi average in $(wu_i/wu_j)^{\beta 3/\beta}$.

What causes the wage difference between Kenya and Bangladesh despite a quite similar GDP per capita? Although a response to this question is beyond the scope of this thesis, it is noted that the minimum wages in the two countries display a large divergence, at US$64.50 per month in Kenya and US$16.00 in Bangladesh.[25] As the semi-skilled wage is affected by the level of the minimum wage, this is a basis for the large wage gap. Furthermore, wages converted by PPP show a much smaller difference, wherein the semi-skilled wage for Kenyan firms is only 26.5% higher than that of Bangladeshi firms. This indicates that much of the difference in wages (and minimum wages) reflects the difference in the price level in the two countries, and Kenyan workers are not better off than Bangladeshi workers, as the exchange-rate converted wages make it appear. In fact, reduction of the Kenyan wage to the Bangladeshi average

[25] The minimum wages are from the Kenya Gazette Supplement No. 43 and the Bangladesh Gazette on January 12, 1994, converted at the exchange rates in 2003. The Bangladeshi minimum wage was raised to US$28.6 in 2006 following a long freeze since 1994, and this figure is closer to the semi-skilled wage in our data.

(equivalent to KSh26,306) would place semiskilled workers' income below the national poverty line (KSh41,052).[26]

3. Conclusion

It has been argued that African firms have lower productivity than firms in other developing countries and that this is a critical source of their lack of competitiveness under globalization. A comparison of Kenyan garment firms with Bangladeshi firms indicates that both local and EPZ firms in Kenya operate as efficiently as Bangladeshi firms on average in terms of transforming input into output. This result is robust with respect to the methodology of productivity measurement. This is notable because Kenyan local firms have little experience in the US/EU markets, while Bangladeshi firms have been successfully competing in the world market for decades. As argued in the literature, the business environment and human capital is poor in Kenyan firms compared with middle-income countries. Yet, they are not poorer than Bangladeshi firms, and because of its relatively simple and mature technology, the garment industry is less sensitive to the business environment and does not require high human capital. Poor endowment does not seem to significantly affect productivity of Kenyan firms.

However, a large gap between the two groups was found in price competitiveness measured as unit cost; the unit cost of Kenyan firms was 2.5 times greater on average. The difference in average unit costs was decomposed based on the production frontier estimation. This revealed that the difference in wages between the two groups explained most of the unit cost difference, and technical inefficiency contributed to slightly reduce

[26] The national poverty line for urban areas is estimated from the official 1997 estimates (Government of Kenya [2000]) by incorporating price changes up to 2003.

the cost gap. Kenyan firms are less competitive due to the high wages, rather than due to the inefficiency of production management.

These results clearly explain market performance of Kenyan garment firms. With the large gap in unit cost, Kenyan garments are not able to compete with low-cost Asian imports and secondhand garments in the domestic market. Hence, local firms evaded competition by specializing in uniform production rather than striving for productivity enhancement. In the export market, while exclusive duty-free and quota-free access compensated relatively high cost of Kenyan garments in the US market until 2004, abolition of the quota system in 2005 has partly, not totally, eroded competitive edge and led to stagnation of export growth. A relationship between export performance and labour costs is observed in other African countries. While the countries with relatively high labor costs, namely Lesotho and Swaziland, experienced stagnation of garment export after 2005, US export from Madagascar where labour costs are as low as Asian countries turned to grow in 2007. [27] This corroborates importance of labour cost in competitiveness.

In addition to southern African countries, wages in CFA Fran countries are also generally higher than in Asian countries (Rama [2000], Mbaye and Golub [2003]). The adverse effect of wages on competitiveness is likely to be significant in other labour-intensive industries considering the correlation of wages for semi-skilled workers. Since labour-intensive industries are most technically feasible for low-income countries and they preceded industrialization of many Asian countries, wage could be one of the important factors in industrial stagnation in some African countries. More empirical studies are needed to demonstrate this point.

Given the relatively high price levels in African countries with high wages, reduction

[27] The monthly wage for operators is US$100 in Lesotho, US$80 in Swaziland (Gibbon [2003]), and US$50-55 in Madagascar (author's interview with the exporters association), while our Kenyan data shows US$87 to 89 for local firms, and US$68 to 80 for EPZ firms.

of wages aggravates poverty. As the Mauritian case shows, industry can remain competitive with relatively high labour costs through improvement of efficiency and upgrading from the bottom-end to the middle range market.[28] Improvement of productivity is a possible solution for labour-intensive industries in those African countries with high wages. We work on productivity changes in the next chapter, which shows that average productivity rather fell among Kenyan local firms. We also work to understand what prevented them from strengthening competitiveness.

[28] Subramanian and Roy [2003] showed improvement of productivity in the Mauritian industry.

Appendix to Chapter 4

Appendix 4.1. Data Construction

1. Sample Used in Estimation

Some samples did not have complete information regarding input and output, particularly the Kenyan sample, due to lack of capital inventory. Only 248 firms out of 293 provided full information. Among these, the samples with incorrect information were also excluded; that is, firms with negative value added, unrealistic labour costs per worker, capital value per worker, or share of labour costs in value added were eliminated. The latter three restrictions were imposed based on our belief that the number of workers is the most reliable information, and so we excluded the samples with unrealistic wages, capital value, and output considering number of workers. The specific restrictions stipulate that labour cost per worker be in the range of US$100 to $2000 for Bangladesh and $500 to $5,000 for Kenya, that capital value per worker be below $5,000, and that the share of the wage bill in value added be greater than 4%. Incorrect data was seen primarily in the Bangladeshi samples. Excluding these firms, 212 firms (165 Bangladeshi firms and 47 Kenyan firms) remained in the sample. It should be noted that, without the restrictions on labour cost per worker and wage share in value added, similar results were obtained, and in particular, the key finding that average technical efficiency does not significantly differ between Bangladeshi and Kenyan local firms was retained.

2. Capital Value Construction

Only the value of equipment was constructed using the perpetual inventory method

based on purchase information (price and year) of all equipment. For some Kenyan samples with incomplete capital purchase price data, capital value was estimated from resale value data. For deflation, a US deflator (price indexes for 'special industry machinery' issued by the Bureau of Economic Analysis) was used for both Kenyan and Bangladeshi samples after capital value was converted to US dollars using the exchange rate. Use of the US deflator is reasonable given that almost all capital equipment was imported. The depreciation rate is set at 10% based on a comparison of constructed capital value with resale value among the Kenyan samples. To check robustness of the results, alternative capital value was constructed using a depreciation rate of 5%, and we found that the main results including technical efficiency remained unchanged (see Appendix 4.3).

3. International Price Deflator

The data of input and output values is in local currency and needs to be converted to quantity when used for the production function. Given the diversity of equipment and products, quantity of capital and output is not usually given in a consistent way. So, a quantity index is normally used, which is derived by dividing value by a price deflator. For imported input (capital equipment) and exported products which are priced in OECD countries, the exchange rate from local currency to US dollars is an appropriate price deflator, as long as the price levels in OECD countries are similar. All Bangladeshi firms and Kenyan EPZ firms export products to US/EU markets, and all sample firms use imported equipment.

For output sold in the domestic market, purchasing power parity is a standard international price deflator. The PPP rate of the Kenyan shilling to the US dollar for consumption goods is Ksh27.59, while the exchange rate is Ksh75.94 (2003, Penn

World Tables). This means that, at the exchange rate-converted price, the same goods cost about three times more in the US than in Kenya, but the average producer prices of T-shirts, men's shirts and trousers in the Kenyan market are not lower than those for the export market (mainly the US market) at the exchange rate-converted price, despite the relatively low quality of Kenyan products. Therefore, the PPP rate is likely to undervalue Kenyan products, and this consequently leads to overestimation of the quantity index of Kenyan local firms supplying the domestic market. To avoid the bias, the exchange rate was used as a price deflator. Estimates of the technical efficiency of Kenyan local firms tend to be smaller than estimates based on the PPP-converted quantity index.

4. Rental Price Estimation

The rental price of capital can be estimated by two distinct methodologies. One is based on the capital service cost reported by sample firms, and the other is based on the arbitrage condition for investment (see Section 2.3). Given that capital service cost is rental price multiplied by quantity of capital (r_iK_t), rental price is obtained by dividing the reported service cost by quantity of capital, which can be replaced by capital value (p_iK_t), when asset price of capital is normalized at one (p_i=1).

Though this estimate has an advantage in that it reflects the heterogeneity of rental prices among firms, it also has serious problems in that the reported service cost does not includes interest and dividends for capital purchased using the owners' personal funds, and in some samples, it includes service cost for land and buildings that are excluded throughout this paper. Because of the above reasons, rental price was estimated using the arbitrage condition at the cost of ignoring variation in rental prices among firms (but rental price differs among Kenyan local, EPZ and Bangladeshi firms).

The choice of estimates affects the estimation of allocative efficiency and decomposition of unit cost by the equation (4.5), while it does not affect production function estimation.

To see the bias that may be borne, two estimates of rental price and the related estimation results are compared; Table 4-A1 shows the two estimates of rental price. It indicates that rental price based on the reported value is higher than the one based on the theoretical deduction in Kenyan local and EPZ firms, while it is lowers in Bangladeshi firms. It also shows that variation of rental price within the group is not small. Since the reported values may be overvalued due to inclusion of service cost of land and buildings, the higher price for Kenyan firms does not necessarily imply that the actual rental price is higher than the theoretical deduction.

Table 4-A1 Comparison of Estimated Rental Prices

	Rental price based on reported capital costs	Rental price based on arbitrage condition
Bangladesh	0.158	0.184
N=163	(0.116)	(0)
Kenyan Local	0.234	0.171
N=37	(0.183)	(0)
Kenyan EPZ	0.187	0.144
N=3	(0.132)	(0)

Note: Seven observations in which rental price is greater than one are excluded from the sample, as it should be less than one with normalization of asset price of capital.

Table 4-A2 shows the unit cost decomposition using the rental price based on the reported information. Since the actual capital-labour ratio is smaller than the optimal ratio for most of the firms, the greater rental price for the Kenyan firms leads to improvement of their allocative efficiency, and accordingly, reduction of its contribution to the unit cost gap with the Bangladeshi firms. Therefore, the contribution of rental price to the unit cost gap becomes larger. Contributions of the other factors (labour cost, scale economies and technical efficiency) are not affected (however, the figures in Table

4-A2 are slightly different from those in Table 4-5 because seven observations in which rental price is greater than one are excluded from the sample).

Table 4-A2 Decomposition of the Difference of Unit Cost

		Kenyan Local Mean / Bangladeshi Mean	Kenyan EPZ Mean / Bangladeshi Mean
Unit cost (a)	D_i/D_j	2.367	2.171
Rental price (b)	$(r_i/r_j)^{\beta 1/\beta}$	1.004	0.983
Skilled Wage (c)	$(ws_i/ws_j)^{\beta 2/\beta}$	1.302	1.794
Semi-skilled Wage (d)	$(wu_i/wu_j)^{\beta 3/\beta}$	1.562	1.589
Scale Economy (e)	$(Y_i/Y_j)^{1/\beta-1}$	1.141	0.932
Technical Inefficiency (f)	$(TE_i/TE_j)^{-1/\beta}$	0.920	0.813
Allocative Inefficiency (g)	$AE_i\eta_i/AE_j\eta_j$	1.136	1.074
Process Effect § (h)		0.972	0.951

§: 'Process Effect' captures difference in constants of cost function (A in equation 4.4) by process dummy (*sewing*).
Note: As indicated by the equation (4.5), a=b*c*d*e*f*g*h.

Appendix 4.2. Estimation Procedure

1. Estimation by MLE (Likelihood Functions and Estimation of u_i)

The inefficiency term u in equation (4.2) has the density function as follows:

$f(u) = \frac{2}{\sqrt{2\pi}\sigma_u} \cdot \exp\left\{-\frac{u^2}{2\sigma_u^2}\right\}$ when u is assumed to follow a half normal distribution,

and

$f(u) = \frac{2}{\sqrt{2\pi}\sigma_u} \cdot \exp\left\{-\frac{u^2}{2\sigma_u^2}\right\}$ when u is assumed to follow a truncated normal distribution.

The density of v is

$$f(v) = \frac{1}{\sqrt{2\pi}\sigma_v} \cdot \exp\left\{-\frac{v^2}{2\sigma_v^2}\right\}.$$

The joint density function of u and v provides the joint density of u and ε, given $\varepsilon=-u+v$. Then, by integrating u out of $f(u, \varepsilon)$, the marginal density function of ε is

$$f(\varepsilon) = \int_o^\infty \frac{2}{2\pi\sigma_u\sigma_v} \cdot \exp\left\{-\frac{u^2}{2\sigma_u^2} - \frac{(\varepsilon+u)^2}{2\sigma_v^2}\right\} du$$
$$= \frac{2}{\sqrt{2\pi}\sigma} \cdot \left[1 - \Phi\left(\frac{\varepsilon\lambda}{\sigma}\right)\right] \cdot \exp\left(-\frac{\varepsilon^2}{2\sigma^2}\right) \cdot$$

given a half normal distribution, and

$$f(\varepsilon) = \int_o^\infty \frac{1}{2\pi\sigma_u\sigma_v\Phi(-\mu/\sigma_u)} \cdot \exp\left\{-\frac{(u-\mu)^2}{2\sigma_u^2} - \frac{(\varepsilon+u)^2}{2\sigma_v^2}\right\} du$$
$$= \frac{1}{\sqrt{2\pi}\sigma\Phi(-\mu/\sigma_u)} \cdot \Phi\left(\frac{\mu}{\sigma\lambda} - \frac{\varepsilon\lambda}{\sigma}\right) \cdot \exp\left(-\frac{(\varepsilon+\mu)^2}{2\sigma^2}\right)$$

given a truncated normal distribution, where $\sigma=(\sigma_u^2+\sigma_v^2)^{1/2}$, $\lambda=\sigma_u/\sigma_v$, and $\Phi(.)$ is the standard normal cumulative distribution function.

Then log-likelihood functions for N observations are,

$$\ln L = \sum_{i}^{N} \left\{ -\frac{1}{2}\ln(2\pi) - \ln\sigma + \ln\Phi\left(-\frac{\varepsilon_i \lambda}{\sigma}\right) - \frac{\varepsilon_i^2}{2\sigma^2} \right\}$$

given a half normal distribution, and

$$\ln L = \sum_{i}^{N} \left\{ -\frac{1}{2}\ln(2\pi) - \ln\sigma - \ln\Phi\left(\frac{\mu}{\sigma\gamma^{1/2}}\right) + \ln\Phi\left(\frac{\mu(1-\gamma) - \varepsilon_i\gamma}{\left[\sigma^2\gamma(1-\gamma)\right]^{1/2}}\right) - \frac{1}{2}\left(\frac{\varepsilon_i + \mu}{\sigma}\right)^2 \right\}$$

given a truncated normal distribution, where $\gamma = \sigma_u^2/\sigma^2$.

The inefficiency of an individual firm i, u_i, is included in the regression residual, ε_i, and not visible. However, it can be estimated from the conditional distribution of u_i given ε_i. Jondrow et al. [1982] showed that if $u_i \sim N^+(0, \sigma_u)$, then the conditional distribution is

$$f(u \mid \varepsilon) = \frac{1}{\sqrt{2\pi}\sigma'} \cdot \exp\left\{ -\frac{(u + \varepsilon\gamma)^2}{2\sigma'^2} \right\} \Big/ \left[1 - \Phi\left(\frac{\varepsilon\gamma}{\sigma'}\right) \right],$$

where $\sigma' = \sigma_u^2\sigma_v^2/\sigma^2$. The expected value of u_i conditional on ε_i was used for technical efficiency, which is given by

$$E[u_i \mid \varepsilon_i] = \sigma' \left[\frac{\phi(\varepsilon_i\lambda/\sigma')}{1 - \Phi(\varepsilon_i\lambda/\sigma')} - \left(\frac{\varepsilon_i\lambda}{\sigma'}\right) \right].$$

$$TE_i = E[\exp(-u_i \mid \varepsilon_i)]$$

For the truncated normal model,

$$f(u \mid \varepsilon) = \frac{1}{\sqrt{2\pi}\sigma'} \cdot \exp\left\{ -\frac{(u - \gamma')^2}{2\sigma'^2} \right\} \Big/ \left[1 - \Phi\left(-\frac{\gamma'}{\sigma'}\right) \right],$$

$$E[u_i \mid \varepsilon_i] = \sigma' \left[\frac{\phi(\gamma_i'/\sigma')}{1 - \Phi(\gamma_i'/\sigma')} - \left(\frac{\gamma_i'}{\sigma'}\right) \right]$$

where $\gamma'_i = (-\varepsilon_i\sigma_u^2 + \mu\sigma_v^2)/\sigma^2$.

2. Estimation by OLS and Method of Moments

Alternative estimation is based on OLS. Rewriting production function as

$$\ln Y_i = (\beta_0 - E[u_i]) + \beta_1 \ln K_i + \beta_2 \ln Ls_i + \beta_3 \ln Lu_i + \beta_3(\pi_1 Tenuer + \pi_2 Experience) + v_i - (u_i - E[u_i])$$

We assume that v_i has mean zero and $u_i \geq 0$. Since the residual, v_i-(u_i-$E[u_i]$), has means zero and constant variance, OLS can yield consistent estimates on β_1, β_2, β_3. This is done without distributional assumption on u. Then, σ_u and σ_v are estimated by method of moments with the distributional assumptions. Assuming $v_i \sim N(0, \sigma_v^2)$ and $u_i \sim N^+(0, \sigma_u^2)$,

$$E[u_i] = \sqrt{2/\pi}\sigma_u$$
$$V[u_i] = \left[\frac{\pi - 2}{\pi}\right]\sigma_u^2$$
$$E[u_i^3] = -\sqrt{2/\pi}(1 - 4/\pi)\sigma_u^3$$

Thus, the second and third centred moments of $\varepsilon_i = v_i - u_i$ are

$$m_2 = \sigma_v^2 + \left[\frac{\pi - 2}{\pi}\right]\sigma_u^2$$
$$m_3 = -\sqrt{2/\pi}(1 - 4/\pi)\sigma_u^3$$

Since E[u_i] is a constant, the second and third moments of the OLS residuals, v_i-(u_i-$E[u_i]$), are same as those of ε_i. Then, using the two moments of OLS residuals, σ_u and σ_v are estimated as

$$\hat{\sigma}_u^2 = \left(\frac{m_3}{\sqrt{2/\pi}(1 - 4/\pi)}\right)^{2/3}$$
$$\hat{\sigma}_v^2 = m_2 - \left(1 - \frac{2}{\pi}\right)\hat{\sigma}_u^2$$

With those estimates, technical efficiency is obtained by the same way described in the previous section.

Estimate of asymptotic covariance matrix for $(\hat{\sigma}_u^2, \hat{\sigma}_v^2)$ is obtained by

$$\left(\frac{\partial \boldsymbol{\sigma}}{\partial \mathbf{m}}\right)\left(CovMatrix\left[m_2, m_3\right]\right)\left(\frac{\partial \boldsymbol{\sigma}}{\partial \mathbf{m}}\right)' \quad ,$$

where $\boldsymbol{\sigma}=\left(\hat{\sigma}_u^2, \hat{\sigma}_v^2\right)$ and $\mathbf{m} = (m_2, m_3)$.

Appendix 4.3. Estimation Results not Reported in the Text

1. Test of Heteroskedasticity

Breush-Pagan and White's tests were carried out using residuals of OLD regression of lnK, lnLs, lnLu, Tenure, Education, Sewing and Klocal on ln Value-Added. Group-wise heteroskedasticity is tested by separating the sample by the process dummy (Sewing). Null hypothesis of homoskedasticity is rejected by Breush-Pagan test and Goldfield-Quandt test in the model at 1%, while White's test did not reject the null

Table 4-A3 Results of Heteroskedasticity Test

H0=homoskedasticity	
Breush-Pagan Test	
χ^2 (7)	20.54
Pvalue	0.005
Whites General test	
χ^2(33)	31.95
Pvalue	0.519
Goldfield-Quandt Test	
grp =1, 0	
F (159, 39)	2.684
Pvalue	0.000

2. Capital value constructed with depreciation at 5%

The results of production frontier estimation using capital value constructed under depreciation at 5% are in Table 4-A4. Estimated model is corresponded with model 4 in Table 4-2. Parameters and average technical efficiency are similar to those under depreciation at 10%. Group average of technical efficiency is also very similar (Table 4-A5).

Table 4-A4 Results of Production Frontier Estimation with Capital Depreciation Rate at 5%

	Stochastic Frontier
Distribution of u	Half Normal
lnK	0.164*
	(0.076)
lnLs	0.467**
	(0.117)
lnLu	0.480**
	(0.104)
Tenure	0.018
	(0.044)
Education	0.021
	(0.021)
Sewing	0.187
	(0.131)
cons	7.686**
	(0.582)
σ_u	0.908
	(0.205)
Dependent var: $\ln\sigma_v^2$	
Sewing	1.165*
	(0.579)
cons	-2.174**
	(0.569)
CRS	3.15
	[0.076]
AV TE	0.551
	(0.167)
N	212

Note: Standard errors are in parentheses.

