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Chapter 5

The Kenyan Garment Industry: Is it able to revive in the economic boom?

Takahiro Fukunishi[a]

Abstract

After trade liberalization, the Kenyan garment industry did not experience sustained growth despite low income per capita. This chapter explored whether the industry recovered under the economic growth after 2003. We found that garment firms supplying the local market do not take measures to enhance their competitiveness and instead avoid competition by specializing in uniforms. Given the large gap in labor costs, avoidance of competition could be an indispensable strategy, but detaching themselves from competitive pressure further weakened their competitiveness. Despite the strongest growth in demand in last two decades, firms did not improve productivity and firm turnover did not result in the entrance of productive firms and the exit of unproductive ones. The political turmoil occurred in 2008 does not explain such firm dynamics against the competitive market. There will be no prospects for growth until the wages in Asian countries significantly exceed Kenyan wages.

Keywords: *firm dynamics, trade liberalization, productivity, Kenya*

[a] Institute of Developing Economies, fukunis@ide.go.jp

1 Introduction

Development of the garment industry lags far behind in sub-Saharan Africa in comparison with Asia and Latin America. With few exceptions, African apparel products do not have a significant share in the export market, and even in the local market, they almost vanished due to a massive increase in imports, including secondhand products, after trade liberalization in the 1990s. Kenya used to have the largest cluster in the garment and textile industry in East Africa, but it drastically contracted after 1994 when trade liberalization became effective. Nowadays, local garment firms are specializing in uniforms, and the local market is dominated by imported apparel. Exports increased sharply after 2000, supported by the preferential access to the US market bestowed upon sub-Saharan African countries, but the growth trend disappeared in 2005. The quota system binding large exporters was abolished at the end of 2004, causing a concentration of orders in competitive countries, typically China. Though it seemed to make a solid albeit late start in export-oriented industrialization, the Kenyan garment industry has failed to continue growing.

It is a puzzling phenomenon that most sub-Saharan African countries including Kenya do not have a competitive garment industry, considering that they are low-income countries which theoretically have a comparative advantage in labor-intensive industry. Another study (Fukunishi 2009) concerning the causes of the weak competitiveness of the Kenyan garment industry suggests that while Kenyan firms, both exporters and non-exporters, were as productive as Bangladeshi firms as representatives of Asian firms on average, their wages are higher by more than twofold. Due to high labor intensity, this pushes up production costs substantially, so that the average unit cost of Kenyan firms is twice the Bangladeshi average. The study concludes that high wages are the main cause of shrinkage of the industry in local and export markets after trade liberalization.

Some economists argue that African countries do not have a comparative advantage in manufacturing industries due to the scarcity of skilled workers (Wood and Mayor 2001). However, in the case of the garment industry, most of the workers attain skill on the job and the educational requirement is not high (Lall and Wignaraja 1994, Fukunishi et al. 2006). In addition, the empirical studies on wages in Kenya confirm the diversion of the wage trend from the factor endowment pattern after the late 1990s (Bigsten and Durevall 2004), which indicates that the stagnation of the garment industry is not attributable to comparative advantage. The background of the high wage has not

yet been explored.

The above study analyzed the situation in 2002, when Kenya was still in economic stagnation, but market conditions changed after that. After 2003, Kenya marked high growth until 2007; annual GDP per capita growth was 2.74%, which contrasts with the negative growth rate of -0.05% from 1998 to 2002. In the 2000s, many sub-Saharan African countries showed strong growth due to a sharp rise in commodity prices, increased foreign investment and aid flow, and some researchers view this as the turning point for African economies following the decades of economic stagnation (Arbache et al. 2008). This new trend could lead to growth of industry, including the garment industry. Increased demand in the local market may enhance economies of scale or induce entry of productive firms, and hence, high wages can be compensated by high productivity. The sharp rise of wages in Asian countries such as China, Vietnam and Bangladesh also helps strengthen the competitiveness of Kenyan apparel products.