Table 4-A5 Average Technical Efficiency and Relative TFP by Group

	1	2
	Technical Efficiency	Relative TFP
Bangladeshi Firms	0.551	-0.134
	(0.170)	(0.813)
Kenyan local firms	0.549	-0.108
	(0.147)	(0.663)
Kenyan EPZ firms	0.582	0.247
	(0.231)	(1.524)

Note: Standard deviations are in parentheses.

3. Results for Heterogeneous Coefficient Model

The result of production frontier estimation incorporating Kenya local dummy (*Klocal*) and its interaction with inputs is in Table 4-A6. The dummy and all the interaction terms are not significant, which means that null hypothesis that a common production function is shared between exporters and non-exporters cannot be rejected.

Table 4-A6 Results of Production Frontier Estimation with Heterogeneous Coefficient

	Stochastic Frontier
Distribution of u	Half Normal
lnK	0.210**
	(0.097)
lnLs	0.376***
	(0.134)
lnLu	0.292**
	(0.133)
lnK*Klocal	-0.177
	(0.154)
lnLs*Klocal	0.001
	(0.266)
lnLu*Klocal	0.417
	(0.257)
Klocal	-0.381
	(1.323)
Sewing	0.184
	(0.132)
cons	8.868***
	(1.158)
σ_u	0.887
	(0.178)
Dependent var: $\ln\sigma_v^2$	
Sewing	1.693**
	(0.694)
cons	-2.618
	(0.739)
N	212

Note: Standard errors are in parentheses.

Chapter 5 Firm Dynamics between 2002/3 and 2008/9

In the previous chapter, the competitiveness and productivity of Kenyan firms were investigated using firm data in FY 2002. While it showed that Kenyan firms were far less competitive than Bangladeshi firms, it may be altered due to productivity enhancement or change of market conditions. Empirical studies occasionally found that inflow of FDI facilitates productivity growth in the related local industries. With significant economic growth in Kenya since 2003, local garment firms may have benefitted from spillover effect. Considerable increase of labour costs in Asian countries including Bangladesh, as discussed later, also enhances relative competitiveness of Kenyan firms. On the other hand, social conflicts occurred in 2008 may adversely affect on production, or specialization of Kenyan firms in a niche market may substantially weaken industrial dynamics that generates 'creative destruction'. In this chapter, the change of competitiveness and productivity between FY 2002 and FY 2008 is analysed. Due to data limitations, the change of Kenyan EPZ firms is not extensively explored, unfortunately. Although it is quite interesting to understand the change of competitiveness in the export market, we managed to collect only a small number of EPZ firms in the second survey. Hence, comparison is made mainly between local Kenyan firms (non-EPZ firms) and Bangladeshi firms.

In the first and second sections, change of the industries between 2002 and 2008 is described in terms of firm turnover, production and employment, followed by the analysis of productivity changes in the third section, where the role of firm turnover in industry-level productivity changes is explored. In the fourth section, relationship

between firm survival and productivity is further investigated to understand firm dynamics in the Kenyan garment industry. The fifth section concludes discussion in this chapter.

1. Data

In this chapter, we use firm data collected in 2003 and 2009. Each survey collected firm information for the previous fiscal years of FY2002 and FY2008. In the second survey, we followed the firms covered in the first survey and also added firms into the new sample. Selection of the added firms was based on random sampling for Kenya and stratified sampling for Bangladesh.[1] In the Kenyan sample of 83 firms, the number of followed firms was 34 and that of added firms was 49 (Table 5-1). The Bangladeshi sample contains 114 followed firms and 116 added firms, for a total of 230 firms. The added sample consists of new entrants (entering firms) between 2003 and 2009 as well as firms that have been in operation (continuing firms) since before 2003 but were not covered in the first survey.

The relatively small number of firms in the followed sample is primarily due to attrition by exit. Among the sample in 2003, 39.5% (30 firms) of Kenyan firms and 39.0% (88 firms) of Bangladesh firms stopped operation or changed their business line out of garment production by 2009. Closure was confirmed by visit. Non-response to the survey also reduced the number of followed firms. In Kenya, 12 firms did not answer the survey questions, and in Bangladesh, 2 firms did not. In addition, 18 firms in the Bangladeshi sample did not even have their operation status confirmed. Attrition of these firms and addition of a new sample made the dataset highly unbalanced. Due to

[1] See Appendix 5.1 for the detail of sampling procedure.

this characteristic, the sample size of panel data is small particularly for Kenyan industry. Therefore, we mostly treat them as cross-section data in the two periods.

Table 5-1 Number of Sample by Entry and Exit

2008		All sample			Sample used for TFP analysis
			non EPZ	EPZ	
Kenya	Total	83	74	9	35
	Continuing since 2003	73(34)	67(29)	6(5)	32(9)
	Entering after 2003	10	7	3	3
Bangladesh	Total	230			218
	Continuing since 2003	184(114)			179 (109)
	Entering after 2003	44			39
	missing starting year	2(0)			0(0)

2002		All sample			Sample used for TFP analysis
			non EPZ	EPZ	
Kenya	Total	76	59	17	46
	Continuing until 2009	46	37	9	27
	Exiting by 2009	30	22	8	19
Bangladesh	Total	222			172
	Continuing until 2009	116			89
	Exiting by 2009	88			69
	missing survival info	18			14

Note: Figures in parenthesis are number of the followed sample.

Samples lacking the necessary information for measuring productivity and those with low-quality data were excluded.[2] In the end, 46 firms (FY2002) and 35 firms (FY2008) were used from the Kenyan sample, and 172 firms (FY2002) and 218 firms (FY2008) were used from the Bangladeshi sample (Table 5-1). After this procedure, only one Kenyan EPZ firm remained in the 2008 sample, and hence, the main analysis is based on Kenyan non-EPZ firms and Bangladeshi firms.

[2] For the conditions for sample restriction, see Appendix 5.1.

2. Changes in the Industry and Firms

During the period between 2002 and 2008, changes in the industry were in contrast in the two countries. The Bangladeshi garment industry grew considerably; export value increased from US$4.8 billion to US$10.6 billion, and the number of firms was also augmented from 3,954 to 4,825 according to BGMEA [2009]. The Kenyan EPZ sector experienced ups and downs during this period, as seen in the previous section. Export value increased from US$136 million in 2002 to US$299 million in 2004 and then gradually decreased to US$260 million in 2008. Then number of EPZ firms also once increased from 30 to 34 in 2003 but then decreased to 19 in 2008. Changes in production in the Kenyan non-EPZ sector are unknown due to lack of census data. After the political regime changed in 2003, significant economic growth was recorded in Kenya until 2007 when conflicts over the Presidential election were erupted. Despite significant drop in 2008, average annual GDP growth rate was 5.5% from 2002 to 2008, which is far higher than before 2002 (World Bank [2011]). This suggests growth of clothing demand, but imports of clothing had increased rapidly by 8.4% annually in the same period (Figure 3-5). Therefore, changes in production in the domestic market are ambiguous.[3]

This evolution of industries entailed active firm turnover. Our second survey, which followed the sample of the first survey and also added a new sample selected by random sampling, reveals firm turnover in the period (Table 5-1). Based on the followed sample, we found that 39.6% of firms exited in the Bangladeshi sample, and similarly, 39.0% of

[3] The available data is an estimation of production quantity by the Kenyan National Bureau of Statistics, which continued estimation without census data for more than 30 years, and it shows tremendous growth of the garment industry by 140.1% between 2002 and 2008 (Kenya Central Bureau of Statistics [2005a], Kenya National Bureau of Statistics [2009]). However, these statistics are not reliable, as mentioned in Chapter 2.

non-EPZ firms exited by 2009 in Kenya.[4] On the other hand, in the added sample, entrants have a share of 20.4% in Kenya and 37.9% in Bangladesh.[5] Given the lack of a complete firm list for the Kenyan non-EPZ sector, it is noted that coverage of entrants may be incomplete and may underestimate the number of entrants. For Kenyan EPZ firms, 22 firms out of 34 firms that operated in 2003 were closed by 2010, while 6 firms entered after 2003.[6]

Average firm size increased among Bangladeshi firms. The average value added grew by 14.7% and employment climbed by 28.3% (Table 5-2, all values are deflated at 2002 prices). Interestingly, capital value showed a drastic increase and nearly tripled on average. On the other hand, average profit slightly dropped, and the share of profit in value added shows a considerable drop, from 68.8% to 41.2%. Changes are significant for employment, capital value and profit share. In this period, export prices did not grow and the average wage increased significantly, while labour productivity decreased (Table 5-2). It appears that Bangladeshi firms dealt with the intensified competition mainly by reducing profit rather than by improving productivity.

For Kenyan local firms, our data shows that the average value added, employment and capital value shrunk by 40% to 60%, and profit decreased by more than 80%. The average profit share in value added turned into negative in 2008. However, changes are not significant except profit share due to the large standard deviations.

By definition, shrinkage of profit share in value added means a rise of cost per value added, which is our measure of unit cost. Therefore, both Bangladeshi and Kenyan local firms experienced weakened competitiveness during the period. In the Bangladeshi case,

[4] Closure may reflect structural change of the economy, for instance, from labour-intensive to capital-intensive industry according to capital accumulation. However, macroeconomic statistics in Kenya shows decline of the manufacturing share in GDP in the 2000s, and in our sample, there was no evidence that owners of exited firms started capital-intensive industry. Therefore, firm's closure is unlikely to be a result of structural changes.

[5] See Appendix 5.1 for the reason to draw share of entrants based on the added sample.

[6] Based on the EPZ firm list issued by the EPZ Authority in 2003 and 2010.

it is presumed that the fall of output price and the rise of labour costs in conjunction with stagnation of productivity led to an increase in the unit cost. In the Kenyan case, labor cost in real value slightly fell.[7] Despite that, their unit cost did not decline and hence, competitiveness did not improve. This implies a fall of output price, rise of other costs such as capital, material and energy, or decline of productivity.

Wage hikes in the garment and textile industry have been observed in many Asian countries including China, India, Vietnam, and Cambodia.[8] This trend is likely to reflect increased labour demand in those low-income Asian countries due to the growth of labour-intensive industries including the garment industry. According to the theory, this indicates that the comparative advantage of Asian garment exporters is gradually weakening, and the low-income countries not experiencing rapid wage growth, e.g. African countries, gain competitiveness. Though some African countries including Kenya suffer from high labour costs, their disadvantage will be mitigated and can be erased under the escalation of wages in Asia. However, it is plausible when the productivity of Kenyan firms is not falling and cancelling the gains in relative labour costs. In the following subsection, productivity change at firm and industry levels is examined.

[7] In terms of competitiveness, nominal wage rather than real wage matters. In nominal terms, the average wage in US dollars increased by 70.7% at Bangladesh firms, while it rose by 29.0% at Kenyan local firms.

[8] See Goto [2012] for Vietnam, Asuyama and Seiha [2012] for Cambodia, for example.

Table 5-2 Summary Statistics

Panel A: Bangladeshi Firms

	2002			2008			Rate of change of means
	Mean	Std. Dev.	N	Mean	Std. Dev.	N	
Gross production (1000$)	3086.2	2596.3	203	4710.6	6215.7	219	0.526
Value added (1000$)	1620.6	1457.5	203	1858.1	2724.5	219	0.147
Profit (1000$)	1325.7	1337.4	173	1213.4	2469.3	219	-0.085
Employment	532.6	258.8	203	683.3	594.5	219	0.283
Capital value	120511	84496	173	349903	1043664	219	1.903
Labour cost per worker	499.5	255.5	203	712.1	270.6	219	0.426
Labour productivity	3168.9	2285.8	203	2518.0	2196.0	219	-0.205
Capital value per worker	274.4	230.0	173	618.8	2624.3	219	1.255
Profit/ Value added	0.688	0.349	173	0.412	0.537	219	-0.401
Unit cost	0.312	0.349	173	0.588	0.537	219	0.883

Panel B: Kenyan Local Firms

	2002			2008			Rate of change of means
	Mean	Std. Dev.	N	Mean	Std. Dev.	N	
Gross production (1000$)	655.1	1352.0	49	322.1	454.4	51	-0.508
Value added (1000$)	363.0	1035.7	49	135.6	227.5	51	-0.626
Profit (1000$)	139.0	486.4	42	24.9	90.3	41	-0.820
Employment	89.5	169.7	49	66.9	123.8	51	-0.253
Capital value	47802	91500	42	46390	86850	41	-0.030
Labour cost per worker	1370.5	686.4	49	1130.7	400.2	51	-0.175
Labour productivity	3800.4	4557.6	49	2856.9	5239.6	51	-0.248
Capital value per worker	797.6	1748.6	42	1325.0	2529.4	41	0.661
Profit/ Value added	0.264	0.513	42	-0.096	0.946	41	-1.364
Unit cost	0.736	0.513	42	1.096	0.946	41	0.489

Note: Values are in 2002 price using GDP deflator of Bangladesh and Kenya.

3. Productivity Change

3.1. Framework

Heterogeneous firm models suggest that competition enhances industry-level productivity growth by reallocating resources to more productive firms. Hopenhayn [1992] and Meritz [2003] developed models of industrial evolution given firm-level heterogeneity in productivity. In Hopenhayn's model which incorporates productivity evolution, firms exit when their productivity becomes lower than the threshold level that

gives zero firm value, while in Meritz's model which assumes constant productivity, increased competition by trade brings about growth of productive firms and contraction or exit of poor performers. Many empirical studies indicated that such a resource allocation effect is significant in industry-level productivity change. In Africa, Shiferaw [2007] reports that the resource allocation effect partly offsets the decline of productivity among surviving firms. As for the relationship between productivity and firm survival, Frazer [2005] finds a positive correlation, while Söderbom et al. [2006] finds such a relationship only among large firms. Given the considerable number of exiting and entering firms in the Kenyan and Bangladeshi garment industries, the effect of firm turnover as well as within-firm change is likely to be significant in the industry-level productivity changes.

In both the export and Kenyan markets, trade liberalization has enhanced market competition and may have induced firm turnover. And in Kenya, the economic boom may have encouraged entrance of entrepreneurs in garment production, while little penetration of imports into the uniform market may hinder competition among local firms. Investigation of firm turnover and productivity change gives insight into how market competition affects productivity growth in the both industries.

Productivity was estimated using the index number approach.[9] Measure is slightly modified from that used in Chapter 4 so that TFP index incorporates the effect of returns to scale.

$$\ln TFP_i = \left(\ln Y_i - \overline{\ln Y}\right) - \sum_n \left(\frac{s_i^n + \overline{s^n}}{2} \right) \left(\ln x_{n,i} - \overline{\ln x_n}\right) - \left(\ln u_i - \overline{\ln u}\right) ,$$

where Y is output (value added), x_n ($n = K$ [capital], Ls[skilled labour], Lu[semiskilled

[9] In stochastic frontier approach, productivity change is measured by change of frontier (technical progress) and change of technical efficiency (Kumbhackar and Lovell [2000]). As our dataset has small number of panel observations, estimation of time variant frontiers will be unstable.

labour]) is input, and s^n is factor share, u is operation hours, and i is a suffix which represents a firm. This time, total operation hours are used instead of utilization rate of capital as many observations do not have information of utilization rate.[10] The variables with a superscript bar (e.g. $\overline{\ln Y}$) indicate a sample mean, which was taken over the pooled sample of two years. The TFP index is positive (negative) when a firm's TFP is higher (or lower) than the hypothetical average firm.

An individual firm's productivity index was aggregated with the weight based on market share, to obtain an industry-wide productivity index. This exercise allows decomposing industry-wide productivity change to that yielded through firm turnover and through productivity growth of continuing firms. Let $\theta_{i,t}$ be the market share (based on value added) of firm i at year t, and the industry-level productivity index is described as

$$\ln TFP_t = \sum_i \theta_{i,t} \ln TFP_{i,t} ,$$

and the growth rate of the industry-level productivity index is

$$\Delta \ln TFP = \ln TFP_{t+1} - \ln TFP_t .$$

The growth rate can be decomposed into growth of firms continuing operation throughout the period and growth resulting from entry and exit. Let I denote the group of firms continuing in operation, X the group of firms that exited after the first survey, and E the group of firms that entered between the two surveys. The growth rate can then be decomposed using the following equation,

$$\begin{aligned}\Delta \ln TFP &= \sum_{i\in I} \theta_{i,t+1} \ln TFP_{i,t+1} + \sum_{i\in E} \theta_{i,t+1} \ln TFP_{i,t+1} - \left(\sum_{i\in I} \theta_{i,t} \ln TFP_{i,t} + \sum_{i\in X} \theta_{i,t} \ln TFP_{i,t} \right) \\ &= \left(\sum_{i\in I} \theta_{i,t+1} \ln TFP_{i,t+1} - \sum_{i\in I} \theta_{i,t} \ln TFP_{i,t} \right) + \left(\sum_{i\in E} \theta_{i,t+1} \ln TFP_{i,t+1} - \sum_{i\in X} \theta_{i,t} \ln TFP_{i,t} \right) .\end{aligned}$$

[10] Operation hour represents utilization rate of labour as well as capital, while capital utilization rate used in the chapter 4 does not consider labour.

(5.1)

The first parenthesis in the second line on the right-hand side represents the contribution of firms continuing in operation (hereafter "continuing firms"), and the second represents that of entry and exit.

The change of the weighted TFP of each group is the result of change of TFP and change of weight, that is, reallocation of market share. When productive firm increases market share, industry-level productivity grows without TFP growth of individual firm. As described in the empirical literature on firm dynamics, it is important to know contribution of technological progress and market share reallocation, respectively. Griliches and Regev [1995] decompose as follows.

$$\begin{aligned}\Delta \ln TFP = &\sum_{i\in I}\left[\left(\frac{\theta_{i,t}+\theta_{i,t+1}}{2}\right)\left(\ln TFP_{i,t+1}-\ln TFP_{i,t}\right)\right]+\left(\frac{\theta_{X,t}+\theta_{E,t+1}}{2}\right)\left(\ln TFP_{E,t+1}-\ln TFP_{X,t}\right)+\\ &\sum_{i\in I}\left[\left(\frac{\ln TFP_{i,t+1}+\ln TFP_{i,t}}{2}\right)\left(\theta_{i,t+1}-\theta_{i,t}\right)\right]+\left(\frac{\ln TFP_{E,t+1}+\ln TFP_{X,t}}{2}\right)\left(\theta_{E,t+1}-\theta_{X,t}\right)\end{aligned} \tag{5.2}$$

where $\theta_{X,t}$ represents the market share of all exited firms at year t, and $\ln TFP_{X,t}$ is the weighted average of TFP of exited firms, where weight is based only on exited firms. The same aggregation is applied also to entering firms. The first and second terms in the RHS represent change of productivity among continuing firms and entering/exited firms, respectively. The third and fourth terms are change of market share. However, our data does not allow this decomposition because continuing firms are unbalanced. Then, we apply the following decomposition which is based on the methods by Griliches and Regev [1995] and Olley and Pakes [1996].

$$\begin{aligned}\Delta \ln TFP = {} & \Theta_I \left(\overline{\ln TFP}_{I,t+1} - \overline{\ln TFP}_{I,t} \right) + \Theta_X \left(\overline{\ln TFP}_{E,t+1} - \overline{\ln TFP}_{X,t} \right) + \\ & \Theta_I \left[\mathrm{Cov}_{t+1} \left(\frac{Y_j}{\overline{Y}_I}, \ln TFP_j \right) - \mathrm{Cov}_t \left(\frac{Y_j}{\overline{Y}_I}, \ln TFP_j \right) \right] + \\ & \Theta_X \left[\mathrm{Cov}_{t+1} \left(\frac{Y_k}{\overline{Y}_E}, \ln TFP_k \right) - \mathrm{Cov}_t \left(\frac{Y_l}{\overline{Y}_X}, \ln TFP_l \right) \right] + \\ & \left(\frac{\ln TFP_{I,t+1} + \ln TFP_{I,t}}{2} \right) \left(\theta_{I,t+1} - \theta_{I,t} \right) + \left(\frac{\ln TFP_{E,t+1} + \ln TFP_{X,t}}{2} \right) \left(\theta_{E,t+1} - \theta_{X,t} \right)\end{aligned} \tag{5.3}$$

where variables with superscript bar (e.g. $\overline{\ln TFP_{g,t}}$) are the unweighted sample averages over the group of firms (g=I, X, E) in year t,

$$\mathrm{Cov}_t \left(\frac{Y_i}{\overline{Y}_g}, \ln TFP_i \right) = \frac{1}{n} \left(\sum_{i \in g} \left[\left(\frac{Y_{i,t}}{\overline{Y}_{g,t}} - 1 \right) \left(\ln TFP_{i,t} - \overline{\ln TFP}_{g,t} \right) \right] \right),$$

$$\Theta_I = \left(\frac{\theta_{I,t} + \theta_{I,t+1}}{2} \right), \quad \Theta_X = \left(\frac{\theta_{X,t} + \theta_{E,t+1}}{2} \right), j \in I,\ k \in E, \text{ and } l \in X.$$

The first and second terms in the RHS are change in average productivity of continuing and entering/exited firms, respectively. The third and fourth terms are change of the covariance between TFP and output normalized by average output, and larger covariance means that productive firm tends to have larger share.[11] These represent reallocation of market share within the group of continuing firms and the group of entering/exited firms, respectively (within-group reallocation). The fifth and sixth terms are reallocation of market share between the two groups (between-group reallocation). More detailed explanation on the above decomposition is provided in Appendix 5.2.

3.2. Results

Table 5-3 shows the statistics of the TFP index. For both Kenyan and Bangladeshi firms, the unweighted average TFP index fell, but Kenyan firms displayed a greater and

[11] Absolute value of covariance tends to be greater for the group of firms with greater average output. Division by average output controls difference of output size across the firm groups.

significant decline. The Kenyan local subsample also exhibits the same trend. Consequently, the difference between the Kenyan and Bangladeshi averages is significant at the 5% level in 2008, though it was not in 2002. The average TFP indices of continuing, exiting and entering firms are calculated as the equation (5.1) (column 4-7 in Table 5-3). This showed that exiting firms had a higher average than surviving ones, and entering firms performed far worse than those that exited in Kenya, though differences are not significant. In addition, surviving firms experienced lowered productivity between 2002 and 2008. The productivity decline in Kenya was due to both firm turnover and change in continuing firms. In contrast, exited firms were slightly less productive than surviving ones, and newly entered firms were more productive than exited firms in Bangladesh. Though productivity of surviving firms dropped, productivity gain by firm turnover compensated for it.

Table 5-3 TFP Index

				2002		2008	
	2002	2008	Difference	Surviving Firm	Exiting Firms	Continuing Firms	Entering Firms
Kenya	-0.019	-0.384	**				
(All sample)	(0.757)	(0.829)					
N	46	35					
Kenya	0.007	-0.383	**	-0.126	0.177	-0.357	-0.648
non EPZ	(0.752)	(0.841)		(0.804)	(0.662)	(0.812)	(1.297)
N	41	34		23	18	31	3
Bangladesh	-0.034	-0.040		-0.015	-0.049	-0.065	0.073
	(0.816)	(0.806)		(0.805)	(0.854)	(0.800)	(0.835)
N	172	218		89	69	179	39

Note: ** indicates that difference of the means of 2002 and 2008 is significant at 5% level.

Productivity change at Bangladeshi firms is mostly consistent with the implications of heterogeneous firm models (Hopenhayn [1992], Melitz [2003]). In a competitive market, there is a threshold in productivity that yields zero expected future profit. Since those firms whose productivity turns out to be below the threshold exit, the average

productivity of those exited is lower than those that survived. Also, assuming sunk entry costs, newly entering firms are more productive than those that exited. Despite the long lag of six years, trajectory of productivity in Bangladeshi firms is in line with theoretical implications.

In contrast, results from Kenyan local firms are not consistent with these implications. In particular, the fact that the average productivity of exited firms is higher than those that continued operation indicates the possibility that little competition is at work among firms in Kenya, specifically the uniform market. Figure 5-1 shows that productivity distribution does not differ by firm survival. This might be caused by the turmoil around the nation from the end of 2007 to 2008, which was incited by the presidential election in December 2007. While the election administration committee declared the incumbent as the winner, the opponent did not accept the result, accusing the committee of manipulation of votes. The collision of the two candidates provoked antagonism between their supporters and resulted in armed conflicts around the nation. Several hundred of people were reported dead, and during this conflict, economic activities were paralyzed. This may have caused a change in the relationship between exit and productivity. Firms may have closed due to the turmoil rather than poor performance.

To further illustrate this point, we examine the relationship between productivity and survival as of 2005 utilizing information collected by the author with the assistance of the University of Nairobi in 2005. This information is not affected by the conflict in 2008, and the problem of long lags, which obscures the relationship between productivity and firm survival, is mitigated. The result does not alter, however, and the average TFP of exited firms is still higher than that of surviving firms, though not significant (Table 5-4).

Figure 5-1 Distribution of TFP Index by Firm Survival as of 2005

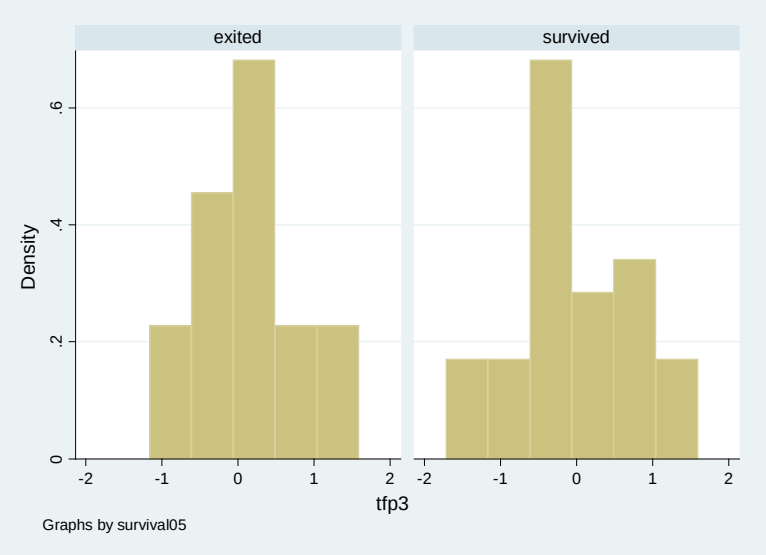


Table 5-4 TFP Index by Firm Survival as of 2005

	Survived Firm	Exited Firms
Kenya non-EPZ Firms	-0.002	0.133
	(0.808)	(0.714)
N	29	6

Note: Six firms lack survival information as of 2005, while they were confirmed closed in 2009.

The weighted average of the TFP index is shown in Table 5-5, which is somewhat different from the picture of a simple average change. Firstly, the weighted average of Kenyan local firms is significantly smaller than the Bangladeshi average in 2003, unlike the similarity of the unweighted averages between them. This implies that market share allocation is more efficient in the Bangladeshi industry; good performers tend to be large and are given high weight. Secondly, in contrast to the decrease of unweighted average productivity, the change in weighted average is smaller and insignificant in Kenya, and slight growth is shown in Bangladesh. As we will see, these differences are yielded by improved reallocation of market shares within the industry.

Decomposition of productivity growth based on equation (5.2) is shown in rows 4 to

10 in Table 5-5. In Kenyan industry, firms that survived throughout the period showed growth of weighted productivity, while firm turnover produced a negative contribution which just cancelled the positive contribution of continuing firms (row 4 and 7). It is noted that TFP changes are negative for the both groups, and the positive effect of market share reallocation compensated for the fall of mean productivity in the continuing firms, whereas reallocation effect is negative in the exiting/entering firms (row 5, 6, 8, and 9). In the Bangladeshi industry, the contribution of continuing firms is slightly negative and that of exiting/entering firms is positive.

Table 5-5 Weighted Averages of TFP Index

			Kenya non-EPZ	Bangladesh
	2002		0.245	0.466
(1)			(0.830)	(0.655)
	N		41	158
	2008		0.243	0.547
(2)			(0.886)	(0.728)
	N		34	218
(3)	Change (growth rate)		-0.002	0.082
(4)	Continuing firms' change	Total	0.226	-0.014
(5)		TFP Change	-0.177	-0.029
(6)		Within reallocation	0.443	0.015
(7)	Entry/Exit change	Total	-0.227	0.100
(8)		TFP Change	-0.194	0.052
(9)		Within reallocation	-0.033	0.048
(10)	Between Reallocation		-0.041	0.005

Note: As the equation (5.2) shows, Continuing firms' change (4) + Entry/Exit Change (7) + Between reallocation (10) = Change in weighted averages (3). Standard deviations are in parentheses. Firms lacking entry/exit info were excluded. Market share of continuing and entering firms in 2009 are based on share among the added sample, which is more likely to represent population.

This exercise showed that the source of productivity gain differs between the two industries; continuing firms made a positive contribution in Kenya, while firm turnover mainly raised industry-level productivity in Bangladesh. It is noted that the productivity gain by continuing firms in Kenya is not due to technological progress but within-group reallocation of market shares. This is consistent with our interview results in Chapter 3,

which found that the majority of Kenyan non-exporting firms did not take productivity enhancement measures. Absence of technological progress is also reported by several empirical studies on African manufacturing sectors including Kenya, and our result is in line with them. [12] Our result in the Bangladeshi industry also indicated little technological progress, but it does not necessarily imply general lack of technological progress in the garment industry. Significant progress in the Cambodian industry in the same period is reported by Asuyama et al. [2013].

On the other hand, the negative impact of firm turnover highlights the productivity dynamics of the Kenyan industry. Exit of relatively productive firms and replacement by less productive entering firms considerably lowered productivity of the whole industry, and it contrasts with theoretical outcome of the competitive market and empirical studies in developing countries (Aw et al. [2001], Pavcnik [2002], van Biesebroek [2003], Bartelsman et al. [2004]). The same result is also reported in Africa, but the relationship between productivity and firm turnover seems somewhat weak. While Frazer [2005] and Shiferaw [2009] found exit of poor performers in Ghana and Ethiopia, respectively, Soderbom et al. [2006] found the same relationship only among large firms in the three African countries. Shiferaw [2007] reported that the proportion of exiting firms increases as a firm become less productive, but still a quarter of firms in the most productive quintile also exited. Our result stresses the irrelevance of firm survival to productivity more clearly than that empirical evidence, and it appears to be an important cause of stagnation of the productivity growth in the Kenyan garment industry.

[12] See section 2.1.1 in chapter 2.

4. Determinants of Firm Survival

4.1. Empirical model

To investigate the role of productivity in firm survival, covariates possibly related with both survival and productivity need to be controlled. Empirical literature found several factors affecting firm survival other than productivity. The most common finding in developed and developing countries is the effect of firm size and age (for example, Disney et al. [2003] and Bernard and Jensen [2007]). In Africa, Frazer [2005], Söderbom et al. [2006] and Shiferaw [2009] found size and/or age effects.

Though many empirical studies found size and age affects survival with controlling firm's productivity, their direct effects are not theoretically clear. Theoretical models such as Jovanovic [1982], Hopenhayn [1992] and Ericson and Pakes [1995] predict that young and/or small firms are more likely to exit because they tend to be less productive, but they do not suggest size and age effects independent of productivity. One of the possible explanations is that older and larger firms tend to have better financial access. In absence of variable representing financial access, as in many existing studies and in this study, firm age and size will pick up effect of financial access. Another possible explanation is that older and larger firms have the capacity to mitigate demand shocks. Foster et al. [2008] found that older plants tend to be larger than younger plants despite the fact that both are equally productive when carefully controlling price of output. They argue that younger plants tend to have lower demand level due to, for example, a narrower customer base or weak brand value. It suggests that adverse demand shock may be smaller for older (and larger) plants with better market capacity.

As discussed, while productivity is found to be crucial for firm survival in theoretical and empirical literature, Söderbom et al. [2006] using firm data in three African

countries including Kenya reported that its effect differs by firm size, where larger firms show greater productivity effect on firm survival. They suggested, though not empirically identified, several reasons for such differing productivity effect by firm size, and they include heterogeneity in autocorrelation of TFP, standard deviation of TFP, value of the exit option, and measurement error in TFP. Though we do not have clear evidence for the above possible reasons, it is worth examining the interaction effect of size and productivity given no unconditional relationship between productivity and survival in our sample.

Being a subcontractor may influence exit behaviour. Subcontracting in the garment industry often covers entire process of production, from cutting fabrics and sewing to finishing. It is, thus, a kind of order sharing arrangement for dealing with excess orders, and a few firms are specializing in it. Since demand for a subcontract is likely to vary more than market demand, subcontractors may exit more frequently than those not specializing in subcontracting. Export status also may affect exiting through productivity, but it may also affect survival directly, if demand shocks in domestic and export markets substantially differ and a switch in a market entails costs.[13] Furthermore, it is argued that the exit decision of multi-plant firms and multinational firms may differ from single-plant firms and single-nationality firms, though empirical evidence is mixed (Disney et al. [2003], Bernard and Jensen [2007], Shiferaw [2009]). Though in our sample of Kenyan non-EPZ firms there is only one multi-plant firm and no multinational firm, a similar issue may arise if a firm owner possesses other businesses. A garment firm whose owner runs other businesses may be less likely to close because it shares resources with other firms owned by the same owner, or such firm may be more likely to exit because an owner has more alternative investment opportunities,

[13] Our Kenyan non-EPZ sample includes firms exporting less than 50% of its products mainly to the African market.

which increase exit value. In Kenya, possession of a multi-business is generally related to the ethnicity of the owner. Reflecting the concentration of business activities in minority people of Asian origin, Asian origin managers are much more likely to run multi-businesses than African origin managers.

Utilizing our observations of firm exit in 2005 and 2009, estimation is based on the duration model. The duration model analyzes the time until subjects move to different states, which are, for example, death, unemployment or exit in this case. Let T be the length of time a firm survives. The cumulative probability function of T is defined as

$$F(t) = P(T \le t), \quad t \ge 0$$

The survivor function is defined as

$$S(t) \equiv 1 - F(t) = P(T > t)$$

The probabilities of leaving the initial state in an interval Δt given survival until t is $P(t \le T < t + \Delta t \mid T \ge t)$, and hazard function, $\theta(t)$, is defined as a marginal rate of leaving the initial state

$$\theta(t) = \lim_{\Delta t \to 0} \frac{P(t \le T < t + \Delta t \mid T \ge t)}{\Delta t} = \frac{f(t)}{S(t)},$$

where $f(t)$ is probability density function. Analysis is centred on the hazard function, conditional on a set of covariates. Suppose that it takes proportional hazard model,

$$\theta(t, \mathbf{x}) = \frac{f(t \mid \mathbf{x})}{S(t \mid \mathbf{x})} = \theta_0(t) \exp(\beta' \mathbf{x}), \qquad (5.4)$$

where $\theta_0(t)$ is the baseline hazard

As our duration data is grouped, from 2003 to 2005 and from 2005 to 2009, some modifications are needed. Following Jenkins [2004], the survivor function at time a_m which is the end of the interval (a_{m-1}, a_m) is

$$S(a_m, \mathbf{x}) = \exp\left[- \int_0^{a_m} \theta(u, \mathbf{x}) du \right]$$
$$= \exp\left[- \exp(\beta' \mathbf{x}) \int_0^{a_m} \theta_0(u) du \right],$$
$$= \exp\left[- \exp(\beta' \mathbf{x}) \Theta_m \right]$$

where $\Theta_m = \int_0^{a_m} \theta_0(u) du$. The discrete hazard function, $h(a_m, \mathbf{x})$, is defined as

$$h(a_m, x) = \frac{S(a_{m-1}, x) - S(a_m, x)}{S(a_{m-1}, x)}$$
$$= 1 - \exp\left[\exp(\beta' \mathbf{x}) \cdot (\Theta_{m-1} - \Theta_m) \right]$$

.

Hence,

$$\log\left[- \log(1 - h(a_m, \mathbf{x})) \right] = \beta' \mathbf{x} + \log(\Theta_{m-1} - \Theta_m)$$
$$= \beta' \mathbf{x} + \gamma_m \quad and$$

$$h_m(\mathbf{x}) \equiv h(a_m, \mathbf{x}) = 1 - \exp\left[- \exp(\beta' \mathbf{x} + \gamma_m) \right],$$

where $\gamma_m = \log\left[\int_{a_{m-1}}^{a_m} \theta_0(u) du \right]$. Complementary log-log transformation (log[-log(.)]) of the hazard function gives a regression equation. Since γ_m summarizes the difference of the baseline hazard function between a_{m-1} and a_m, it represents a pattern of duration dependence of the hazard functions. Among several patterns, we apply the piecewise-constant hazard, which assumes the hazard rate is constant within each period.

Estimation is based on maximum likelihood. Two characteristics are considered in construction of the likelihood function: right censoring and left truncation. Given the survival of some firms throughout the period of observation, survival time, T_i, is right censored for some observations. In addition, our sample is drawn from firms in operation in 2003, which is stock sampling, rather than sampling from firms entered in initial status, operation in this case, during the specific period. Stock sampling has left a truncation problem, where firms with short survival time are more likely to be dropped

from the sample. Refer to the Appendix 5.3 for details of the likelihood function.

Explanatory variables includes three types of productivity indices, firm age, firm size in number of employment, interaction term between productivity and firm size, a subcontract dummy (=1 if a firm recognizes itself as a subcontractor), an export dummy (=1 if a firm exports at least some of its products), and a dummy of firm decision maker's ethnicity (=1 if she is of African origin). Productivity indices are TFP estimated by index number, TFP estimated by stochastic frontier approach, and labor productivity. Estimates by index number are the ones used in the previous section, and those by stochastic frontier are the ones introduced in Chapter 4. Labour productivity is a crude measure of productivity but can be justified given the relatively similar capital intensity within the same industry.[14] All explanatory variables represent firm characteristics in 2002.

4.2. Results

Estimated coefficients are reported in Table 5-6. Negative coefficient means that increase in value of a regressor reduces the hazard rate (hence raise survival rate), and vice versa.[15] Only labour productivity shows a weakly significant coefficient, while the other two productivity measures are not significantly related with the hazard rate. Interaction terms with employment size are not statistically significant for all cases. Instead, age significantly reduces the hazard rate in the all models; one year of experience reduces the probability of exit by 8.4 to 8.9%. Other variables including employment size, subcontract, export and ethnicity of a manager are all not significant,

[14] The correlation coefficient between the TFP index and technical efficiency is 0.866, and the one between the TFP index and labour productivity is 0.617. Labour productivity is adjusted by the operation rate of individual firms for consistent comparison.

[15] Taking exponent of coefficient gives effect of a regressor on hazard function (Jenkins [2004]). And since we applied proportional hazard model (equation 5.4), a coefficient indicates proportional effect on hazard function. For example, the result of model 1 is interpreted to mean that an increase of the TFP index by 1 unit reduces the hazard rate to 58.1% [=exp(-0.543)] of the initial rate, that is reduction of hazard rate by 41.9% (=1-0.581).

though signs of coefficients of size, subcontract and ethnicity are as expected. The dummy for the second period, 2005-2008, is also not significant, and it means no duration dependence of the hazard function.

Table 5-6 Estimation of Hazard Function

	1	2	3
TFP	-0.543		
	(0.499)		
TFP*Worker	0.028		
	(0.023)		
TE		-2.719	
		(2.408)	
TE*Worker		0.146	
		(0.131)	
LP			-0.00028*
			(0.00015)
LP*Worker			0.00001
			(0.00001)
totalworker	-0.007	-0.082	-0.027
	(0.009)	(0.070)	(0.020)
age	-0.093**	-0.093*	-0.088*
	(0.046)	(0.048)	(0.047)
subcontract	0.729	0.669	0.902
	(0.561)	(0.622)	(0.534)
export	-0.390	-0.548	-0.336
	(0.711)	(0.679)	(0.682)
african	0.065	-0.073	0.209
	(0.576)	(0.597)	(0.583)
s2 (2005-09)	0.015	0.093	-0.024
	(0.552)	(0.581)	(0.541)
cons	-0.114	1.345	0.245
	(0.755)	(1.257)	(0.805)
Log pseudo likelihood	-30.534	-29.394	-30.520
N	70	70	70

Note: Heterosckedasticity robust standard errors are reported in the parenthesis.

There may be a difference in exit behaviour between the two periods, considering the occurrence of conflicts around the nation from 2007 to 2008. Different coefficients are estimated for productivity (and its interaction term with firm size) across periods denoted by a dummy variable $s1$=1 between 2003 and 2005 and $s2$=1 after 2005 (Table

5-7). The first model using an index number yielded significant coefficients for the second period (first column), which indicates a negative relationship between probability of exit and TFP and a positive relationship with the interaction term of TFP and firm size. This implies that negative relationship disappears as a firm becomes larger. The simulation of the hazard rate based on the first model is shown in Figure 5-2. For a firm with 10 workers, the hazard rate decreases as TFP rises, while the opposite trend is depicted for a firm with 30 workers. Therefore, high TFP reduces the probability of exit only for very small firms. A similar trend is seen in the other models using technical efficiency and labor productivity, and coefficients on labour productivity are weakly significant.