This chapter demonstrates the change in the Kenyan garment industry after trade liberalization using original firm-level data as well as existing statistics of trade and industry. Since no firm-level data with substantial number of garment firms are available, the team including the author conducted firm surveys in 2003 and 2009, which covered firms employing more than 10 employees. Informal sector, which is particularly prevalent in Kenya was excluded considering their difficulty to become formal (McCormick et al. 1997, Bigsten and Kimuyu 2002). In Kenya, the data covered 71 (2003) and 83 (2009) firms including both exporting and non-exporting firms as a result of exhaustive survey based on the multiple firms lists. Our Kenyan data covered 68.2% of the garment firms that we confirmed operation in 2003, though our firm lists may not be complete due to lack of a complete list in Kenya. The author additionally conducted interviews with Kenyan local firms in 2005 and 2006 to supplement detailed information, in particular about export participation. The sample consists of 28 locally owned firms including exporting and non-exporting firms. Also, the author interviewed with foreign exporters, retail shops, the industrial association, and the related ministries in Kenya during the period.

In the next section, we first describe the industry and the markets using trade statistics and firm-level information collected by the author. Given the lack of comprehensive information on the industry, particularly firm-level information, this provides an overview of the Kenyan garment industry after trade liberalization. Secondly, we analyze changes in the industry in the period of economic growth from

2003 to 2009 in the third section. This shows whether non-exporting firms have gained competitiveness utilizing the most significant growth opportunity in the last two decades. Using original firm data, we explore the change in productivity and the role of firm dynamics in productivity growth. In the last section, we briefly discuss the prospects for the Kenyan garment industry based on the results in the second and third sections.

2 The Garment Industry under Trade Liberalization

2.1. Evolution of Trade and Production

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 1 shows the import value of garment products including secondhand clothing.[1] 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

[1] 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 are possible reasons, since smuggling is prevalent in Kenya. Hence, these figures are likely to be underestimated.

further after 2005, and it exceeded US$100 million in 2008.

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 production.[2] 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.[3] 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 2). 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.

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.[4] More importantly, AGOA applied generous rules of origin for less developed beneficiary countries (LDBC), which allows the use of fabrics and yarn

[2] The production value compiled by the Central Bureau of Statistics (Kenya Central Bureau of Statistics 1995-2004) 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.

[3] 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.

[4] 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.

made in a third country.[5] 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). 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.

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 in 2002. 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 1). 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, 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.

After trade liberalization, adverse effects on production appeared initially, and with about a 10-year lag, these adverse effects were supplemented by exporting. Though government production statistics do not seem reliable, our survey data and export statistics from the Export Processing Zone Authority demonstrated that production value 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 2). 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.

However, after 2005, the growth trend was 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), 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

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

number of firms after trade liberalization, but government statistics did not capture this change clearly.[6] 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 (Ongil and McCormick 1996).[7] 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. 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. Based on this information, we estimate that about 120 to 150 local firms (with more than 10 employees), and 35 EPZ firms were in operation in 2003 (Table 2). 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, EPZ firms further decreased to 19 (Table 1).

The Kenyan garment industry experienced drastic ups and downs after trade liberalization. An upsurge in imports adversely hit the Kenyan garment industry, which was reduced by half in terms of real production 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.

2.2. Competition in the Markets

In the previous section, the competitive position of the Kenyan garment industry was

[6] Statistics on the number of firms by CBS (*Statistical Abstract*) display unnatural behavior, such that exactly the same rate of change is reported for all size categories.

[7] Ongil 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.

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.

2.2.1. 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. 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). While the production cost of men's suits at a local non-exporting firm was KSh2200, 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 Kenya 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.[8] Low and medium-priced imported garments come from mainly China and India, while high-priced products are from Europe.

Based on the characteristics of retail shops, Table 3 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,

[8] Based on an interview with the director of a supermarket's clothing division.

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, packaging is not as good as high quality imports, and even in comparison with imports within same price range, it is poorer and less popular.

As replied by managers of local garment firms, their costs of production are higher than price of imports for low-price products, which have the largest market share. However, for the products priced slightly higher, poor quality of local products is also reason to lose market share.

2.2.2. 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. While six local exporters were newly established after AGOA and operated as subcontractors to EPZ firms, two local exporters operated even before AGOA and started subcontracting for EPZ firms after the growth of the EPZ sector. It is noted that those two local exporters continued to supply products domestically, and they exported a small part of their production directly to the EU market. In contrast, all EPZ firms and six local exporters exported all their products mostly 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.

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 exclusive advantage for Kenya and other AGOA beneficiary countries, the market reaction indicates that their competitiveness has been weakened. Retailers in the US, for example GAP, Walmart and Levis, place orders to a trading company called a package provider located in East Asia, which has a global network of fabric and garment producers (UNCTAD 2002). Utilizing this network, buyers are able to swiftly shift suppliers.