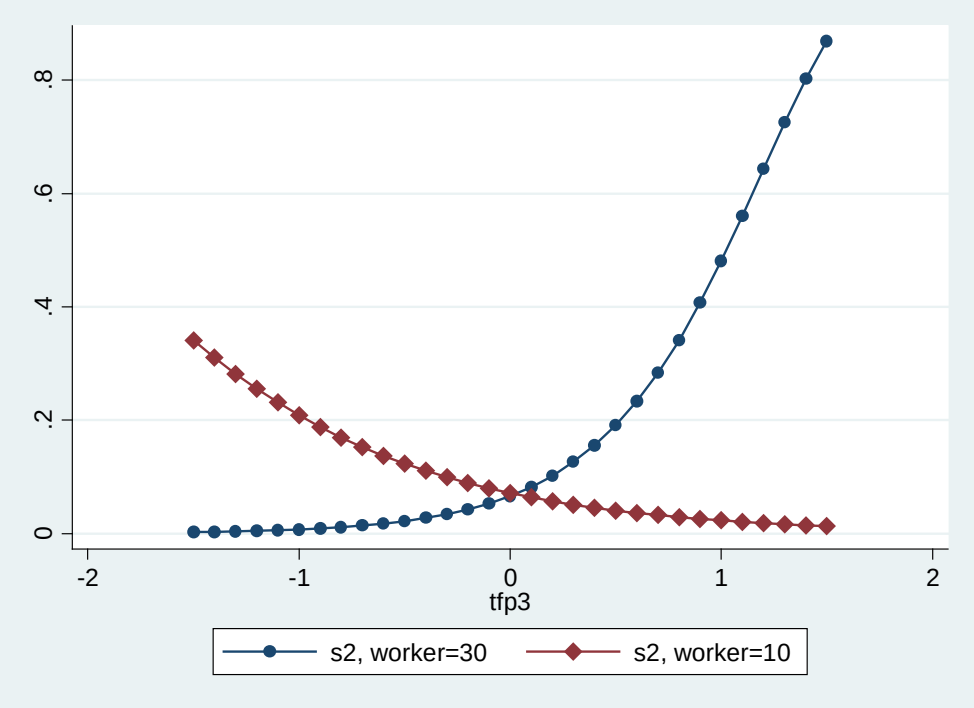
The most robust result is estimated for firm age; in all the models, it has a significantly negative relationship with the hazard rate. Interpretation of this result will be discussed in the next subsection. For the variables representing firm size, subcontracting, and ethnicity of owner, the sign of the coefficient is as expected, but all the coefficients, except one case, are not significant.

Table 5-7 Estimation of Hazard Function with Differed TFP Effects by Period

	1	2	3
TFP*s1	-0.606		
	(0.447)		
TFP*s2	-2.862**		
	(1.451)		
TFP*Worker*s1	0.015		
	(0.012)		
TFP*Worker*s2	0.171***		
	(0.061)		
TE*s1		-4.084*	
		(2.237)	
TE*s2		-1.255	
		(3.607)	
TE*Worker*s1		0.147	
		(0.129)	
TE*Worker*s2		0.168	
		(0.147)	
LP*s1			-0.001*
			(0.0003)
LP*s2			-0.0003*
			(0.0002)
LP*Worker*s1			0.00001*
			(0.00001)
LP*Worker*s2			0.00001*
			(0.00001)
totalworker	-0.004	-0.085	-0.033
	(0.007)	(0.073)	(0.020)
age	-0.128**	-0.095**	-0.090*
	(0.062)	(0.047)	(0.050)
subcontract	1.143*	0.600	0.818
	(0.676)	(0.734)	(0.599)
export	-0.444	-0.541	-0.368
	(0.646)	(0.761)	(0.712)
african	0.508	-0.031	0.169
	(0.658)	(0.649)	(0.643)
s2 (2005-09)	-0.590	-1.608	-1.021
	(0.670)	(1.580)	(0.845)
Cons	-0.242	2.069	1.060
	(0.769)	(1.176)	(1.095)
Log pseudo likelihood	-25.582	-28.379	-29.511
Number of Observation	70	70	70

Note: Heterosckedasticity robust standard errors are reported in the parenthesis.

Figure 5-2 Simulation of Hazard Rate by TFP Index and Firm Size



Note: Based on estimation results shown in column 1 of Table 5-8.

There can be an estimation bias due to unobserved heterogeneity. With single-spell data like ours, the scope of controlling such bias is limited, however. We need to assume unobserved heterogeneity is independent of other covariates (Wooldridge [2002]).[16] Even with this assumption, controlling unobserved heterogeneity eliminates underestimation of coefficients (Jenkins [2004]). We further need to make a distributional assumption on unobserved heterogeneity, and we applied normal distribution.[17] Estimated coefficients and their significance are very similar to those in Table 5-6 and 5-7, and in fact, the null hypothesis of no unobserved heterogeneity cannot be rejected in the models using the TFP index and technical efficiency (Table

[16] Not to mention, there is possibility that unobserved heterogeneity is correlated with covariates. For example, firm's managerial ability and financial access may be correlated with both productivity and hazard rate. However, since they are likely to be positively correlated with productivity and negatively with hazard rate, omission of those variables yields downward bias in coefficient of productivity. Therefore, the result that productivity does not reduce hazard rate will not be altered.

[17] Gamma distribution is another feasible alternative, but in our case it did not produce consistent estimation due to non-convergence of the likelihood function. See Appendix 3 for the detail.

5-A1 and 5-A2). In the model using labour productivity and allowing different effect by period, coefficients for the second period are no more significant, and the test result indicated significance of unobserved heterogeneity (Table 5-A2). Therefore, the model using labour productivity does not robustly support a significant effect of productivity and its interactions with firm size on firm survival.

In our exercise, no clear relationship between TFP and firm survival is found. There is weak evidence that, between 2005 and 2009, higher TFP reduced the probability of exit for very small firms. This indicates that firm turnover was not driven by competition as a whole, and it may have worked only for micro firms and only during the period of low demand. Instead of productivity, firm age robustly related with survival. An older firm is more likely to survive. This is consistent with empirical evidence in other countries.

4.3. Discussion

Our analysis suggests that firm survival was mostly irrelevant to productivity, while market share allocation improved significantly from 2002 to 2008. This is a complicated result in view of market competition; a less productive firm has a smaller share, but its probability of exit is not higher than that of more productive firms. There are some possible explanations.

One possibility is that local Kenyan firms substantially differ in tolerance of negative shocks. Firms with small cash flow or little credit access are more susceptible to temporal negative profits. Even if the present value of future expected profit is positive (i.e., the value of the firm is positive) those firms have to close due to temporal loss. This explains the exit of the firms that posted current losses but expected positive profit in the future, and with a standard assumption, there exists a range of productivity

satisfying this condition.[18] However, this does not explain the survival of very poor performers whose expected future profits are negative and the exit of very good performers who post positive profits. The other possibility is that firms differ in exit value. It may be reasonable to assume that productive firms have a higher exit value than unproductive ones because of higher capacity. This increases exit probability of good performers relative to that of poor performers, and obscures the positive relationship between productivity and firm survival. Since those hypotheses provide an account for the exit of firms with positive future profits, competitive allocation of market share can coexist with irrelevance of productivity and firm survival. That is, firms obtain market share (and profits) according to productivity, while high profits do not necessarily lead to high probability of survival.

However, they cannot explain the survival of very unproductive firms with negative future profits. Though we do not exhaust all possibilities, it would be hard to justify the survival of such firms.[19] Therefore, it is reasonable to conclude that all the continuing firms exhibited productivity above the threshold for producing breakeven *future* profits. Given that the productivity distribution of continuing firms overlaps with that of exiting firms (Figure 5-1), it means that all sample firms had higher productivity than the threshold. This is possible when output price is higher than the competitive price and thus the threshold is lower.

In fact, imported products have not penetrated into the uniform market, since

[18] Assuming a random walk in productivity innovation, expected future productivity is equal to current productivity. However, expected future profits, which is determined by future productivity is not necessarily equal to current profit, because range of possible future profit has a limit on the downside if a firm can opt to exit when it finds realised productivity yields profit that is smaller than exit value (Söderbom et al. [2006]). Given such a downward limit on future profit, expected future profitability tends to be higher than current profit. Therefore, there also exists a productivity level that generates negative *current* profit but positive expected *future* profit.

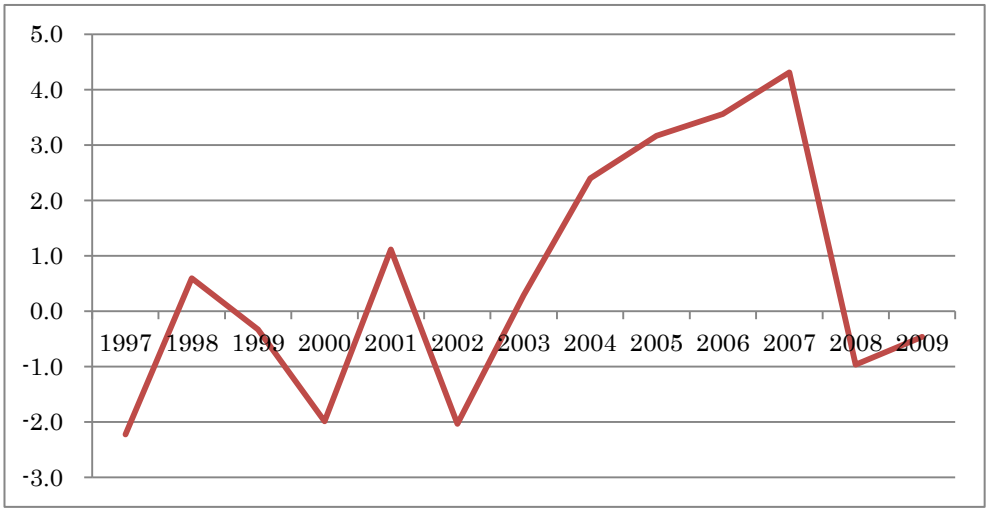
[19] It would be reasonable for a firm group when garment production has externality for production in different business. Our regression result, however, did not find a significant effect caused by business group using ethnicity of owner as a proxy. Another possibility is that a manager predicts higher future profits than correct expected profit due to difficulties in prediction. Though this assumption is not unrealistic, such a firm cannot sustain operation for a long time with negative profits.

uniforms require a high degree of customization. This feature has allowed local garment firms to survive in the market after trade liberalisation, but it may restrict price competition. High demand for customization is likely to necessitate a stable relationship between a buyer and a supplier that reduces transaction costs such as specifying design and material, producing samples and checking products. If transaction costs are large relative to production costs, unproductive firms with lengthy experience in the market can be competitive. The result that an older firm is more likely to survive is consistent with this explanation, though the effect of firm age on survival can be accounted for by other reasons, such as financial access.[20]

Under this assumption, our result is interpreted as suggesting that market competition became more significant in the second period to the extent that market share was more closely related with productivity, but it was not strong enough to force poor performers out of the market. The market share of an unproductive firm becomes smaller, but it is still large enough to sustain operation. Market demand was likely to fall sharply in 2008 and 2009 given the negative growth of GDP per capita (Figure 5-3). The conflict from the end of 2007 to the first half of 2008 and the financial crisis appear to have intensified price competition in the local garment market. Particularly, small unproductive firms were possibly hit severely by the demand shock. Given their limited liquidity, small unproductive firms tend to be more vulnerable to temporal negative profit than large unproductive firms, and hence, the former exit more frequently than the latter. This may account for the positive relationship between productivity and firm survival only for small firms.

[20] Since we do not have information of financial access for the sample firms, its effect cannot be identified directly. Given correlation of financial access with firm size or age in general, negative effect of firm age on hazard rate may indicate effect of financial access. On the other hand, we found strong correlation between firm size and credit access as shown in Chapter 6, yet firm size does not have significant effect on hazard rate (Table 5-6 and 5-7).

Figure 5-3 GDP per Capita Growth (%)



Source: World Bank [2011]

5. Conclusion

The Kenyan garment industry performed as productively as Bangladeshi firms on average in FY 2002 as seen in Chapter 4. After six years, however, their productivity fell significantly, while Bangladeshi firms maintained average productivity level. In Kenya, the fall of average productivity was partly caused by the continuing firms becoming less productive during the period, but firm turnover had a greater effect on it; relatively productive firms exited and new entrants were far less productive. On the other hand, allocation of market share became more efficient during the period, that is, more productive firms tend to have larger market share. This helped industry-level productivity, which is average productivity weighted by output, to maintain the same level between FY 2002 and FY 2008.

In view of market competition, this is a complicated result, since it indicates that firm exit did not appear to be related to productivity, while market share reallocation follows productivity. It is not consistent with the theoretical implications and many empirical studies of firm turnover in a competitive market, which suggest exit of less productive

firms. Even in our sample, exiting firms exhibited lower productivity than those that continued operation in the Bangladeshi firms. The conflicts that occurred in the first half of 2008 are not likely to have affected the results, as firm exit in 2005 was also not related to productivity.

Investigation of firm exit by duration model suggested quite limited evidence of a positive correlation between productivity and firm survival. It suggested a positive relationship only in the period between 2005 and 2008 and only among very small firms, while the positive effect of firm age was robustly identified. In conjunction with the result that market share allocation became more efficient, these results indicate that competition in the domestic market in Kenya has been enhanced since 2002, but it was not sufficiently strong to force unproductive firms out of the market. More concretely, the market share of an unproductive firm becomes smaller, but it is still large enough to sustain operation since output price is higher than competitive price.

Imported products have not penetrated into the uniform market, given that uniforms require a high degree of customization. This feature has allowed local garment firms to survive in the market after trade liberalisation, but it may restrict price competition. Due to relatively high transaction costs for product customization, having a stable relationship with buyers is crucial for competition. The result that an older firm is more likely to survive is consistent with this explanation.

The decline of productivity is a serious problem in growth of the industry. After trade liberalisation, most local firms became specialised in uniform production to avoid competition with imported garments and second-hand garments. Given the large gap in labour costs, in Chapter 4 we found that specialisation in the uniform market was an inevitable strategy to survive trade liberalisation. However, it further reduced the scope of market competition, and confined the dynamism of the industry growth. The

productivity gap between Kenyan and Bangladeshi firms became significant in 2008, though it was not significant in 2002. The competitiveness of the Kenyan garment industry in the domestic market was eroded during the six years, and their production was further constrained in the niche uniform market.

Appendix to Chapter 5

Appendix 5.1. Data Construction

1. Samples Used in the Analysis

Samples lacking necessary information to measure productivity and those with low-quality data were excluded. The conditions for sample restriction are same as the ones utilized in Chapter 4; that is, the samples with negative value added, unrealistic average wage and share of labour costs in value added were excluded. In the Kenyan sample, 46 firms (FY2002) and 35 firms (FY2008) were left, and 172 firms (FY2002) and 218 firms (FY2008) were remained in the Bangladeshi sample (Table 5-1). After this procedure, only one Kenyan EPZ firm was remained in the 2008 sample, and hence, the main analysis is based on Kenyan non-EPZ firms and Bangladeshi firms.

2. Data Construction

Capital value construction and exchange of value unit from local currency to US dollar are based on the same methodology with those in the Chapter 4. All values are deflated at 2002 price using GDP deflator for descriptive statistics (Table 5-2). The input and output value information was deflated at 2002 prices. For the productivity calculation, item-specific deflators were used wherever possible; data used include the apparel wholesale price index in the US (Bureau of Economic Analysis) for gross product and material cost, the fuel and electricity price index in Kenya and Bangladesh for energy cost, the utility price index for utility cost, and the GDP deflator of the both countries for the remaining items.

3. Share of Entrants

Since the survey sample in 2009 incorporates traced and added observations, share of entrants in the 2009 sample is underrepresented. Share of entrants in added sample is supposed to be appropriate assuming large population size, in which traced observations do not have significant share. While this is the case for Bangladesh, the traced observations take substantial share in the population in the Kenyan industry, and thus, entrants is likely to overrepresented in the added sample. However, coverage of entrants in our survey is also likely to be insufficient due to incompleteness of the firm lists that we used. Therefore, we have used share of entrants and incumbents in the added sample for $\theta_{E,t+1}$ and $\theta_{I,t+1}$ in the equation (5.1) for the both countries.

Appendix 5.2. Decomposition of Weighted Productivity Change in Section 3.1

Let $\theta_{I,t}$ represents the market share of all continuing firms at year t, and $\ln TFP_{I,t}$ is the weighted average of TFP of continuing firms, where weight is based only on continuing firms. Then, the equation (5.1) is expressed as follows.

$$\Delta \ln TFP = \left(\frac{\theta_{I,t}+\theta_{I,t+1}}{2}\right)\left(\ln TFP_{I,t+1} - \ln TFP_{I,t}\right) + \left(\frac{\theta_{X,t}+\theta_{E,t+1}}{2}\right)\left(\ln TFP_{E,t+1} - \ln TFP_{X,t}\right) + \left(\frac{\ln TFP_{I,t+1}+\ln TFP_{I,t}}{2}\right)\left(\theta_{I,t+1} - \theta_{I,t}\right) + \left(\frac{\ln TFP_{E,t+1}+\ln TFP_{X,t}}{2}\right)\left(\theta_{E,t+1} - \theta_{X,t}\right) \quad (5.4)$$

Olley and Pakes (1996) showed that the difference between weighted and unweighted averages indicates resource allocation. That is,

$$\ln TFP_t - \overline{\ln TFP_t} = \sum_i \left[\left(\theta_{i,t} - \overline{\theta_t}\right)\left(\ln TFP_{i,t} - \overline{\ln TFP_t}\right)\right] = \frac{1}{n}\left(\sum_i \left[\left(\frac{Y_{i,t}}{\overline{Y_t}} - 1\right)\left(\ln TFP_{i,t} - \overline{\ln TFP_t}\right)\right]\right),$$

where variables with superscript bar (e.g. $\overline{\ln TFP_t}$) are the unweighted sample averages over all firms in year t. The RHS is the sample covariance TFP and output normalized by average output, and larger covariance means that productive firm tends to have large share. From this equation, $\ln TFP_{g,t}$ (g=I, E, X) is expressed as

$$\ln TFP_{g,t} = \overline{\ln TFP_{g,t}} + \frac{1}{n}\left(\sum_{i\in g}\left[\left(\frac{Y_{i,t}}{\overline{Y_{g,t}}} - 1\right)\left(\ln TFP_{i,t} - \overline{\ln TFP_{g,t}}\right)\right]\right).$$

Inserting this to the equation (5.4), we get

$$\Delta \ln TFP = \left(\frac{\theta_{I,t}+\theta_{I,t+1}}{2}\right)\left\{\left(\overline{\ln TFP}_{I,t+1} - \overline{\ln TFP}_{I,t}\right) + \left[\mathrm{Cov}_{t+1}\left(\frac{Y_j}{\overline{Y_I}}, \ln TFP_j\right) - \mathrm{Cov}_t\left(\frac{Y_j}{\overline{Y_I}}, \ln TFP_j\right)\right]\right\} + \left(\frac{\theta_{X,t}+\theta_{E,t+1}}{2}\right)\left\{\left(\overline{\ln TFP}_{E,t+1} - \overline{\ln TFP}_{X,t}\right) + \left[\mathrm{Cov}_{t+1}\left(\frac{Y_k}{\overline{Y_E}}, \ln TFP_k\right) - \mathrm{Cov}_t\left(\frac{Y_l}{\overline{Y_X}}, \ln TFP_l\right)\right]\right\} + \left(\frac{\ln TFP_{I,t+1}+\ln TFP_{I,t}}{2}\right)\left(\theta_{I,t+1} - \theta_{I,t}\right) + \left(\frac{\ln TFP_{E,t+1}+\ln TFP_{X,t}}{2}\right)\left(\theta_{E,t+1} - \theta_{X,t}\right)$$

which is the equation (5.2). This decomposition has advantage to isolate effect of the

market share allocation within the group of entering/exited firms, which is not separated in Griliches and Regev (1995) and other variants of decomposition.

Appendix 5.3. Duration Analysis

1. Likelihood Function

Firm's survival time, T_i, can be censored if it continues operation at the last observed period. Then if a firm i exited at a_m, likelihood function is

$$\begin{aligned} L_i &= P(T_i = a_m) = f_i(a_m) \\ &= h_{i,m} S_i(a_m - 1) \\ &= \frac{h_{i,m}}{1 - h_{i,m}} \prod_{k=1}^{m} (1 - h_{i,k}) \end{aligned} .$$

And the likelihood of a censored firm is

$$\begin{aligned} L_i &= P(T_i > a_m) = S(a_m) \\ &= \prod_{k=1}^{m} (1 - h_{i,k}) \end{aligned} .$$

Our data is a random sample from firms in operation in 2003, which is stock sampling, rather than from firms entered in initial status, operation, during the specific period. Stock sampling has left truncation problem, where firms with short survival time are more likely to be dropped from the sample. Jenkins [1995] showed convenient result of likelihood with left truncation.

$$\begin{aligned} L_i &= \frac{\left(\frac{h_{i,m}}{1 - h_{i,m}} \right)^{c_i} \prod_{k=1}^{m} (1 - h_{i,k})}{S_i(u_i)} , \\ &= \left(\frac{h_{i,m}}{1 - h_{i,m}} \right)^{c_i} \prod_{k=u_i+1}^{m} (1 - h_{i,k}) \end{aligned}$$

where u_i is timing of sampling, and c_i is censoring indicator (c_i=0 if censored, otherwise =1). Multiplying individual likelihood and taking log, we have following log likelihood function to be estimated.

$$\log L = \sum_i c_i \log\left(\frac{h_{i,m}}{1 - h_{i,m}} \right) + \sum_i \sum_{k=u_i+1}^{m} \log\left(1 - h_{i,m}\right)$$

2. Dealing with Unobserved Heterogeneity

Consider the following hazard function,

$$h(a_m, \mathbf{x}, v) = vh(a_m, \mathbf{x}),$$

where v is an unobservable individual effect on hazard function. It is assumed that v has the following properties; $v>0$, E[v]=1, finite variance, and distributed independently with other covariates, a_m and $\mathbf{x}$. Then, cloglog transformation of hazard function based on proportional hazard model is

$$\log\left[-\log(1-h(a_m, \mathbf{x}))\right] = \beta'\mathbf{x} + \gamma_m + u,$$

where u=log(v). As u is an individual effect, degree of freedom is not large enough to estimate it. By specifying distribution of v, $g(v; \rho)$, which has a few parameters, we can integrating out unobserved effects (Wooldridge [2002], Jenkins [2004]). Because v and $\mathbf{x}$, and v and a_m are independent, survivor function is expressed as,

$$S_v(a_m, \mathbf{x}; \rho) = \int_0^\infty S(a_m, \mathbf{x}, v) g(v; \rho) dv .$$

If we assume Gamma distribution, it has a closed form expression (Meyer [1990]) and likelihood function is specified. When Normal distribution is assumed, no closed form exists and integrating out is done numerically based on random effect methods (Jenkins [2004]).