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. Apparel markets in industrial countries are typical cases of a buyer-driven market, in which 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 (Greffi et al. 2005). Under such a market structure, buyers in the US market demanded lower prices given increased availability of low-cost suppliers after the MFA phase-out. According to managers' responses in interviews, prices fell by 16% to 30% by 2006.

Kenyan exporters experienced two types of adverse shock in 2005, i.e., the enhanced competitiveness of other exporters by quota elimination and the fall of export prices. However, as mentioned, Kenyan exporters still have the advantage of no tariffs, and the fall of export prices was observed for other exporters as well. Therefore, 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, and buyers preferred other exporters despite the Kenyan advantage in price. It is sometimes argued that delivery from African producers takes longer than from Asian producers due to difficult logistics and slow customs clearance.

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.

2.3. 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.

2.3.1. 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 4 shows measures taken by local firms that continued supply to domestic and neighboring 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 and order lots are generally small. 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. No other marketing efforts were seen.

Productivity improvement does not mean restructuring of the production system or innovation in management but replacement of old equipment by new (occasionally secondhand) equipment or partial change of the production system, although five firms employed 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. 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.

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 A2) 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.

2.3.2. 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 favorable 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 4 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. This indicates that EPZ firms remaining in Kenya expanded their production capacity through mergers and that they may have achieved 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 and its other factory in Latin America in order to raise the product's price. This evidence indicates that the production cost in Kenya is higher than for other competitors 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 which supply the EU market though FOB contracts as well as subcontracts for the US market attempted to increase FOB contracts in the EU market.

2.3.3 Competitiveness of Kenyan firms

As the literature reports, most local firms neither took positive measures to improve productivity nor entered the export market. Empirical studies on the African manufacturing sector generally argue that firms' lack of capacity and the poor quality of the business environment preclude African firms from investing in technology and human capital (Lall 1999, Biggs et al. 1995, Collier and Gunning 2000). While these hypotheses indicate lower productivity at African firms than at competitors, few studies have analyzed productivity in consistent manner. In a different work, the author compared productivity of Kenyan garment firms and Bangladeshi firms, which are a benchmark for competitive Asian firms (Fukunishi 2009). This comparison has an advantage in that both countries have a similar GDP per capita, and thus, the simultaneity problem between productivity and the business environment is minimal;

while a good business environment ensures high productivity, growth of productivity leads to a good business environment through growth of per capita GDP.

The comparison showed that unit costs differ significantly between the two countries; the Kenyan average is more than twice as high, which corroborates the weak competitiveness of Kenyan products. However, in contrast to conventional wisdom, the average total factor productivity (TFP) measured by two methodologies does not differ between Kenyan and Bangladeshi firms, even for Kenyan non-exporting firms. Instead, the wages differ remarkably between them, and the gap in wages accounts for most of the difference in unit costs. Since the wage gap remains after controlling for education and experience of workers, the labor market condition is the likely source of the large gap, given the similar GDP per capita.

This result explains the passive response of Kenyan firms to increased competition. Given the large disadvantage in wages and similarity in productivity level, the margin of competitiveness enhancement, particularly in terms of gaining a price advantage, is limited for Kenyan firms including both non-exporting and exporting firms. For non-exporters, competing with secondhand products and new imports is almost impossible and specializing in uniforms is the only means of survival. Exporters have better prospects given their advantage of the duty-free access, and some firms were enhancing productivity through pursuing economies of scale or attempting to avoid price competition through product upgrading, while many other exporters gave up.

Market conditions may have changed for non-exporters after 2003. The Kenyan economy grew at its highest rate until political turmoil interrupted in 2008. Increased market demand provides opportunities for economies of scale or product upgrading, which can mitigate the disadvantage of high wages in Kenya. However, Kenyan firms may have dismissed the opportunity, or political turmoil may have dampened the prospects for revival. In the next section, we explore changes by non-exporting firms during economic growth.

3. Firm Dynamics between 2002/3 and 2008/9

Non-exporting firms did not seem to be taking effective measures to enhance their competitiveness despite the growth of the local market. To make this point clearer, in this section, we explore changes in productivity during the period of economic growth. For a price taker, productivity enhancement is the key to gaining competitiveness when

competition is based on price rather than quality. We specifically analyzed the role of firm dynamics, i.e., entry and exit, on industry-level productivity changes in addition to productivity growth within a firm. Replacing unproductive firms with productive ones occasionally plays a substantial role in industry-level productivity changes in the manufacturing sector (for example, Olley and Pakes 1996, Aw et al. 2000, Shiferaw 2007) and particularly in the garment industry (Asuyama et al. 2010). However, the substantial contraction of the number of firms after trade liberalization may have weakened firm dynamics in the Kenya.