Estimation is based on assumption of Normal distribution. Alternative assumption of Gamma distribution and non-parametric approach by Heckman and Singer [1984] did not unfortunately yield reliable results. Results incorporating unobserved individual heterogeneity are shown in Table 5-A1 and 5-A2.

Table 5-A1 Estimation of Hazard Function Incorporating Unobserved Heterogeneity

	1	2	3
TFP	-0.543		
	(0.557)		
TFP*Worker	0.028		
	(0.018)		
TE		-2.720	
		(2.386)	
TE*Worker		0.146*	
		(0.086)	
LP			-2.720
			(2.386)
LP*Worker			0.146
			(0.086)
totalworker	-0.007	-0.082*	-0.082
	(0.008)	(0.046)	(0.046)
age	-0.093**	-0.093**	-0.093**
	(0.045)	(0.044)	(0.044)
subcontract	0.729	0.669	0.669
	(0.579)	(0.604)	(0.604)
export	-0.390	-0.547	-0.547
	(0.794)	(0.837)	(0.837)
african	0.065	-0.073	-0.073
	(0.619)	(0.651)	(0.651)
s2	0.015	0.093	0.093
	(0.533)	(0.541)	(0.541)
cons	-0.114	1.346	1.346
	(0.835)	(1.412)	(1.412)
$\ln\delta_u^2$	-12.425	-12.676	-12.676
	(513.989)	(29.472)	(29.472)
δ_u	0.002	0.002	0.002
	(0.515)	(0.026)	(0.026)
$\rho=\delta_u/1+\delta_u$	0.000002	0.000002	0.000002
	(0.001)	(0.0001)	(0.0001)
Log pseudo-likelihood	-30.534	-29.394	-30.520
Test of H0: $\rho=0$	5.60E-06	9.90E-06	1.50E-05
χ^2 and p-value	0.499	0.499	0.498
N	70	70	70

Note: δ_u is variance of unobserved term.

Table 5-A2 Estimation of Hazard Function with Differed TFP Effects by Period Incorporating Unobserved Heterogeneity

	1	2	3
TFP*s1	-0.606		
	(0.675)		
TFP*s2	-2.862*		
	(1.557)		
TFP*Worker*s1	0.015		
	(0.015)		
TFP*Worker*s2	0.171***		
	(0.066)		
TE*s1		-4.083	
		(2.834)	
TE*s2		-1.255	
		(2.993)	
TE*Worker*s1		0.147*	
		(0.089)	
TE*Worker*s2		0.168*	
		(0.095)	
LP*s1			-0.002*
			(0.001)
LP*s2			-0.001
			(0.0005)
LP*Worker*s1			0.00004*
			(0.00002)
LP*Worker*s2			0.00003
			(0.00002)
totalworker	-0.004	-0.085*	-0.079
	(0.007)	(0.047)	(0.054)
age	-0.128**	-0.095**	-0.272
	(0.057)	(0.045)	(0.171)
subcontract	1.143	0.600	2.281
	(0.665)	(0.648)	(2.034)
export	-0.444	-0.540	-2.533
	(0.783)	(0.836)	(2.213)
african	0.508	-0.031	0.049
	(0.684)	(0.680)	(1.887)
s2	-0.590	-1.608	-0.990
	(0.691)	(1.542)	(1.721)
cons	-0.242	2.069	5.073
	(0.902)	(1.565)	(4.032)
$\ln\delta_u^2$	-13.838	-12.654	2.760
	(658.484)	(29.310)	(1.214)
δ_u	0.001	0.002	3.976
	(0.326)	(0.026)	(2.413)
$\rho=\delta_u/1+\delta_u$	0.000001	0.000002	0.906
	(0.0004)	(0.0001)	(0.104)
Log pseudo-likelihood	-25.582	-28.379	-28.515

Test of H0: ρ=0	0.000	0.000	1.990
χ^2 and p-value	0.499	0.499	0.079
Number of Observation	70	70	70

Note: δ_u is variance of unobserved term.

Chapter 6 Export Participation by Local Firms

Investigation in the chapter 4 and 5 demonstrated weak competitiveness of Kenyan garment in export market. However, thanks to the preferential access to US market, it had competitive edge until the quota system was terminated in the end of 2004. Facing strong competition from cheap imported goods, rapidly growing export market may have been a good alternative for Kenyan local firms. Around the world, garment FDI has facilitated local firms' participation in the export market in developing countries. 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], Greenaway 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.[1] For example, the garment industries in Bangladesh and 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

[1] 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 [2005a], De Loecker [2007], Bigsten et al. [2004], Grima et al. [2004]), while some of them support self-selection explanations (Clerides et al. [1998], Bernard and Jensen [1999], Delgado et al. [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.

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 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.

In this chapter, 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.[2] 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.

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 second section. The third section investigates

[2] 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]).

the feasibility of local firms to start exporting from the aspect of absorptive capacity, and the fourth section approaches it in terms of credit accessibility. Based on those results, expected profit is simulated and the firms' incentive is investigated in the fifth section. The last section concludes the discussion.

1. FDI and Export Participation by Local Firms

1.1. 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 relatively 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 to 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 in 1979, 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]).

1.2. Local exporting firms in Kenya

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 6-A1 in appendix 6.1). 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.[3] 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 6-1). 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

[3] 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.

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.

Table 6-1 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.

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 3-3). There is clearly a minimum scale in export production; except for one small firm, all local exporters employ more than 70 workers and most of them have 130 workers (Table 6-A1).[4] 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.[5]

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,

[4] One small firm (firm C in Table 6-A1) specialized in printing.
[5] According to the Table 3-3, 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.

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.[6] 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.[7] 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

[6] 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.
[7] This is according to the author's interview.

to many local firms. Among the local firms in which the author conducted interviews, 72.7% were contacted by them about subcontracts.[8] Although there were about 120-150 garment firms with more than 10 employees in Kenya based on our estimation (Table 3-3), 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 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.

2. Analytical Framework and Methodology

2.1. 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,

[8] New exporters are not included.

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 Pindyck [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 did 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

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

This characterization implies that a firm participates in exporting whenever

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

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 Pindyck [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.[9]

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 present case, 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 3. However,

[9] 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 et al. [1998]).

as mentioned, there is a minimum production scale for export production, which is larger than the average scale of local firms, and we assume that local firms finance such expansion by credit from financial institutions.[10] As equipment for local supply can be utilized for export supply, moderately credit-constrained firms start exporting by giving up local supply, while firms with good credit access can opt to supply both markets by adding production line for export to existing line. A firm that is unable to finance at a minimum scale, even utilizing existing equipment, has no possibility of participating in the export market. 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 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 for equipments in Kenya.[11] 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

[10] Though firms may use retained profits or equity instead of loan to finance investment, as the literature on finance in SMEs argues, they are not usually sufficient to maintain growth of SMEs (Aryeetey and Nissanke [1998]). Since needed expansion is relatively large to firm's equipment value as we will see later, we think that it is not totally unreasonable to neglect retained profits and equity as a source of finance. However, it is noted that our evaluation is not valid for the exceptional firm that has quite large retained profits or resourceful investors.

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

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

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

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

$$\pi_t^f \geq \pi_t^d - s_{t-1}W + \rho\left(E_t\left[V_{t+1}\middle|s_t=0\right] - E_t\left[V_{t+1}\middle|s_t=1\right]\right). \qquad (6.1)$$

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 $\pi_E^{f*} = \pi_t^d - W + \rho\left(E_t\left[V_{t+1}\middle|s_t=0\right] - E_t\left[V_{t+1}\middle|s_t=1\right]\right)$ and they now consider sunk cost W, while the one for non-exporters is $\pi_N^{f*} = \pi_t^d + \rho\left(E_t\left[V_{t+1}\middle|s_t=0\right] - E_t\left[V_{t+1}\middle|s_t=1\right]\right)$ 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 (6.1) 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, $E_t\left[V_{t+1}\middle|s_t=0\right] > E_t\left[V_{t+1}\middle|s_t=0\right]$ holds and the last term in (6.1) 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.[12] Then, the last term in (6.1) can be negative. Hence, if the learning-by-exporting effect is not substantially large, the participation condition (6.1) 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 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 or exchange rate volatility entailed with export sales, 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 6-2 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

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

are mainly due to uncertainty of order and the relatively large physical investment required.

Table 6-2 Reasons Not Taking Subcontract Work 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

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 neighbour'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. Therefore, it is reasonable to assume that local firms know price and profitability with little uncertainty.[13]

[13] Furthermore, the fact that new exporters who are more uncertain in garment exports than local non-exporters were more positive in exporting suggests that uncertainty of export market did not discourage motivation.

2.2. Methodology for Identification

Though standard methodology to identify determinants of export participation is to estimate reduced-form equation about export participation based on the samples including those who started exporting and did not (i.e., Roberts and Tybout [1997], Bernard and Jensen [1999], 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 (6.1) 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. A firm's characteristics including factor prices and productivity generate 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.

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 endogeneity problems are significant. By directly looking at expected

profit, our methodology avoids misidentification of determinants. [14] On the other hand, difficulties lie in the collection of measurable data related to decision making, such as precise information on credit access and risk preference. In particular, lack of information about risk preference of individual firms caused ambiguity in empirical test of the theoretical model. In case that the evidence is not consistent with the model prediction, we cannot systematically investigate whether it is caused by firms' risk preference or assumptions on which our model based. This arises in the analysis of Type 3 firms in section 5.2.

2.3. 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.

Estimation methodology follows the one adopted in Chapter 4. We mainly based on stochastic production approach and OLS is used supplementary to check robustness of the result. Specifically, it assumes a production function

$$Y_i = \alpha\, K_i^{\beta 1} Ls_i^{\beta 2} Lu_i^{\beta 3}\, e_i, \qquad (6.2)$$

where Y: output, K: utilized capital, Ls: skilled labour, Lu: semi-skilled labour, e:

[14] Conley and Udry [2010] also estimated expected profits in a study of farmers' learning of new technology in Ghana. They used neighboring farmers' realized profits (with control of production characteristics) for expected profits, and it is basically same methodology as ours.

stochastic errors with mean at one, and *i* represents an individual producer. To identify heterogeneity of production function between exporters and non-exporters, export dummy and its interactions with inputs are added. In the OLS, *e* represents TFP, while *e* is separated to technical efficiency and pure noise in the stochastic approach based on the assumption on distribution of technical efficiency. Productivity is used to evaluate the performance of local exporters and to identify the learning-by-exporting effect based on the cross-sectional variation of productivity according to export experience.

The estimation of expected profits is based on a profit function drawn from production function estimates utilizing duality of production and cost functions, as applied in Chapter 4. It is to minimize possible bias caused by measurement error of rental price. While local firms made estimations of profitability based on their experience, we do so using the data of exporting firms in Bangladesh and Kenya. As shown in Chapter 4, a cost function expressed by production function parameters is

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

where $\beta=\beta_1+\beta_2+\beta$, $A = \beta\left(\alpha \prod_n \beta_n^{\beta n}\right)^{\frac{-1}{\beta}}$ 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.[15]

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

[15] $\overline{AE} \geq 1$ 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.

$$TC_i = A\, r_i^{\frac{\beta 1}{\beta}} ws_i^{\frac{\beta 2}{\beta}} wu_i^{\frac{\beta 3}{\beta}} \hat{Y}_i^{\frac{1}{\beta}} TE_i^{\frac{-1}{\beta}} \overline{AE}_i\ \eta_i, \qquad (6.3)$$

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

$$\hat{\pi}_i = p\hat{Y} - T\hat{C}_i\left(r_i, ws_i, wu_i, Y, TE_i, \overline{AE_i}, \eta_i\right). \qquad (6.4)$$

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 (6.4). Though rental price enters into the equation (6.4) 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.

2.4. 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 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.[16] The Kenyan sample consists of 3 local exporters, 5 foreign exporters and 39 local firms supplying to

[16] See Appendix 4.1 for details of sampling method.

domestic and African markets (Table 6-3). 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 6-3). For supplementary information, 5 EPZ firms, Export Processing Zones Authority, Ministry of Trade and Industry and Kenyan Association of Manufacturers (industrial association) were interviewed.

Table 6-3 Sample Size of Interview and Survey in Kenya

		Interview (2005-6)	Survey (2003)	Population
Total		33	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.

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.

3. Absorptive Capacity

3.1. What Is 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 separated to more steps than that of domestic products because of the larger volume and shorter lead time involved. With a highly ramified production process, an operator concentrates on a single task (e.g., 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 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.[17] This means that operators in local firms

[17] 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.

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.[18] 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, since all local exporters heavily relied on subcontracting, they did 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 (Nordås [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.

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

3.2. 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 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 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 6-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 6 exporters

are Asian Kenyan (Table 6-A1).[19] 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

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

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. Although reliance on the subcontract needs to be 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.

3.3. 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 6-4). 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.[20] 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 studies conducted in 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.

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

Table 6-4 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 6-7, respectively.
* indicates difference with the figure in line 3 is significant at 5%.

4. Credit Constraint and Export Opportunity

The initial investment required for a garment assembler is relatively small because of its labour 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 the equation right after (4.3) with assumption on minimum output.[21] 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

[21] The simulation does not include land and building as these can be rented. See appendix 6.2 for details of the simulation method.

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 capital 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 6-5 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.

Table 6-5 Necessary Addition of Capital by Firm Size

Employment	Ratio of addition to initial capital			
	0%	[0%, 50%)	[50%, 100%)	more than 100%
more than 50	3	7	1	0
30-49	0	1	2	0
less than 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

Credit accessibility is investigated through interviews. Access to formal credit clearly differed according to the size of the firm as exiting studies show (Isaksson and Wihlborg [2002]). 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 6-6). The manager's judgment of credit accessibility almost always corresponded with credit use (right hand side of Table 6-6). Then, we set a boundary for credit access at 50 workers. Combining this information and Table 6-5, 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 6-5). 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. Since most of financial institutes require collateral in Kenya (Isaksson and Wihlborg [2002]), the amount of credit depends on the firm's assets. Hence, unless assuming assets other than production equipment, a firm cannot make an investment greater than the value of its current equipment.[22] With this conservative assumption, all 11 firms can be Type 2, given that needed expansion of equipment is smaller than current equipment value in all cases. With the same assumption, only three firms possessing the minimum production capacity (top far left in Table 6-5) can be Type 3, as their capital value is large enough as collateral for financing additional export capacity. However, identification of Type 3 firms remains ambiguous as some firms may have other assets. Later in this chapter, we evaluated possible effect of this judgment on credit accessibility on results of following analysis.

Table 6-6 Credit Availability of Local Firms by Firm Size

	Credit Use Experience (last 5 years)		Credit Accessibility		
Employment	Yes	No	Yes	No	Unknown
more than 50	9	3	10	0	2
30-49	0	1	1	0	0
less than 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

[22] Isaksson and Wihlborg [2002] reported that collateral required by financial institution was occasionally larger than size of loan.

5. Expected Profitability of Local Firms

5.1. 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. 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 6-7). 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 labour 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 6-4. 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.

Table 6-7 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]).

To form a more rigorous investigation, effect of export status on technical efficiency is estimated. Following Kumbhakar et al. [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 6-8).

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 (6.3). Log of $\overline{AE}$ is regressed on exogenous variables, assuming a proportional effect of export years. Table 6-8 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

Table 6-8 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*.

and negative coefficient of export experience.[23] One year of experience reduces 0.49% of the cost of allocative efficiency, which leads to a 0.14% increase in profit. Though

[23] To control endogeneity of export years, the average tenure of skilled workers and that of semi-skilled workers were incorporate 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.

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 et al. [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.[24] 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 (6.1) 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 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 enhancement. Yet, credit access will be a constraint for expansion.

5.2. Simulation of Expected Profits

Based on the production function estimates (OLS3 in Table 6-7), cost function was

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

drawn as the equation (6.3) and profit is simulated by the equation (6.4). 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 labour 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.[25]

Eleven firms with 50 workers, which are candidate for Type 3, are used for simulation. The production scale is set to the minimum. The result indicates that expected profit is positive for all firms (line 1 in Table 6-9). And in nine out of eleven firms, ratio of profit to capital value is larger than one; that is, one year of operation will cover capital investment.[26] This simulation result indicates that the export market is expected to be very profitable. There are three possible explanations. Firstly, local firms did not start exporting due to their risk-averseness; that is, expected profitability was not large enough to cover the risk premium that local firms require. Secondly, they are not Type 3 but Type 2. Thirdly, our assumption of no sunk entry cost in export market was wrong and it discouraged local firms from exporting. The third possibility is less likely given the result that expected profit in the present period is larger than capital investment. As expected profit in FY2002 would cover whole capital investment, that is sunk cost in our framework, they do not need to wait until FY2003 to update

[25] 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%.

[26] 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].

expectations.[27] More probable explanations are either they were not Type 3 or they refrained from investing due to risk preference. These explanations are within our analytical model.

Table 6-9 Simulation of Expected Profits

	Mean	Median	Std. Dev	Min	Max	N
Kenyan Local non-Exporter	109130	105560	55420	9558	178015	11
Kenyan Local Exporter	149949	143980	56649	96520	209345	3
Bangladeshi Exporter	194479	207041	39856	76718	241172	51

5.3. 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. Hence, their decision problem is the same as that of a Type 3 firm.

Expected profit is compared between non-exporters (candidates for Type 3) and exporters to see the relationship between expectation and response to export opportunity. It is noted that we have small number of firms that started to export in 2002; that is, a counterpart of the local non-exporter. Then, characteristics of such firms were replicated

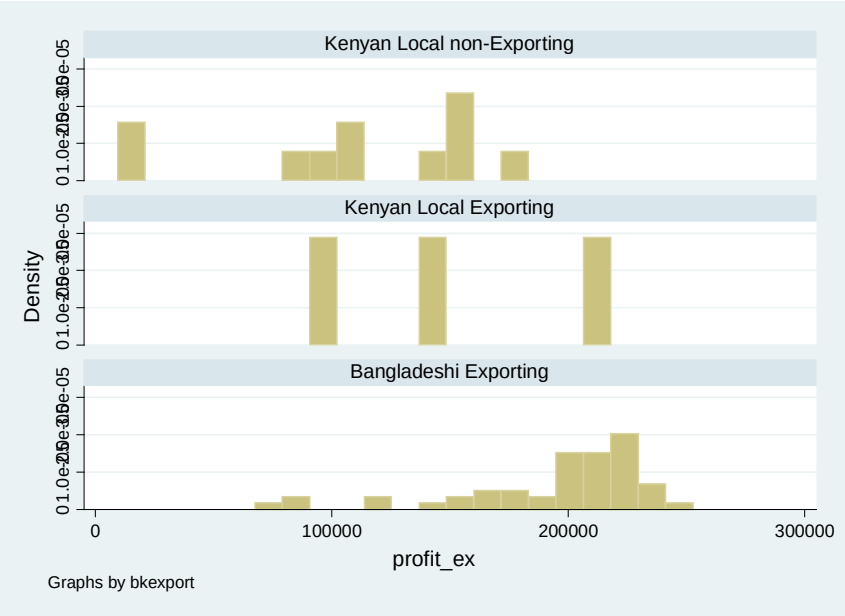
[27] Another possibility is that sunk entry cost for a subcontractor includes not only equipment but others such as cost of building, land, adjustment costs.

from those of exporters in our survey sample. Estimating the correlation between firm age and characteristics among exporters, firms that started exporting in 2002 were replicated.[28] 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 (Table 6-9). Figure 6-1 shows that distributions of expected profits for local exporters and non-exporters overlap. This indicates that export was highly profitable for local exporters and hence, a firm with substantial financial capacity has incentive to start exporting. It suggests that different responses to export opportunity between Type 3 firms and local exporters can be explained by risk preference.