In this section, we focus on non-exporting firms during the time when growth opportunity emerged in the local market. They are compared with Bangladeshi firms as a benchmark of Asian firms that dominate the Kenyan market. Though the share of Bangladeshi products in the Kenyan market is small, we regard them as sharing similar characteristics with Indian and Chinese firms exporting to Kenya.

3.1. Data

In this section, 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. In the Kenyan sample of 83 firms, the number of followed firms was 34 and that of added firms was 49 (Table 5). 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 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.

Samples lacking the necessary information for measuring productivity and those with low-quality data were excluded.[9] 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). 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.

3.2. 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 Kenya 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 1). Therefore, changes in production in the domestic market are ambiguous.[10]

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). Based on the followed sample, we found that 39.6% of firms exited in the Bangladeshi sample, and similarly, 39.0% of non-EPZ firms exited by 2009 in Kenya. On the other hand, in the added sample, entrants have a share of 20.4% in Kenya and 37.9% in Bangladesh. Given the lack of a

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

[10] 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 (KNBS 2005, 2009). However, these statistics are not reliable, as mentioned in section 2.

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.[11]

Average firm size increased among Bangladeshi firms. The average value added grew by 14.7% and employment climbed by 28.3% (Table 6, 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 6). 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. There were no significant changes in firm size, but profits share decreased significantly.

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, it is presumed that the fall of output price and the rise of labor 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.[12] 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.[13] 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,

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

[12] 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.

[13] See Chapters for Vietnam, Cambodia in this report.

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.

3.3. Productivity Change

3.3.1. 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 between productivity and firm survival, while Soderbom, Teal and Harding (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.

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

where Y is output (value added), x_n ($n = K$ [capital], Ls[skilled labour], Lu[semiskilled labour]) is input, and s^n is factor share, u is operation hours, and i is a suffix which represents a firm. 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, and it incorporates the effect of returns to scale.

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

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

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 after the first survey. The growth rate can then be decomposed using the following equation,

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

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.

$$\Delta \ln TFP = \sum_{i \in I} \left[\frac{\theta_{i,t} + \theta_{i,t+1}}{2} \left(\ln TFP_{i,t+1} - \ln TFP_{i,t} \right) \right] + \left[\frac{\theta_{X,t} + \theta_{E,t+1}}{2} \left(\ln TFP_{E,t+1} - \ln TFP_{X,t} \right) \right] + \sum_{i \in I} \left[\frac{\ln TFP_{i,t+1} + \ln TFP_{i,t}}{2} \left(q_{i,t+1} - q_{i,t} \right) \right] + \left[\frac{\ln TFP_{E,t+1} + \ln TFP_{X,t}}{2} \left(q_{E,t+1} - q_{X,t} \right) \right] \quad (1)$$

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 combines the methods by Griliches and Regev (1995) and Olley and Pakes (1996).

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

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,

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

$$\Omega_I = \left[\frac{\theta_{I,t} + \theta_{I,t+1}}{2} \right] \quad \Omega_X = \left[\frac{\theta_{X,t} + \theta_{E,t+1}}{2} \right], \; j \in I, \; k \in E, \text{ and } l \in X.$$

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.[1] 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 3.

3.3.2. Results

Table 7 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 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 (column 4-7 in Table 7). 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. 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 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 8).

The weighted average of the TFP index is shown in Table 9, 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 1 is shown in rows 4 to 10 in Table 9. 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.

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 Section 2, 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. 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. (2010).

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 African, 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. (2007) 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.