In contrast, a comparison with Bangladeshi exporters yields a large and significant difference in expected profits. On average, the expected profits of Bangladeshi firms are greater than Kenyan non-exporters by 1.8 times (Table 6-9). 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 6-1). 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 the result in section 5.2, we can conclude that Type 3 Kenyan firms did not diversify to the export market due to risk-averseness, yet it does not solely account for the different response from Bangladeshi firms; Kenyan local firms are less likely to be motivated to export even if they are as risk averse as Bangladeshi firms.

[28] See Appendix 6.2 for results of the estimation.

Figure 6-1 Distribution of Expected Profits



Finally, we would evaluate sensitivity of results with respect to our judgment on credit accessibility of individual firms. In section 4, based on firm's credit use and manager's subjective evaluation of credit accessibility, we defined that firms employing less than 49 workers do not have access to credit. Though strong relationship between firm size and credit access is widely reported in Africa, there may be an exceptional small firm that has good access to credit or the threshold drawn at 49 workers may be incorrect. Hence, true number of Type 1 firms and other firms (Type 2 or 3) may differ from our judgment; for instance, Type 1 firms may be less than 72%. However, it does not affect our result that Type 2 firms are not motivated to start exporting, as production function was estimated over all samples of Kenyan local firms. It means that any Kenyan local firms are not motivated for export market as long as they are not Type 3. On the other hand, if most of firms are Type 3, our model does not provide clear and robust explanation about non-participation of local garment firms given the simulation result that Type 3 firms have export incentive if they are risk-neutral. However, we think

that it is unlikely as 92.7% of firms need to make investment greater than their current capital value to be Type 3 with minimum size, and 59.0% of firms need investment twice more than current capital (Table 6-5).[29] Our results are unlikely to be sensitive to judgment on credit accessibility.

6. 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.

[29] Among 39 samples, 36 firms (92.7%) have capital value less than the minimum capital size for exporters, and thus, they need investment greater than their current capital to set up a new factory for export market (Table 6-5).

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, exporting is a preferred option for those which had sufficient financial capacity and were risk-neutral. It is consistent with the fact that newly established firms with rich financial capacity are more positive to start exporting than existing garment firms having much weak financial capacity. Though 28% of our local firm sample was a candidate for Type 3 firms, we are not able to identify it unfortunately. If there was a Type 3 firm, however, it is most likely that risk aversion account for their non-participation. It also account for differed response with local exporters given no significant difference in the expected profits. On the other hand, the average expected profit of Bangladeshi firms is significantly higher than that of Kenyan local firms and it clearly gave an advantage to Bangladeshi firms.

Export participation of the Kenyan local garment firms were constrained by weak financial capacity rather than absorptive capacity. 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 motivated as much as Asian exporters due to the large gap in expected profits.

Appendix to Chapter 6

Appendix 6.1. List of Local Exporters

Table 6-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
A	India, UK	in operation	Working in the same company	Started UK export in 1992, US export in 2002
B	No expatriate	in operation	Textile trader in West Africa	Started US export in 2004
C		(Closed 04/05)		Started US export in 2003
D	Bangladesh, Sri Lanka	in operation [mainly domestic]	Garment firm	
E		Closed 04/05		
F		Closed 04/05		
G		Closed 04/05	Garment firm [relative of a local firm owner]	
H*		(Closed 04/05)		
I*		(Closed 04/05)		
J	Sri Lanka	Closed 06	Textile trading, Min of Defense	
K	India	in operation [mainly domestic]	Owner of supermarket, Banker	
L*	Sri Lanka	(Closed 04/05)		
M	Sri Lanka	Closed 06	Cargo business in East Africa	
N		Closed 06		
O		Closed 06	(wife of former president)	
P	Sri Lanka	in operation	Shoes trading business	
Q	Sri Lanka	Closed 06	Horticulture trading, Min of Treasury	
R	India	Closed 06	HR manager of EPZ, HR manager of bank	Took over firm O
S	India	in operation	Min of Local Government, Engineering consultant	Took over firm M

Appendix 6.2. Simulation of Capital demand and Expected Profits

1. Necessary Capital to Start Exports

Conditional capital demand function is given by the first equation (4.3) in Chapter 4. Firm's own factor prices, technical and allocative efficiency, and the minimum output level set to 262643.7 US$ is inserted into the equation. The minimum output level is referred to the actual output of the relatively small firm employing 84 workers. 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

Expected profits are simulated by the profit function given by the equation (6.4). It is noted that parameters of profit function is obtained from production function parameters utilizing duality of production function and cost function (and hence profit function). The equation (6.3) shows relationship of parameters of two functions. We prefer this dual methodology to directly estimating profit function because of difficulty in measurement of rental price of capital. In many cases, capital service cost is known only very imprecisely, as a firm owner providing personal asset does not always claim dividend separately from her wage. Such difficulty makes estimation of profit function

unreliable, while it does not affect parameter estimates of profit function. It is noted that rental price is still needed for simulation of profit as shown in the (6.4), yet simulation error is much smaller than direct estimation of profit function given less bias in parameters and relatively small share of capital service costs in value added (it is less than 15%).

Firm's own factor prices, technical and allocative efficiency are inserted in the equation (6.4). Output level is set to the minimum level defined in the section 1 of this Appendix, 262643.7 US$, 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 were estimated for both local non-exporters and exporters in Kenya and Bangladesh for the purpose of comparison. As our dataset contains small number of the firms started export in 2002 (10 firms), 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 6-A2). 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 6-A2 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 (0.002)	Age	0.014** (0.007)	0.006 (0.004)	-0.007 (0.007)	-0.008 (0.006)
Age*Export	-0.005*** (0.002)	Sewing	0.000 (0.002)	0.000 (0.001)	0.001 (0.000)	0.000 (0.000)
Manager's Education	-0.013 (0.053)	Location in capital city	0.111 (0.251)	0.197 (0.156)	0.171** (0.076)	-0.074 (0.074)
Manager's Experience (years)	-0.002 (0.002)	non-EPZ dummy	-0.313 (0.838)	0.161 (0.412)		
_cons	0.158*** (0.050)	_cons	7.766*** (0.874)	6.384*** (0.439)	6.983*** (0.083)	5.807*** (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.

Chapter 7 Conclusion

Diversification of economic structure has been a central issue of economic development and poverty reduction, and it has become critical in sub-Saharan Africa after hike of commodity prices strengthened its dependence on primary sector. This thesis attempts to understand causes behind stagnation of the African manufacturing sector based on comparative case studies. We specifically compare the garment industry between Kenya and Bangladesh, which have similar endowment including income per capita and business environment, but contrast in development of the typical labour-intensive industry. We intend that our comparison between countries with similar endowment simplifies causes of the divergent performance, since it effectively controls possible reverse causation that good manufacturing performance creates good conditions such as business environment and human capital. Also focus on labour-intensive industry demonstrates obstacles at the early stage of industrialization, in which most of African countries are situated.

We set three research questions that are related to 1) relative competitiveness of Kenyan garment firms to Bangladeshi firms, 2) firm dynamics in terms of productivity changes among non-exporters, and 3) firm dynamics in terms of export participation. The fact that the Kenyan industry has growth opportunity in the period of our analysis, 2002-2008, made our investigation effective in searching the causes of industry's stagnation. In this concluding chapter, we first present answers to the research questions through summarising finding in the previous chapters in the following section. Based on the answers, we argue contribution of our results to the literature with its limitations in

the second sections. Third section presents policy implications and future research agenda.

1. Answers to the Research Questions

We have explored background of the stagnation in the Kenyan garment industry through the three research questions raised in the first chapter. Here, we provide answers to the questions.

RQ1: How competitive is the Kenyan garment industry in comparison with the Bangladeshi industry, which is a successful Asian exporter? What are the causes of the gap in competitiveness?

In Chapter 3, we found significant difference in unit cost, which is a measure of price competitiveness. The unit cost of Kenyan firms is, on average, more than double Bangladeshi firms' cost. This result well explains the weak competitiveness of Kenyan products in the local as well as export market. Growth of export from Kenya was supported by duty-free and quota-free access given to the selected African countries, which compensated high unit cost relative to Asian exporters, though loss of effectiveness of quota-free access significantly hurt competitiveness of Kenyan clothing. In the local market, the results indicate that gap of cost is so large that Kenyan products cannot compete with Asian imports without substantial tariff or non-tariff barriers.

Decomposition of the cost difference showed that it has not resulted from lower productivity of Kenyan firms but rather from their higher wages than Bangladeshi firms.

Somewhat surprisingly, estimation results showed that even local Kenyan firms are as productive as Bangladeshi firms. Both export-oriented foreign firms and local firms in Kenya share the same technology with Bangladeshi exporters, and the average efficiency does not differ. Furthermore, firm-level proxies of business environment neither differ between the two countries, nor significantly affect efficiency. Therefore, our analysis indicates that, as of FY2002, technological gap and business environment did not account for the gap of competitiveness, but price of labour did.

Though we have used several different methodologies and assumptions, there may be an estimation bias in productivity measurement. The greatest concern is difficulties in deflating the price in the export market and local market. However, even if measurement bias is significant, wage has substantial impact on competitiveness given the observed large gap in wages, which is pointed out by a few studies.

RQ2: Is the gap of competitiveness between Kenyan and Bangladeshi industries narrowing or widening? In particular, how did inflow of FDI induce the productivity growth of local firms?

In Chapter 5, the change of the gap in competitiveness and productivity between 2002 and 2008 was analyzed. During the six years, Bangladeshi firms experienced substantial increase of real wage in contrast to a slight fall in Kenya. Though the difference was narrowed slightly, unit cost rose in both countries, and the cost in Kenya was still twice higher than that of Bangladesh in 2008. Investigation of productivity change revealed that average productivity fell significantly in Kenya while the Bangladeshi average did not change. The fall of average productivity was caused by decline of productivity among local Kenyan firms that continued operation throughout

the six years, and the fall in productivity due to firm turnover. The latter means that good performers tend to have exited with higher probability. On the other hand, allocation of market share improved during the period; that is, better performers gained market share. Hence, industry-level productivity, defined as a weighted average of productivity by market share, was maintained, despite a significant fall of simple average of productivity. In contrast, the dynamics in Bangladeshi firms showed a higher rate of exit of poor performers.

These results indicate the following two features of the Kenyan industry; spillover effect of FDI was not significant with respect to productivity and firm turnover, in particular exits, did not follow productivity. To see the precise effect of productivity on exit, probability of exit in the two periods (from 2003 and 2005, and from 2005 to 2009) was regressed on productivity with other covariates. The results indicate that firm exit was not related with productivity except in the case of micro firms in the second period (2005-2009). A robust determinant is firm age, which significantly reduces probability of exit. Assuming that a firm exits whenever it has negative present value of expected future profits, we conclude that output price was high enough to allow survival of very unproductive firms. In conjunction with improvement of market share allocation during the six years, our results implies that price competition became significant to the extent that poor performers lost market share, but it was not strong enough to force them out of the market. Firm's characteristics related with age, such as tolerance to negative demand shock or exit value, dominate exit decision.

RQ3: What are the constraints for the export participation of Kenyan local firms after significant inflow of FDI into the sector in question? Did low absorptive capacity prevent them from learning through positive spillovers from FDI?

In Chapter 6, local firms' decisions about export participation were explored. We found that export opportunity was available to most local firms at least until 2004 through subcontracting with EPZ firms. While subcontracting waives marketing in foreign markets and handling of international logistics, local firms need to adjust their production systems to fit with larger volume, shorter lead times and more stringent quality control standards than domestic supply. In line with experience in other garment-exporting countries including Bangladesh, necessary knowledge was transferred through movement of skilled workers, who were available in Kenya as expatriates working in EPZ firms. In fact, many of the local exporters were established by Kenyan entrepreneurs without experience in the garment industry in collaboration with expatriates, and they performed as productive as EPZ firms. Therefore, lack of absorptive capacity does not explain the non-participation of local firms.

The other possible constraint for local firms is credit constraint. To satisfy the minimum production scale for the export market, most local firms need substantial expansion of production capacity, while access to credit is severely constrained for small firms in Kenya. While equipment for local supply is convertible for export supply, we found that more than 70% of local firms were not able to finance necessary investment even if they gave up domestic supply. As for the rest of the firms, decision rules differ depending on whether they can manage to start exporting without sacrificing domestic supply. If they need to give up domestic supply to prepare export capacity, they are motivated to export when export profits exceeds domestic ones. Our estimation, however, shows neither a significant difference in profit between export and local markets nor learning-by-exporting. Therefore, local firms did not have motivations to switch from local to export markets. On the other hand, if a local firm can add export

capacity to existing domestic supply, positive export profit is a sufficient condition for them to invest, and simulated profit is positive for most of the cases. Risk averseness is a possible explanation if there is such a firm.

2. Findings in This Thesis

Through focus on a labour-intensive industry and comparison with a low-income country, we have reached quite different conclusions than the existing literature, which has argued that stagnation of the manufacturing sector is caused by poor quality of the business environment and the technological backwardness in Africa. However, the business environment neither differs significantly between Kenya and Bangladesh nor significantly affects firm-level productivity. We also did not find any evidence that the capacity of Kenyan firms was significantly poorer than the successful Bangladeshi industry. The technology of Kenyan EPZ firms is basically the same as the Asian exporters with which they are affiliated, and no significant gap was found in productivity. The performance of local Kenyan firms was also as productive as Bangladeshi firms, at least in 2002, and some of them started supplying to the export market through subcontracting with foreign affiliates. These results are not surprising, given the growth experience of the garment industry in many low-income countries. Relatively simple and matured technology in garment assembling, particularly assembling of basic products, is less susceptible to the quality of the business environment and does not require high skill and capacity for managers and workers. Furthermore, development of fragmentation among multinational garment firms has accelerated the spread of skilled workers in low-income countries, which, consequently,

effectively facilitated technology transfer through the movement of skilled workers from foreign affiliates to local firms in the host country including Kenya.

Instead of business environment and technology, our analysis shows that the strikingly high wage is the most influential factor in the weak competitiveness. Despite similar income per capita between the two countries, the average wage of floor-level workers in Kenyan firms is higher by about 2.5 times than that of Bangladeshi firms, which doubled the production costs of Kenyan firms. With such a large gap in costs, Kenyan firms could not compete with imports from Asia as well as second-hand clothing, and these firms specialized in uniform production to escape from competition with them. In the export market, Kenyan products cannot compete without double advantages in market access, namely duty-free and quota-free access. Comparative cost structure of the two industries is consistent with the market outcomes.

Such a large cost gap has even dampened dynamics in the industry for development. Specialization in the niche local market significantly weakened competition among local firms, and consequently, productivity growth through technological changes and firm turnover has been seriously stagnated. Although the market condition has become more favourable for the Kenyan industry due to the steady rise of wage in Asian countries and recent demand growth in African countries, local firms have not benefitted from growth opportunity because of stagnation in productivity. Besides, in conjunction with credit constraints, specialization in the niche market prevented local firms from export participation since the higher profit margin in the niche market discouraged from switching to the competitive export market. It suggests that even if export growth had continued after the MFA phase-out, export participation of local firms would have been inactive.

It is notable that our comparison suggested that the capacity of firms in Kenya did not

constrain their industrial performance. Focusing on a labour-intensive industry, which is the most feasible industry for low-income countries, our analysis showed that Kenyan firms are capable of absorbing technology and knowledge and performing as productively as leading exporters, which contrasts with the characteristics of African firms as described in the existing literature. If wages were proportional to GDP per capita, Kenyan garment industry would have developed as one of leading industries. One may think that the Kenyan wage is not high, but the Bangladeshi wage is low among low-income countries.

In fact, it is one of the lowest in the world, yet wages in other low-income countries are substantially lower than Kenya (Table 7-1). For instance, an operator's wage in Cambodia, India, Pakistan and Indonesia is lower than that in Kenya. Table 7-1 also indicates some other African countries, such as Lesotho, South Africa and Cote d'Ivoire, that have higher wages than the Asian low-income countries. In addition, high wage is not peculiar to garment industry but common in the Kenyan manufacturing sector. In Table 7-2 that shows that ratio of manufacturing wage to GDP per capita, Kenya is the second highest among the countries with wage data. In fact, its ratio, 4.46, is higher than ratio of average garment wage to GDP per capita (2.28),[1] and therefore, wages in the other manufacturing industries are higher than that in the garment industry.

[1] Nominal average wage of local Kenyan firms is $1768.2 in 2008 based on our dataset, and GDP per capita is $774.7 (World Bank [2011]).

Table 7-1 Average Monthly Wage of Operator in Garment Industry ($)

	Around 2002	Around 2008
Kenya*	67	121
Lesotho	100	
South Africa (urban)	130-180	
Mauritius	220	242
Madagascar*	50-55	80
Cote d'Ivoire	102.3 (2001)	
Zambia		74.6 (2006)
Bangladesh*	43	69
Cambodia*	58	93
India	49.6 (2001)	
Sri Lanka	62.1 (2001)	
Pakistan	50.2	
Indonesia		71.9 (2006)
China	73 (2000)	125.1 (2006)

Source: The figures with asterisk are from the surveys by the Institute of Developing Economies. The others are from Gibbon [2003] (Lesotho and South Africa), Mauritius Central Statistics Office [2008] (Mauritius), and ILO [2012].

Table 7-2 Ratio of Manufacturing Wage to GDP per Capita (Average from 2004 to 2008)

1	Ethiopia	5.38	22	Colombia	1.54	43	Greece	1.08	64	Sri Lanka	0.82
2	Kenya	4.46	23	Fiji	1.53	44	Ukraine	1.07	65	Singapore	0.76
3	Tanzania	4.37	24	Cyprus	1.47	45	Denmark	1.07	66	Peru	0.75
4	Syria	4.32	25	Korea	1.42	46	Malaysia	1.04	67	Portugal	0.73
5	Afghanistan	3.71	26	Jordan	1.36	47	Indonesia	1.04	68	Czech	0.73
6	Eritrea	3.56	27	Germany	1.35	48	United States	1.02	69	Azerbaijan	0.72
7	Malta	3.13	28	Brazil	1.34	49	New Zealand	1.00	70	Thailand	0.72
8	Kyrgyzstan	3.05	29	Turkey	1.27	50	Georgia	1.00	71	Armenia	0.69
9	Morocco	3.03	30	Belgium	1.24	51	Yemen	0.98	72	Estonia	0.68
10	Pakistan	2.91	31	U. K.	1.18	52	Poland	0.98	73	Russia	0.67
11	Philippines	2.42	32	Netherlands	1.17	53	Italy	0.98	74	Lithuania	0.66
12	Lesotho	2.34	33	Panama	1.15	54	Albania	0.96	75	Luxembourg	0.62
13	India	2.28	34	Austria	1.15	55	Mauritius	0.96	76	Latvia	0.61
14	South Africa	2.24	35	Finland	1.15	56	Sweden	0.94	77	Oman	0.59
15	Egypt	1.85	36	Uruguay	1.12	57	Mongolia	0.93	78	Bulgaria	0.57
16	Iran	1.76	37	China	1.11	58	Romania	0.92	79	Madagascar	0.56
17	Suriname	1.70	38	Spain	1.11	59	Norway	0.91	80	Saudi Arabia	0.40
18	Chile	1.69	39	Croatia	1.11	60	Hungary	0.89	81	Macao	0.26
19	Israel	1.64	40	Canada	1.10	61	Ireland	0.88	82	Qatar	0.18
20	Moldova	1.62	41	Tonga	1.10	62	Japan	0.86	83	Botswana	0.04
21	Macedonia	1.58	42	France	1.09	63	Kazakhstan	0.84	non-OECD average		1.49

Note: Ratio of average manufacturing wage to GDP per capita.
Source: Author's calculation using UNIDO [2011] (manufacturing wage) and World Bank [2011] (GDP per capita).

Our result about adverse effect of wage on competitiveness is robust to possible measurement error in output. Output of local Kenyan firms may suffer from upward bias given greater margin in price of local uniform market than that of export market. Though we have used exchange-rate-converted output value rather than PPP-converted value to reduce possible upward bias, bias may remain. This would overestimate productivity local Kenyan firms relative to Bangladeshi and Kenyan EPZ firms, and underestimate its adverse effect on competitiveness. However, given large size of the wage differential, its adverse effect must be substantial even with upward bias in output value.[2]

Price of labour has not been seriously investigated as a source of the weak competitiveness of the African manufacturing sector. While empirical studies occasionally reported relatively high unit labour cost in Africa as compared to other regions (Lindauer and Velenchik [1994], Mabye and Golub [2003], Blattman et al. [2004], Shah et al. [2005]), they have not mentioned its critical importance in manufacturing competitiveness. This is presumably because the difference of labour costs (or unit labour costs) is moderate when compared with middle-income countries, such as China or India, and the lower labour productivity in Africa compared to those countries partly accounts for high unit labour costs.[3] However, as we have shown, the difference in labour costs is remarkable in a comparison among low-income countries, whereas productivity gap is not significant. Given similar physical, human and knowledge capital endowments and business environments, comparison with a low-income comparator shows more precisely the competitiveness of the African industry, as the products are similar in quality. By comparing with a country featuring

[2] Since upward bias in output leads to downward bias in our measure of competitiveness (unit cost), increase of adverse effect of productivity does not cause proportional decrease of wage effect on competitiveness.