3.4. Determinants of Firm Survival

3.4.1. 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. (2007) 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. A 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. Focusing on firm heterogeneity on the demand side rather than the supply side, they argue that younger plants tend to have lower demand level due to, for example, a narrower customer base or weak brand value. The argument by Foster et al. (2008) 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. (2007) 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 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 behavior. 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.[14] 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, through empirical evidence is

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

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, 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

$$F(t) = P(T \leq t), \quad t \geq 0$$

The survivor function is defined as

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

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

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

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

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

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. The survivor function at time a_m which is the end of the interval (a_{m-1}, a_m) is

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

where $\Theta_m = \int_0^{a_m} q_0(u)du$. The discrete hazard function, $h(a_m, \mathbf{x})$, is defined as

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

Hence,

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

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

where $\gamma_m = \log\left[\int_{a_{m-1}}^{a_m} q_0(u)du\right]$. 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 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 Fukunishi (2009). Labor productivity is a crude measure of productivity but can be justified given the relatively similar capital

intensity within the same industry.[15] All explanatory variables represent firm characteristics in 2002.

3.4.2. Results

Estimated coefficients are reported in exponential form in Table 10, so that it indicates the effect on the hazard function, $h(a_m, \mathbf{x})$. And since we applied proportional hazard model, 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 by 41.9% (=1-0.581). 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, 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.

There may be a difference in exit behavior 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 across periods (Table 11). 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 6. 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. For the variables representing

[15] 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.

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.

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). 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.[16] Estimated coefficients and their significance are very similar to those in Table 10 and 11, and in fact, the null hypothesis of no unobserved heterogeneity cannot be rejected in the models using the TFP index and technical efficiency (Table A2 and A3). In the model using labour productivity and allowing different effect by period, coefficients are no more significant, and the test result indicated significance of unobserved heterogeneity (Table A3). 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.

3.4.3. Discussion

Our results suggest that, in the period between 2003 and 2005, firms' exit was irrelevant to productivity, and covariance between market share allocation and productivity is smaller than the next period. A standard theoretical implication based on firm heterogeneity in productivity is that a less productive firm has a smaller share, and those with productivity that is below the threshold exit (Merits 2003). Hence, this suggests that the local market was not driven by price competition in the first period. On the other hand, in the period between 2005 and 2009, TFP was highly correlated with

[16] 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.

market share, but firm exit is only marginally determined by TFP. This is a complicated result in a 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 Kenyan local 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 firm is positive, those firms have to close due to temporal loss. This explains the exit of the firms which posted current losses but expect positive profit in the future, and with a standard assumption, there exists a range of productivity satisfying this condition.[17] However, this does not explain firms outside of the above productivity range, such as 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 skill. This increases exit probability of good performers relative to that of poor performers, and obscures positive relationship between productivity and firm survival. Since those hypotheses provide account for 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 profits do not necessarily correlate with survival.

However, they cannot explain survival of very unproductive firms with negative future profits. Though we do not exhaust all possibilities, it would be hard to justify survival of such firms.[18] 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

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[17] 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 equals 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 realized productivity generates profit that is smaller than exit value .Given such downward limit on future profit, expected future profitability tends to be higher than currently productivity. Therefore, there also exists a productivity level that generates negative *current* profit but positive expected *future* profit.

[18] 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.

that of exiting firms (Figure 5), it means that all sample firms had productivity higher than the threshold. This is possible when output price is higher than the competitive price and thus the threshold is lower. Imported products have not penetrated into the uniform market, since uniforms require a high degree of customization. This feature has allowed local garment firms to survive in the market after trade liberalization, 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 long 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.

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. 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 7). The social conflict from the end of 2007 to 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 seriously 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.

4. Conclusion

After trade liberalization, Kenyan garment firms did not experience sustained growth. In the local markets, the price gap between imports, both new and secondhand products, and domestic products is so large for low-priced apparel that Kenyan firms find it difficult to compete. Domestic products are not competitive among high-priced products due to the quality gap with imports that is largely attributable to the quality of fabrics. Almost all firms except those in the informal sector are specializing in uniforms, which do not compete with imports. In the export market, the preferential access to the US

market, which provides duty-free access with the one-stage rule of origin, induces foreign direct investment and a sharp increase in exports. However, even with those exclusive advantages, Kenyan products are only marginally competitive in the apparel market, where the quota for large exporters, such as China, was abolished.

We found that garment firms supplying the local market do not take measures to enhance their competitiveness and instead avoid competition by specializing in uniforms. As shown in other studies, there is a huge gap in production costs between Kenyan and Asian firms because of far higher labor costs in Kenya (Fukunishi 2009). Given the large gap in labor costs, avoidance of competition could be an indispensable strategy.

However, such specialization has resulted in the loss of dynamics of the industry even amidst the growing demand. On one hand, the average productivity of the continuing firms has fallen, causing relatively productive firms to exit, but new entrants are far less productive than exiting firms. Consequently, the average productivity of Kenyan firms, which did not differ from the Bangladeshi average in 2002, dropped significantly in 2008. Only allocation of market share became more efficient during the period, that is, more productive firms tend to have a larger market share. This helped industry-level productivity, which is average productivity weighted by output, to maintain the same level between FY2002 and FY2008. The observed relationship between productivity and firm exit is not consistent with the theoretical implications 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 among the Bangladeshi firms. The conflict that occurred in the first half of 2008 is not likely to have affected the results, as firm exit in 2005 was also not related with productivity.

Investigation of firm exit by the duration model suggested quite limited evidence of 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. These results indicate that competition in the domestic market in Kenya, particularly the uniform market, was not strongly driven by price but by other factors related to firm age. The need for high customization may be related to weak competition by price, and instead, the experience of firms matters. Specialization in uniforms further reduced the scope of market competition and confined dynamism of the industry growth.

Because of the large gap in competitiveness, many of Kenyan firms closed and

the small number of surviving firms had to choose to avoid competition. However, detaching themselves from competitive pressure further weakened their competitiveness. Despite the strongest growth in demand in last two decades, firms did not improve productivity and firm turnover did not result in the entrance of productive firms and the exit of unproductive ones. There will be no prospects for growth until the wages in Asian countries significantly exceed Kenyan wages.

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Table 1 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 Value (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) EPZA (2005), (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*.

Table 2 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 2000-2006)	19	—	—	231.1	60.0 ($0.75mil)	100.0	0

Source: (EPZ Firm) Kenya EPZ 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.

Table 3 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.

Table 4 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	3
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.

Table 5 Number of Sample by Entry and Exit

2009		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)

2003		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.

Table 6 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	120511.4	84496.2	173	349903.0	1043664.0	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	47801.7	91500.4	42	46390.1	86849.7	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.

Table 7 TFP index (Unweighted averages)

	2002	2008	Difference	2002		2008	
				Surviving Firm	Exiting Firms	Continuing Firms	Entering Firms
Kenya	-0.019	-0.384	**				
(All sample)	(0.757)	(0.829)					
	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)
	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)
	172	218		89	69	179	39

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

Table 8 Average TFP index by firm survival as of 2005

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

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

Table 9 Weighted Averages of TFP Index

			Kenya non-EPZ	Bangladesh
(1)	2002		0.245	0.466
			(0.830)	(0.655)
	N		41	158
(2)	2008		0.243	0.547
			(0.886)	(0.728)
	N		34	218
(3)	Change (growth rate)		-0.002	0.082
(4)	Continuing firms'	Total	0.301	0.012
(5)	change	TFP Change	-0.177	-0.029
(6)		Within Reallocation	0.443	0.015
(7)	Entry/Exit change	Total	-0.303	0.07
(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 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.

Table 10 Estimation of Hazard Function

	1	2	3
TFP	0.581		
	(0.290)		
TFP*Worker	1.028		
	(0.024)		
TE		0.066	
		(0.159)	
TE*Worker		1.158	
		(0.151)	
LP			0.9997*
			(0.0002)
LP*Worker			1.00001
			(0.00001)
totalworker	0.993	0.921	0.973
	(0.009)	(0.064)	(0.020)
age	0.912**	0.911*	0.916*
	(0.042)	(0.044)	(0.043)
subcontract	2.074	1.953	2.464
	(1.164)	(1.215)	(1.316)
export	0.677	0.578	0.715
	(0.481)	(0.392)	(0.487)
african	1.067	0.930	1.233
	(0.615)	(0.555)	(0.719)
s2	1.015	1.097	0.976
	(0.561)	(0.637)	(0.528)
Log pseudo likelihood	-30.534	-29.394	-30.520
N	70	70	70