[3] Unit labour cost is expressed by wage and labour productivity as $wL/Y = w/(Y/L)$. Therefore, it increases as labour productivity decreases, holding wage constant.

similar conditions, we have narrowed down a cause of manufacturing stagnation.

Then, the natural question is why the manufacturing wage is disproportionally high in some African countries? As we compare wages represented in US dollar, exchange rate can be possible reason. Exchange rate was appreciated in Kenya by 12.1% from 2002 and 2008, whereas it was depreciated by 18.5% in Bangladesh in the same period (World Bank [2011]). Without exchange rate volatility, the wage differential in 2008 between the two countries reduced but still remains. At exchange rate in 2002, the average nominal wage in local Kenyan firms is 1.5 times higher than that of Bangladeshi firms, while it is 2.0 time at exchange rate in 2008. Furthermore, exchange rate does not account for the large dispersion of average wage from GDP per capita (see footnote 1).

Then, does factor endowment account for it, as Wood and Mayer [2001] argued? Though answering these questions is out of our scope, we have found some evidences. In Chapter 4, we showed that both skilled and unskilled wages in Kenya are higher than those in Bangladesh, which is in contrast to the argument by Wood and Mayer that highlighted a scarcity of skilled labour. Therefore, to explain high unskilled wages, unskilled labour must also be scarce relative to other factors, and it must be fully employed. While it may be reasonable to assume that, in Kenya, unskilled labour is scarce relative to land in comparison with Bangladesh given the large difference in population density, the unemployment rate has remained high for several decades. This indicates that realized unskilled wage does not reflect factor endowment. Accordingly, Bigsten and Durevall [2004] argues that the relative price of labour to capital and to land were increased sharply after 1994 in Kenya, and they were significantly diverted from factor endowment.[4] These evidences indicate that the high unskilled wage is not

[4] They also found that the sharp rise of relative price of labour is not related with the trade liberalization. Their analysis covered the period from 1964 to 2000.

entirely accounted for by factor endowment.

We cannot deny the possibility that other factors than labour costs and credit constraints may have played critical roles in differential results in export participation between the two countries. Local firms in Bangladesh began exporting in the early 1980s, while those in Kenya began in the 2000s. This 20-year difference prevented the direct comparison of experiences in the two countries, because the supply system in the apparel industry changed substantially. The supply system has been changed to respond to demand changes in the export markets, which increasingly favours wide variety in design and frequent change of style. As discussed in Chapter 6, suppliers are required to produce within a short lead time and deal with frequent change of product style (Nordås [2004]), and this can be a high barrier for small local firms to start exporting. Evidence is mixed so far. In Vietnam, where local exporters have a substantial share, large state-owned enterprises are the main local exporters (Goto [2012]), while small local exporters are emerging in Madagascar (Fukunishi and Ramiarison [2012]). Further investigation of other exporting countries that only recently began exporting garments, e.g. Cambodia, is needed to clarify the change of prospective for small local firms in the export markets.

3. Policy Implications and Future Research Agenda

3.1. Policy Implications

It is encouraging that Kenyan local firms have sufficient capacity to perform as productively as leading exporters and to start exporting after inflow of FDI in the sector, as it indicates that local firms have the potential to compete in the local and world

markets. However, the high wage is a difficult problem to solve. As discussed in Chapter 4, there is a large difference in price level between Kenya and Bangladesh, which is also reflected in the national poverty lines. If Kenyan semiskilled workers were paid at the Bangladeshi average wage, their income would be far below the national poverty line. Economy-wide wage reduction may cause a fall in the price level, but it is not necessarily proportional to changes in wage reduction, nor does it occur in the short term. Therefore, a policy guiding lower wages would undoubtedly increase poverty in the economy at least in the short term.

A more feasible solution is the reduction of indirect costs and the enhancement of productivity. World Bank [2010b: Figure 0-2] shows correlation between logistics performance and wage among major garment exporters, which suggests that lower logistics costs compensate for high wages or buyers pay higher prices for fast delivery. Another possible account for correlation between logistics performance and wage is that countries with better business environments tend to export higher value products. Since production of high quality garments requires both skill of workers and an efficient business environment, high-wage countries maintain competitiveness if they have a sufficiently good business environment and human capital accumulation. There are many garment-exporting countries that have higher wages than Kenya, for instance, Turkey, Mauritius, Morocco, and the coastal region in China, and these countries maintain competitiveness by high productivity, which is largely due to the high value of products that they export. With substantial improvement of the business environment, buyers in developing countries and multinational garment firms would consider Kenya as a production site for mid-priced products.

One may think that, given high wages, there is little prospective for a labour-intensive industry in Kenya and some other African countries. The figures in World Bank [2010b]

indicate a substantial possibility of the Kenyan garment industry. In the figure, Kenya lies out of the fitted line with lower logistics performance given wage, which means that Kenya's logistics performance is lower than other exporters given wage. Although the logistics performance of Kenya is comparable with Bangladesh, the high wage pushes Kenya out of the fitted line. To be located on the line without changing wages, the logistics performance of Kenya should be slightly better than Vietnam though it can still be poorer than that of China or South Africa. It is not a hopeless target for Kenya to build as good business environment as one in Vietnam.[5] Furthermore, improving the business environment, particularly infrastructure, is also indispensable for the development of industries beyond labour-intensive manufacturing. Agro-processing, electric and electronics and information technology industries, are suggested as candidates for prospective industries in Kenya, all of which require good logistics to the airport, a low-cost communication infrastructure and a reliable power supply (Kenya Ministry of Trade and Industry and JICA [2007]). The requirement of infrastructure quality for perishable agricultural products including horticultural products may be more stringent than the requirement for high-quality garment products. It does not seem that development of labour-intensive manufacturing is less prospective than other alternatives.

It appears contradicting to recommend upgrading of business environment based on the conclusion that denies its adverse effect on competitiveness. Our conclusion indicates that given quality of products that currently produced in Kenya, business environment does not constrain competitiveness. However, to upgrade product quality, it needs to be improved. Given difficulty of lowering wage level, Kenya should

[5] As the World Bank [2010b] figure shows only a simple relationship, it is susceptible to endogeneity problem. However, based on technological requirement, it is well known that logistics and skill is needed for high-quality products. Correlation in the figure can be an heuristic tool to know the crude estimation of the necessary business environment given wage.

facilitate quality of business environment that is suitable for wage level rather than income level.

On the other hand, it appears difficult to gain share in the local market. Given small local demand for high-value products, growth opportunity of local firms has been seriously constrained . Until the average income rises substantially, Asian products and second-hand clothing are likely to dominate the local market. Therefore, for the development of local firms, supports for export participation will be needed. Linking local firms and foreign affiliates enhances export opportunities through subcontracting, labour turnover and vertical linkages. As introduced in Chapter 3, the export opportunity was recognized by local entrepreneurs through the seminars held by World Bank and the government, while foreign affiliates individually contacted many local firms to find subcontractors. These facts suggest that there is demand for government and industrial associations to intervene in communication between local and foreign affiliates. Credit supply, which was implemented in Mauritius and Bangladesh, is another important support for export participation. In Kenya, it would allow existing local firms to start exportation without sacrificing local supply, and it would encourage new entrants in the export-oriented garment industry.

3.2. Future Research Agenda

The diversion of formal sector wage and GDP per capita is not a unique feature in Kenya, but is shared by some other African countries as well. Although manufacturing wage data is limited for African countries, Ethiopia and Tanzania as well as Kenya have the highest manufacturing wage relative to GDP per capita in the world, and Lesotho and South Africa also have a larger divergence than the average of non-OECD countries (Table 7-2). It is worth noting that manufacturing wages in Mauritius and Madagascar,

which are successful garment exporters, are lower than GDP per capita, while Lesotho, South Africa and Kenya failed to continue growth of exports. Those facts suggest that high wage given income level may well account for stagnation of a labour-intensive industry in other African countries. On the other hand, given substantial heterogeneity within Africa, it is also likely that factors other than labour costs are decisive causes, for example, in a landlocked country or in a country suffering from weak governance. Accumulation of further empirical researches on labour-intensive industries is seriously needed for comprehensive understanding of manufacturing development in Africa.

Another related important research issue is the cause of the large diversion of formal wage from GDP per capita. Divergence is not unreasonable itself, since GDP per capita, which is an approximate of average labour productivity, should correlate with average wage instead of formal sector wages. Thus, in a country with a large wage differential between the formal and the informal sectors, or between urban and rural areas, the formal sector wage tends to be higher than GDP per capita. In Africa, where the formal sector takes a small share in the economy, the diversion between the formal wage and GDP per capita is likely to be large. However, several studies reported higher unit labour cost in the African manufacturing industry than in developing Asian countries, which implies a greater discrepancy between wage and labour productivity in the African manufacturing sector. Existing studies on the African labour market have suggested that labour market institutions or labour contract arrangements that include efficiency wages and rent sharing represent a source of discrepancy between wage and productivity. Yet, it is not clear how much those factors explain the actual divergence in Africa. Some studies reported that the labour market institution does not fully explain wage-productivity discrepancy, whereas there is no evidence that bias caused by labour contracts is larger in high-wage African countries than others. Further research that

carefully incorporates distinctive features of African labour markets from other developing countries will demonstrate the background of one of the most striking characteristics of African economies.

References

Acemoglu, Daron, Simon Johnson and James A. Robinson [2001] "The Colonial Origin of Comparative Development: An Empirical Investigation," *American Economic Review*, Vol.91, No.5, pp.1369-1401.

Acemoglu, Daron and Fabrizio Zilibotti [1999] *Productivity Differences*, NBER Working Paper No. 6879, Cambridge: National Bureau of Economic Research.

Adenikinju, Adeola, Ludvig Södering, Charles Soludo and Aristomène Varoudakis [2002] "Manufacturing Competitiveness in Africa: Evidence from Cameroon, Cote d'Ivoire, Nigeria, and Senegal," *Economic Development and Cultural Change,* Vol.50, No.3, pp. 643-665.

African Development Bank [2007] *African Development Report 2007*, New York; Oxford University Press.

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.

Aizenman, J. and N. Marison [1995] *Volatility, Investment and Disappointment Aversion*, NBER Working Paper No.5386, Cambridge: National Bureau of Economic Research.

De Alessi, Louis [1983] "Property Rights, Transaction Costs, and X-Efficiency: An Essay in Economic Theory," *American Economic Review*, Vol. 73, No.1, pp.64-81.

Alfaro, Laura, Areendam Chanda, Sebnem Kalemli-Ozcan, Selin Sayek [2004] "FDI and Economic Growth: The Role of Financial Markets," *Journal of International Economics*, No.64, pp.89-112.

Aryeetey, Ernest and Machiko Nissanke [1998] *Financial Integration and Development: Liberalization and Reform in Sub-Saharan Africa*, Routledge; London.

Asuyama, Yoko, Dalin Chhun, Takahiro Fukunishi, Seiha Neou and Tatsufumi Yamagata [2013] "Firm Dynamics in the Cambodian Garment Industry: Firm Turnover, Productivity Growth, and Wage Profile under Trade Liberalization," *Journal of Asia and Pacific Economy*, Vol.18, No.1, pp.51-70.

Asuyama, Yoko, and Seiha Neou [2012] "How Has the Cambodian Garment Industry Evolved?," in Takahiro Fukunishi ed., *Dynamics of the Garment Industry in Low-Income Countries: Experience of Asia and Africa* (Interim Report), Chiba; Institute of Developing Economies.

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

Auty, Richard M. and Alan H. Gelb [2001] "Political Economy of Resource-Abundant States," in Richard M. Auty ed, *Resource Abundance and Economic Development*, New York; Oxford University Press.

Aw, Bee Yan, Xiaomin Chen, and Mark J. Roberts [2001] "Firm-level Evidence on Productivity Differentials and Turnover in Taiwanese Manufacturing," *Journal of Development Economics*, Vol.66, No.1, pp.51-86.

BGMEA (Bangladesh Garment and Manufacturers and Exporters Association) [2009] *BGMEA Member's Directory 2008-2009*, Dhaka.

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.

Bardhan, Pranab and Christopher Udry [1999] *Development Microeconomics*, Oxford: Oxford University Press.

Barr, Abigail [2000] "Social Capital and Technical Information Flows in the Ghanaian Manufacturing Sector," *Oxford Economic Papers*, Vol. 52, No.3, pp.539-559.

Bartelsman, Eric, Stefano Scarpetta, and Fabiano Schivardi, [2003] *Comparative Analysis of Firm Demographics and Survival: Micro-Level Evidence for the OECD Countries*, OECD Economics Department Working Papers 348, OECD Publishing.

Bell, Martin and Keith Pavitt [1993] "Accumulating Technological Capability in Developing Countries," *Proceedings of the World Bank Annual Conference on Development Economics 1992*, World Bank; Washington D.C.

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.

Bernard, Andrew B., and J. Bradford Jensen [2007] "Firm Structure, Multinationas, and Manufacturing Plant Death," *The Review of Economics and Statistics*, Vol.89, No.2, pp.193-204.

Biggs, Tyler, Margaret Miller, Caroline Otto and Gerald Tyler [1996] *Africa Can Compete! Export Opportunities and Challenges for Garments and Home Products in the European Market*, World Bank Discussion Paper No.300, Washington D.C.; World Bank.

Biggs, Tyler, Manju Shah and Pradeep Srivastava [1995] *Technological Capabilities and Learning in African Enterprises,* World Bank Technical Paper No.25, Washington D.C.; World Bank.

Bigsten, Arne [2002], "History and Policy of Manufacturing in Kenya," in Arne Bigsten and Peter Kimuyu eds., *Structure and Performance of Manufacturing in Kenya*, Hampshire; Palgrave.

Bigsten, Arne and Mulu Gebreeyesus [2007] "The Small, the Young, and the Productive: Determinants of Manufacturing Firm Growth in Ethiopia," *Economic Development and Cultural Change*, Vol.55, No.4, PP.813-840.

Bigsten, Arne and Peter Kimuyu eds. [2002] *Structure and Performance of Manufacturing in Kenya*, Basingstoke; Palgrave.

Bigsten, Arne, Paul Collier, Stefan Dercon, Bernard Gauthier, Jan Willem Gunning, Anders Isaksson, Abena Oduro, Remco Oostendorp, Cathy Pattillo, Måns Söderbom, Michel Sylvain, Francis Teal and Albert Zeufack [1999] "Investment in Africa's Manufacturing Sector: A Four Country Panel Data Analysis," *Oxford Bulletin of Economics and Statistics*, Vol.61, No.4, pp.489-512.

Bigsten, Arne, Paul Collier, Stefan Dercon, Bernard Gauthier, Jan Willem Gunning, Anders Isaksson, Abena Oduro, Remco Oostendorp, Cathy Pattillo, Måns Söderbom, Michel Sylvain, Francis Teal and Albert Zeufack [2000a] "Rate of Return on Physical and Human Capital in Africa's Manufacturing Sector," *Economic Development and Cultural Change*, Vol.48, No.4, pp.801-827.

Bigsten, Arne, Paul Collier, Stefan Dercon, Bernard Gauthier, Jan Willem Gunning, Anders Isaksson, Abena Oduro, Remco Oostendorp, Cathy Pattillo, Måns Söderbom, Michel Sylvain, Francis Teal and Albert Zeufack [2000b] *Exports and Firm-level Efficiency in African manufacturing,* Centre for the Study of African Economies Working Paper 2000-16, Oxford University.

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

Bigsten, Arne, and Dick Durevall [2004] *Kenya's Development Path and Factor Prices 1964-2000*, Scandinavian Working papers in Economics, No.142.

Blattman, Christopher, Linda Cotton, Vyjayanti Desai, Ibrahim Elbadawi, James Habyarimana, Jean Michael Marchat, Vijaya Ramachandran, Manju Keida Shah, Kehnide Ajayi, Peter Kimuyu, Rose Ngugi, Arne Bigsten and Måns Söderbom [2004] *Enhancing the Competitiveness of Kenya's Manufacturing Sector: The Role of the Investment Climate*, Africa Private Sector Group, Washington D.C.; Word Bank.

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

Bruno, Michael [1978] "Duality, Intermediate Inputs and Value-added," in Fuss and McFadden eds., *Production Economics: A Dual Approach to Theory and Applications*, Amsterdam; North-Holland Publishing Company.

Calderón, César and Luis Servén [2010] "Infrastructure and Economic Development in Sub-Saharan Africa," *Journal of African Economies*, Vol. 19, supplement 1, pp.i13-i87.

Caves, Douglas W.; Laurits R. Christensen; and W. Erwin Diewert [1982] “Multilateral Comparisons of Output, Input, and Productivity Using Superlative Index Numbers,” *Economic Journal*, Vol. 92, pp.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 [2007] *The Bottom Billion: Why the Poorest Countries Are Failing and What Can Be Done about It*, New York; Oxford University Press.

Collier, Paul [2003] “Primary Commodity Dependence and Africa’s Future,” in Boris Pleskovic, Nicholas Stern eds., *Annual World Bank Conference on Development Economics 2003*, New York; Oxford University Press.

Collier, Paul [1998] "Globalization: Implications for Africa," in Zubair Iqbal and Mohsin S. Khan eds., *Trade Reform and Regional Integration in Africa*, Washington D.C.; International Monetary Fund Institute.

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

Collier, Paul and Anke Hoeffler [2004] “Greed and Grievance in Civil War,” *Oxford Economic Papers*, Vol.56, No.4, pp. 563-595.

Collier, Paul and Anthony J. Venables [2007] “Rethinking Trade Preferences: How Africa can Diversify its Exports?,” *The World Economy*, Vol.30, No.8, pp. 1326-1345.

Commission on Growth and Development [2008] *The Growth Report: Strategies for Sustained Growth and Inclusive Development*, Washington D.C.; World Bank.

Conley, Timothy G., and Christopher R. Udry [2010] “Learning about a New Technology: Pineapple in Ghana,” *American Economic Review*, Vol.100, No.1, pp.35–69.

Crespo, Nuno and Maria Paula Fontoura [2006] “Determinant Factors of FDI Spillovers: What Do We Really Know?,” *World Development*, Vol.35, No.3, pp.410-425.

De Soto, Hernando [1989] *The Other Path*, New York; Harper and Row.

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.

De Loecker, Jan [2007] “Do Exports Generate Higher Productivity? Evidence from Slovenia,” *Journal of International Economics*, Vol.73, No.1, pp.69-98.

Disney, Richard, Jonathan Haskel, and Ylva Heden [2003] “Entry, Exit, and Establishment Survival in UK Manufacturing Sector,” *Journal of Industrial Economics*, Vol. 51, No.1, pp.91-112.

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

Eifert, Benn, Alan Gelb and Vijaya Ramachandran [2005] *Business Environment and Comparative Advantage in Africa: Evidence from the Investment Climate Data*, Working Paper No. 56, Center for Global Development.

Elbadawi, Ibrahim A. [1999] *Can Africa Export Manufactures? The Role of Endowment, Exchange Rates, and Transaction Cost*, Policy Research Working Paper 2120, Washington D.C.; World Bank.

Elbadawi, Ibrahim, Taye Mengistae, and Albert Zeufack [2006] *Market Access, Supplier Access, and Africa's Manufactured Exports: An Analysis of the Role of Geography and Institutions*, World Bank Policy Research Working Paper 3942, Washington D.C.; World Bank.

Ericson, Richard, and Ariel Pakes [1995] "Markov-Perfect Industry Dynamics: A Framework for Empirical Work," *Review of Economic Studies*, Vol. 62, No. 1, pp.53-82.

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.

Fafchamps, Marcel [2004] *Market Institutions in Sub-Saharan Africa: Theory and Evidence*, Massachusetts; The MIT Press.

Fafchamps, Marcel [2000] "Ethnicity and Credit in African Manufacturing", *Journal of Development Economics*, Vol. 61, No.1, pp.205-235.

Fafchamps, Marcel and Remco Oostendorp [2002] "Investment," in Willem Gunning and Remco Oostendorp eds., *Industrial Change in Africa: Zimbabwean Firms under Structural Adjustment*, New York; Palgrave, pp.153-186.

Foster, Andrew D. and Mark R. Rosenzweig [2010] *Microeconomics of Technology Diffusion*, Yale University Economic Growth Center Discussion Paper, 984.

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.103, No.6, pp.1176-1209.

Foster, Lucia, John Haltiwanger, and Chad Syverson [2008] "Reallocation, Firm Turnover, and Efficient: Selection on Productivity or Probability?" *American Economic Review*, Vol.98, No.1, pp.394-425.

Frazer, Garth [2005] "Which Firms Die? A Look at Manufacturing Firm Exit in Ghana," *Economic Development and Cultural Change*, Vol.53. No.5, pp.585-617.

Frazer, Garth and Johannes van Biesebroeck [2010] "Trade Growth under the African Growth and Opportunity Act," *Review of Economics and Statistics*, Vol. 92, No. 1, pp.128-144.