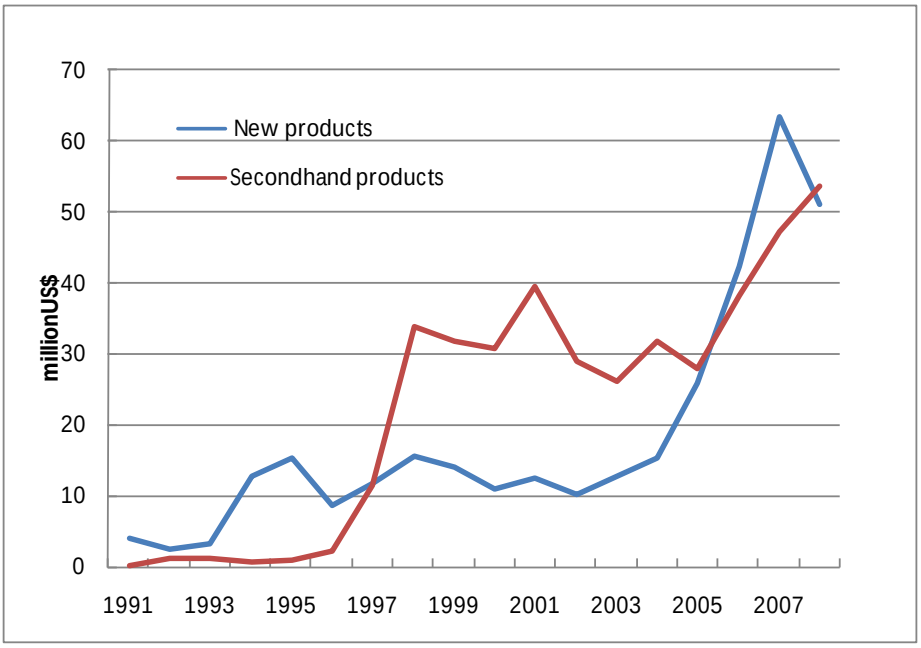
Note: Coefficients are in exponential form. Heterosckedasticity robust standard errors are reported in the parenthesis.

Table 11 Estimation of Hazard Function with Differed TFP Effects by Period

	1	2	3
TFP*s1	0.546		
	(0.244)		
TFP*s2	0.057**		
	(0.083)		
TFP*Worker*s1	1.015		
	(0.012)		
TFP*Worker*s2	1.186***		
	(0.073)		
TE*s1		0.017	
		(0.038)	
TE*s2		0.285	
		(1.028)	
TE*Worker*s1		1.158	
		(0.149)	
TE*Worker*s2		1.183	
		(0.174)	
LP*s1			0.999*
			(0.0003)
LP*s2			0.9997*
			(0.0002)
LP*Worker*s1			1.00001*
			(0.00001)
LP*Worker*s2			1.00002*
			(0.00001)
totalworker	0.996	0.918	0.968
	(0.007)	(0.067)	(0.019)
age	0.879**	0.910**	0.914*
	(0.055)	(0.042)	(0.045)
subcontract	3.136*	1.822	2.267
	(2.120)	(1.338)	(1.357)
export	0.641	0.582	0.692
	(0.414)	(0.443)	(0.493)
african	1.662	0.970	1.184
	(1.093)	(0.629)	(0.762)
s2	0.554	0.200	0.360
	(0.371)	(0.316)	(0.304)
Log pseudo likelihood	-25.582	-28.379	-29.511
Number of Observation	70	70	70