Fukunishi, Takahiro and Herinjatovo Aimé Ramiarison [2012] *Exporting Firms in Madagascar's Garment Industry: Knowledge Transfer, Performance and Survival*, mimeo, Chiba; Institute of Developing Economies.

Fukunishi, Takahiro, Mayumi Murayama, Akio Nishiura and Tatsufumi Yamagata [2006] *Industrialization and Poverty Alleviation: Pro-poor Industrialization Strategies Revisited*, Vienna; United Nations Industrial Development Organization.

Gerdin, A. [1997] *On Productivity and Growth in Kenya*, Ekonomiska Studier utgivna av Nationalekonomiska institutionen, Handelshogskolan vid Goteborgs Universitet, No. 72, Goteborg.

Gereffi, Gary, and Stacey Frederick [2010] *The Global Apparel value Chain, Trade and the Crisis: Challenges and Opportunities for Developing Countries*, Policy Research Working Paper 5281, Washington D.C.; World Bank.

Gereffi, Gary, John Humphrey and Timothy Sturgeon [2005] "The Governance of Global value Chains," *Review of International Political Economy*, Vol.12, No.1, pp.78-104.

Gereffi, Gary, and Olga Memedovic [2003] *The Global Apparel Value Chain: What Prospects for Upgrading by Developing Countries*, Vienna: United Nations Industrial Development Organization.

Gibbon, Peter [2003] "The African Growth and Opportunity Act and the Global Commodity Chain for Clothing," *World Development*, Vol.31, No.11, pp. 1809-1827.

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.

Goto, Kenta [2012] "Is the Vietnamese Garment Industry at a Turning Point? Upgrading from the Export to the Domestic Market," in Fukunishi ed., *Dynamics of the Garment Industry in Low-Income Countries: Experience of Asia and Africa (Interim Report)*, Chiba; Institute of Developing Economies.

Government of Kenya [2000] *Interim Poverty Reduction Strategy Paper 2000 – 2003*, Nairobi; Government of Kenya.

Greenaway, 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.

Griliches, Zvi, and Haim Regev [1995] "Firm Productivity in Israeli Industry," *Journal of Econometrics*, Vo. 65, No. 1, pp.175-203.

Grima, Sourafel, David Greenaway, 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.

Grossman, Gene M. and Elhanan Helpman [1991] *Innovation and Growth in the Global Economy*, Massachusetts; The MIT Press.

Hall, Robert E., and Charles Jones [1999] "Why Do Some Countries Produce So Much More

Output per Worker Than Others?" *The Quarterly Journal of Economics*, Vol. 114, No.1, pp.83-116.

Harrigan, James and Geoffrey Barrows [2009] "Testing the Theory of Trade Policy: Evidence from the Abrupt End of the Multifiber Arrangement," *Review of Economics and Statistics*, Vo. 91, No. 2, pp.282-294.

Heckman, J. and B. Singer [1984] "A Method for Minimizing the Impact of Distributional Assumptions in Econometric Models for Duration Data," *Econometrica*, Vol. 52, No.2, pp. 271-320.

Hermes, N. and R. Lensink [2003] "Foreign Direct Investment, Finacial Development and Economic Growth," *Journal of Development Studies*, No.40, pp.142-163.

Hill, Hal and Kalirajan K. P. [1993] "Small Enterprise and Firm-level Technical Efficiency in the Indonesian Garment Industry," *Applied Economics*, Vol.25, No.9, pp.1137-1144.

Hopenhayn, Hugo A. [1992] "Entry, Exit, and Firm Dynamics in Long Run Equilibrium," *Econometrica*, Vol.60, No.5, pp.1127-1150.

ILO (International Labour Organization) [2012] *Labour Statistics Database*, http://laborsta.ilo.org/.

Isaksson, 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.

Iwanow, Tomasz, and Colin Kirkpatrick [2008] "Trade Facilitation and Manufactured Exports: Is Africa Different?" *World Development*, Vol. 37, No. 6, pp.1039-1050.

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.

Jenkins, Stephen P. [1995] "Easy Estimation Methods for Discrete-Time Duration Models," *Oxford Bulletin of Economics and Statistics*, Vol.57, No.1, pp.129-138.

Jenkins, Stephen P. [2004] *Survival Analysis*, Unpublished Manuscripts, Institute for Social and Economic Research, University of Essex.

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 [1982] "Selection and Evolution of Industry," *Econometrica*, Vol.50, No.3, pp.25-43.

Jovanovic, Boyan and Yaw Nyarko[1996] "learning by Doing and the Choice of Technology," *Econometrica*, Vol. 64, No.6, pp.1299-1310.

Kaplinsky, Raphael [2000] "Globalisation and Unequalisation: What Can Be Learned from Value Chain Analysis?" *Journal of Development Studies*, Vol. 37, No.2, 117-146.

Kapur, Sandeep [1995] "Technological Diffusion with Social Learning," *The Journal of*

Industrial Economics, Vol. 43, 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, No. 1, pp.199-227.

Kenya Central Bureau of Statistics [1995a-2005a] *Economic Survey*, Nairobi.

Kenya Central Bureau of Statistics [1995b-2004b] *Statistical Abstract*, Nairobi.

Kenya Export Processing Zones Authority [2002-2008] *Annual Report*, Nairobi.

Kenya Ministry of Trade and Industry and JICA [2007] *The Master Plan Study For Kenyan Industrial Development (MAPSKID) in The Republic of Kenya*, Interim Report (2), Main Report, prepared by Sanyu Consultants Inc. and KRI International Corp; Tokyo.

Kenya National Bureau of Statistics [2009, 2010] *Economic Survey*, Nairobi.

Kinoshita, Yuko [2001] *R&D and Technology Spillovers through FDI: Innovation and absorptive Capacity*, CEPR Discussion Paper 2775, London; Centre for Economic Policy Research.

Kowalski, Przemyslaw and Margit Molnar [2009] *Economic Impacts of the Phase-Out in 2005 of Quantitative Restrictions under the Agreement on Textile and Clothing*, OECD Trade Policy Working Papers, No.90, Paris; OECD Publishing.

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 LTD.

Lall, Sanjaya and Carlo Pietrobelli [2002] *Failing to Compete: Technology Development and Technology Systems in Africa*, Cheltenham; Edward Elgar.

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, pp.21-48.

Levinsohn, 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.

Lindauer, David L. and Ann D. Velenchik [1994] "Can African Labour Compete?" in David L. Lindauer and Michael Romer eds., *Asia and Africa: Legacies and Opportunities in Development*, San Francisco; Institute for Contemporary Studies, pp.269-304.

Lopez-Acevedo, Gladys, and Raymond Robertson eds. [2011] *Sewing Success?: Employment and Wages Following the End of the Multi-fibre Arrangement*, Washington D.C.; World Bank.

Lundvall, Karl, Walter Ochoro and Lennart Hjalmarsson [2002] “Productivity and Technical Efficiency,” in Arne Bigsten and Peter Kimuyu eds., *Structure and Performance of Manufacturing in Kenya*, Hampshire: Palgrave, pp.151-172.

Mano, Yukichi, Alhassan Iddrisu, Yutaka Yoshino, and Tetsushi Sonobe. [2011] “How Can Micro and Small Enterprises in Sub-Saharan Africa Become More Productive? The Impacts of Experimental Basic Managerial Training,” *World Development*, Vol. 40, No. 3, pp.458-468.

Mansfield, Edwin, Mark Schwartz, and Samuel Wanger [1981] “Imitation Costs and Patents,” *Economic Journal*, Vol.91, pp.737-749.

Marschak, Jacob and William H. Andrews [1944] “Random Simultaneous Equations and the Theory of Production”, *Econometrica*, Vol.12, No.3&4, pp.143-205.

Mauritius Central Statistics Office [2008] *Digest of Labour Statistics*.

Mauro, Paolo [1995] “Corruption and Growth,” *Quarterly Journal of Economics*, Vol. 110, No. 3, pp.681-712.

Mazumdar, Depak and Ata Mazaheri [2002] *Wages and Employment in Africa*, Hampshire; Ashgate Publishing.

Mazumdar, Depak and Ata Mazaheri [2003] *The African Manufacturing Firm: An Analysis Based on Firm Surveys in Seven Countries in Sub-Saharan Africa*, London; Routledge.

Meyer, Bruce D. [1990] “Unemployment Insurance and Unemployment Spells,” *Econometrica*, Vo. 58, No.4, pp.757-782.

Mbaye, Ahmadou Aly and Stephen Golub [2003] "Unit Labour Costs, International Competitiveness, and Exports: The Case of Senegal," *Journal of African Economies*, Vol.11 No.2, pp.219-248.

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.

McCormick, Dorothy and Christian Rogerson eds. [2004] *Clothing and Footwear in African Industrialisation*, Pretoria; Africa Institute of South Africa.

Melitz, Marc J. [2003] “The Impact of Trade on Intra-Industry Reallocations and Aggregate Industry Productivity,” *Econometrica*, Vol.71, No.6, pp.1695-1725.

Mlambo, Kupukile [2002] “Productivity Growth and Technical Efficiency in Zimbabwean Manufacturing,” in Willem Gunning and Remco Oostendorp eds., *Industrial Change in Africa: Zimbabwean Firms under Structural Adjustment*, New York; Palgrave, pp.208-231.

Mostafa, Romel and Steven Klepper [2009] *Industrial Development through Tacit Knowledge Seeding: Evidence from the Bangladesh Garment Industry*, mimeo.

Murayama, Mayumi [2008] “Female Garment Workers in India and Bangladesh in the Post MFA Era,” Mayumi Murayama and Hiroshi Sato eds., *Globalization, Employment and*

Mobility: The South Asian Experience, Basingstoke; Palgrave Macmillan.

Nelson, Richard R. and Edmund S. Phelps [1966] "Investment in Humans, Technological Diffusion, and Economic Growth," *American Economic Review*, Vol.56, No.1/2, pp.69-75.

Nelson, Richard R. and Sudney G. Winter [1982] *An Evolutionary Theory of Economic Change*, Cambridge: The Belknap Press of Harvard University Press.

Nishimizu, Mieko and John M. Page, Jr. [1986] "Productivity Change and Dynamic Comparative Advantage," *Review of Economics and Statistics*, Vol.68, No.2, pp.241-247.

Nissanke, Machiko [2009] *Linking Economic Growth to Poverty Reduction under Globalization: A Case for Harnessing Globalization for the Poor in Sub-Saharan Africa*, a paper prepared for the AERC project on Understanding Links between Growth and Poverty Reduction in Africa.

Nissanke, Machiko, and Eric Thorbecke eds. [2010] *The Poor under Globalization in Asia, Latin America and Africa*, Oxford; Oxford University Press.

Nissanke, Machiko and Erik Thorbecke [2008] "Introduction: Globalization–Poverty Channels and Case Studies from Sub-Saharan Africa," *African Development Review*, Vol. 20, No.1, pp.1–19.

Nordås, Hildegunn Kyvik [2004] *The Global Textile and Clothing Industry post the Agreement on Textile and Clothing*, Discussion Paper No.5, Geneva, World Trade Organization.

Ogawa, Sayaka [2005] "The Trade of Second-hand Clothes in The Local-Mega City Mwanza Tanzania: With Special Reference to the Social Networks of Mali Kauli Transaction," *African Study Monographs*, Supplementary Issue 29, pp.205-215.

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.

Ongile, Grace and Dorothy McCormick [1996] "Barriers to Small Firm Growth: Evidence from Nairobi's Garment Industry," in Dorothy McCormick and Paul Ove Pedersen eds., *Small Enterprises: Flexibility and Networking in an African Context*, Nairobi; Longhorn Kenya.

Pack, Howard [1987] *Productivity, Technology and Industrial Development: A Case Study in Textiles*, World Bank Research Publication, New York; Oxford Press.

Pack, Howard [1993] "Productivity and Industrial Development in Sub-Saharan Africa," *World Development*, Vol.21, No.1, pp.1-16.

Pack, Howard and Christina Paxson [1999] "Is African Manufacturing Skill-Constrained?" *Policy Research Working Paper*, 2212, Washington D.C; World Bank.

Parente, Stephen L. and Edward C. Prescott [2002] *Barriers to Riches*, Cambridge: The MIT

Press.

Pattillo, Catherine [2000] "Risk, Financial Constraints and Equipment Investment in Ghana: A Firm-level Analysis," in Paul Collier and Catherine Pattillo eds., *Investment and Risk in Africa*, London; Macmillan, pp.96-119.

Pavcnik, Nina [2002] "Trade Liberalization, Exit, and Productivity Improvements: Evidence from Chilean Plants," *Review of Economic Studies*, Vol.69, No.2, pp.245-276.

Rama, Martin [2000] "Wage Misalignment in CFA Countries: Were Labour Market Policies to Blame?," *Journal of African Economies*, Vol.9, No.4, pp.475-511.

Ramachandran, Vijaya and Manju Kedia Shah [1999] "Minority Entrepreneurs and Firm Performance in Sub-Saharan Africa," *Journal of Development Studies*, Vol. 36, No. 2, pp.71-87.

Razzaque, Abdur and Selim Raihan eds. [2008] *Venturing into a Quota-free World: The Ready-made Garment Industry of Bangladesh*, Dhaka; Pathak Shamabesh.

Redding, Stephen, and Anthony J. Venables [2004] "Economic Geography and International Inequality," *Journal of International Economics*, Vol.62, No.1, pp. 53-82.

Rhee, Yung Whee and Therese Belot [1989] *Export Catalysis in Low-income Countries: Preliminary Findings from a Review of Export Success Stories in Eleven Countries*, Industry and Energy Department Working Paper, Industry Series No.5, Washington D.C.; World Bank.

Rhee, Yung Whee, Katharina Katterbach, Therese Belot, Antonia Bowring, Young Wook Jun and Kwang Chul Lee [1995] *Inducing Foreign Industrial Catalysts into Sub-Saharan Africa: Firm Level Study of Supply Sources of Potential Foreign Industrial Catalysts for Sub-Saharan Africa's Private Sector Development*, PSC Occasional Paper Series No.1, Washington D.C.; World Bank.

Roberts, Mark J. and James R. Tybout eds. [1996] I*ndustrial Evolution in Developing Countries: Micro Patterns of Turnover, Productivity, and Market Structure*, Oxford; Oxford University Press.

Roberts, Mark J. and Tybout J. [1997] "The Decision to Export in Colombia: An Empirical Model of Entry with Sunk Cost," *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*, Washington D.C.; World Bank.

Romer, Paul M. [1990] "Endogenous Technological Change," *Journal of Political Economy*, Vol.98, No.5, pt.2, pp.S71-S102.

Sachs Jeffrey D. [2005] *The End of Poverty: Economic Possibilities for Our Time*, New York; Penguin Books.

Sachs, Jeffrey and Andrew Warner [1995] *Natural Resource Abundance and Economic Growth*, NBER Working Paper No.5398, Cambridge; National Bureau of Economic Research.

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.

Servén, Luis [1997] "Irreversibility, Uncertainty and Private Investment: Analytical Issues and Some Lessons for Africa," *Journal of African Economies*, Vol. 6, Suppl. 3, pp. 229-268.

Servén, Luis and A. Solimano [1992] "Private Investment and Macroeconomic Adjustment," *World Bank Research Observer,* Vol. 11, No.1, pp. 95-114.

Shah, Manju Keida, James Habyarimana, Linda Cotton and Ivan Rossignol [2005] *Madagascar: Investment Climate Assessment*, Technical Report, Africa Private Sector Group, Washington D.C.; World Bank.

Shibanuma, Akira [2012] *Improving SMEs' Management and Performance through KAIZEN: Impacts of Teaching KAIZEN and non-KAIZEN Practices to Manufacturing SMEs in Ethiopia*, a paper presented at Spring Conference of the Japan Economic Association.

Shiferaw, Admasu [2007] "Firm Heterogeneity and Market Selection in Sub-Saharan Africa: Does It Spur Industrial Progress?" *Economic Development and Cultural Change*, Vol.55, No.2, pp.393-423.

Shiferaw, Admasu [2009] "Survival of Private Sector Manufacturing Establishments in Africa: The Role of Productivity and Ownership," *World Development*, Vol. 37, No.3, pp.572-584.

Söderbom, Måns and Francis Teal [2000] "Skills, Investment and Exports from Manufacturing Firms in Africa," *Journal of Development Studies*, Vol.37, No.2, pp.13-43.

Söderbom, Måns and Francis Teal [2004] "Size and Efficiency in African Manufacturing Firms: Evidence from Firm-level Panel Data," *Journal of Development Economics*, Vol.73, No.1, pp.369-394.

Söderbom, Måns, Francis Teal and Alan Harding [2006] "The Determinants of Survival among African Manufacturing Firms," *Economic Development and Cultural Change*, Vol.54, No.3, pp.533-555.

Söderling, Ludvig [2000] "Dynamics of Export Performance, Productivity and Real Effective Exchange Rate in Manufacturing: the Case of Cameroon," *Journal of African Economies*, Vol.9, No.4, pp.411-429.

Subramanian, Arvind and Devesh Roy [2003] "Who Can Explain the Mauritian Miracle? Meade, Romer, Sachs, or Rodrik?," in Dani Rodrik ed., *In Search of Prosperity: Analytic Narratives on Economic Growth*, Princeton; Princeton University Press.

Teal, Francis [1996] "The Size and Sources of Economic Rents in a Developing Country Manufacturing Labour Market," *Economic Journal*, Vol. 106, pp.963-976.

Teal, Francis [1999] “The Ghanaian Manufacturing Sector 1991-5: Firms Growth, Productivity and Convergence,” *Journal of Development Studies*, Vol.36 No.1, pp.109-127.

Teece, David J. [1977] “Technology Transfer by Multinational Firms: The Resource Cost of Transferring Technological Know-how,” *Economic Journal*, Vol.87, pp.242-261.

Tyler, William and Lung-fei Lee [1979] "On Estimating Stochastic Frontier Production Functions and Average Efficiency: An Empirical Analysis with Colombian Micro Data," *Review of Economics and Statistics*, Vol.61, No.3, pp436-438.

UNCTAD (United Nations Conference on Trade and Development) [2008] *Economic Development in Africa 2008: Export Performance Following Trade Liberalization*, New York and Geneva; United Nations.

UNCTAD [2002] *World Investment Report 2002: Transnational Corporations and Export Competitiveness*, New York; United Nations.

UNIDO (United Nations Industrial Development Organisation) [2011] *International Yearbook of Industrial Statistics*, Vienna: United Nation Industrial Development Organization.

van Biesebroeck, Johannes [2005a] “Exporting Raises Productivity in Sub-Saharan African Manufacturing Firms,” *Journal of International Economics*, Vo.67, No.2, pp. 373-391.

van Biesebroeck, Johannes [2005b] “Firm Size Matters: Growth and Productivity Growth in African Manufacturing,” *Economic Development and Cultural Change*, Vol. 53, No.3, pp.545-583.

Velenchik, Ann D. [1997] “Government Intervention, Efficiency Wages, And the Employer Size Effect in Zimbabwe,” *Journal of Development Economics*, Vol. 53, No. 2, pp305-338.

Wang, Jian-Ye, and Magnus Blomström [1992] “Foreign Investment and Technology Transfer,” *European Economic Review*, Vol. 36, pp.381-402.

Wignaraja, Ganeshan and Gerrishon Ikiara [1999] “Adjustment, Technological Capabilities and Enterprise Dynamics in Kenya,” in Sanjaya Lall ed., *The Technological Response to Import Liberalization in SubSaharan Africa*, London; MacMillan Press.

Wood, Adrian [2003] “Could Africa be Like America?”, in Boris Pleskovic and Nicholas Stern eds., *Annual World Bank Conference in Development Economics 2003*, New York; Oxford University Press.

Wood, Adrian and Jörg Mayer [2001] “Africa's Export Structure in a Comparative Perspective,” *Cambridge Journal of Economics*, Vol.25, No.3, pp.369-394.

Wooldridge, Jeffrey M. [2002] *Econometric Analysis of Cross Section and Panel Data*, Cambridge; MIT Press.

World Bank Institute [2011] *Governance Indicators*, http://www.worldbank.org/wbi/governance.

World Bank [2012] *World Development Report 2012: Gender Equity and Development*, Washington D.C.; World Bank.

World Bank [2011] *World Development Indicators 2011*, Washington D.C.; World Bank.

World Bank [2010a] *World Development Indicators 2010*, Washington D.C.; World Bank.

World Bank [2010b] *Incentives, Exports and International Competitiveness in sub-Saharan Africa: Lessons from the Apparel Industry*, Washington D.C.; World Bank.

World Bank [2006] *World Development Indicators 2006*, Washington D.C.; World Bank.

World Bank [2005] *World Development Report 2005: A Better Investment Climate for Everyone*, Washington D.C.; World Bank.

WTO (World Trade Organisation) [2011] *International Trade Statistics 2011*, Geneva; World Trade Organization.

WTO (World Trade Organisation) [2012] *Statistics Database*, http://stat.wto.org/Home/WSDBHome.aspx?Language=E.

Young, Alwyn [1991] "Learning by Doing and the Dynamic Effects of International Trade," *Journal of Quarterly Economics*, Vol.106, pp.369-406.