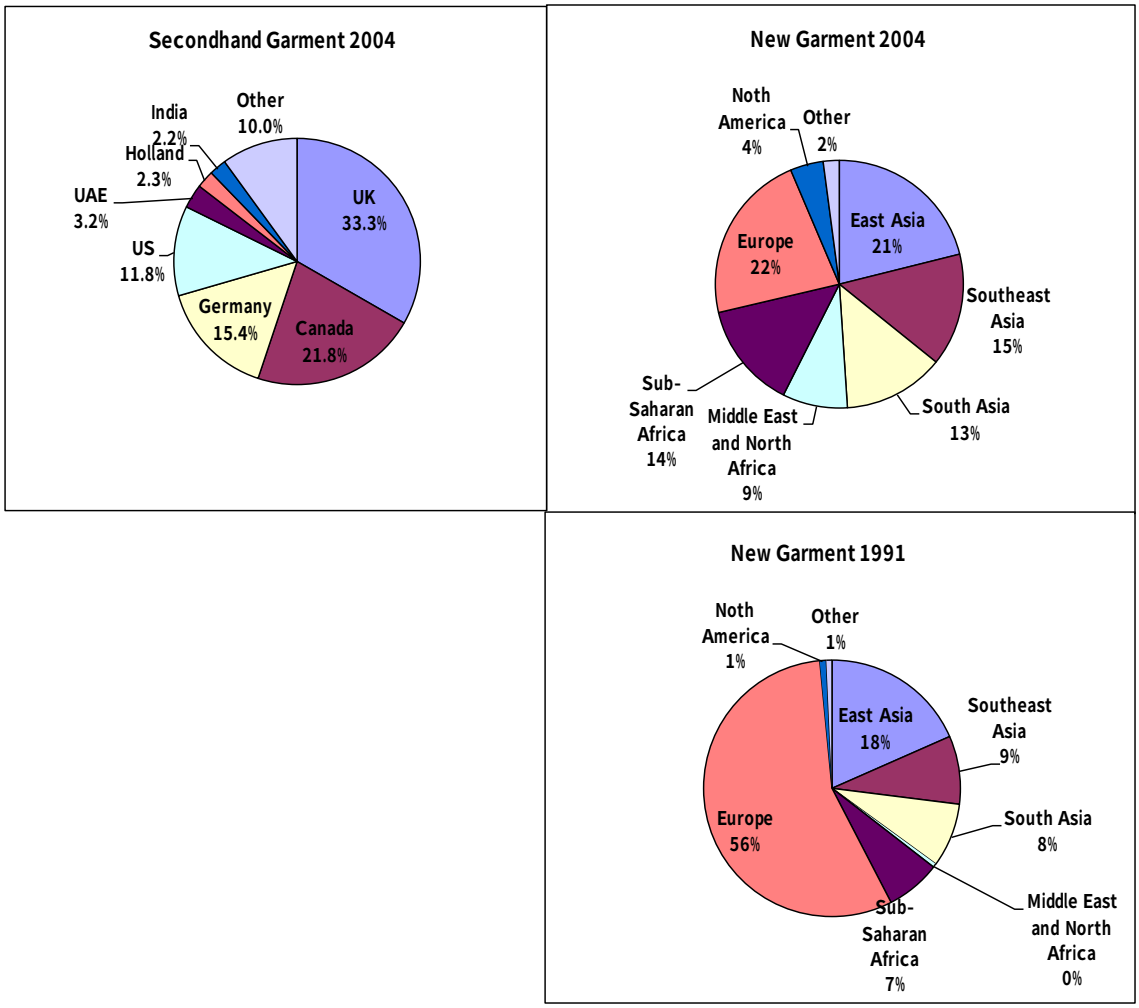
Note: Coefficients are exponentiated. Heterosckedasticity robust standard errors are reported in the parenthesis.

Fig 1 Import Value of Garment



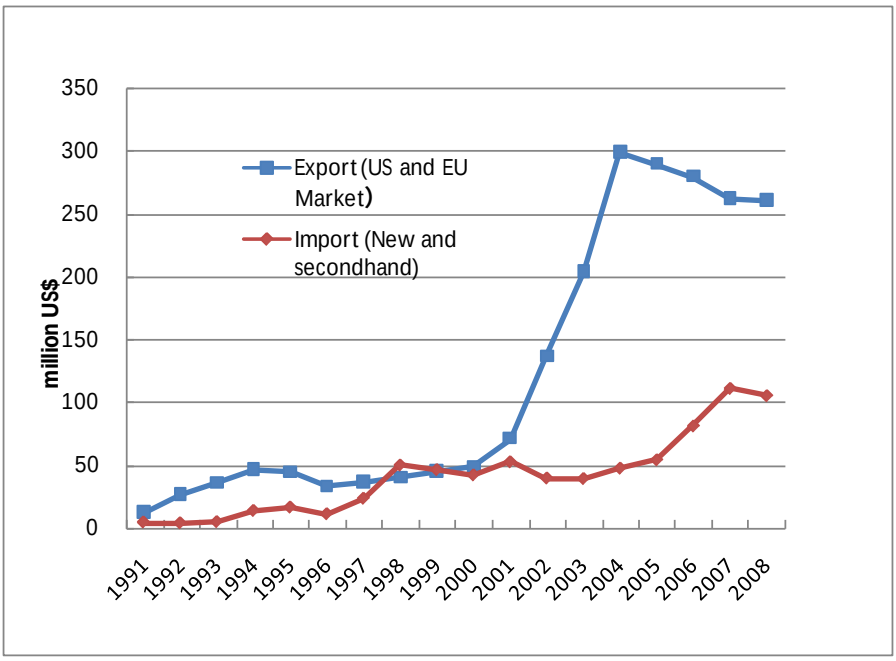
Source: United Nations Commodity Trade Statistics (Kenya Report)

Fig 2 Origin of Garments Imported in Kenya



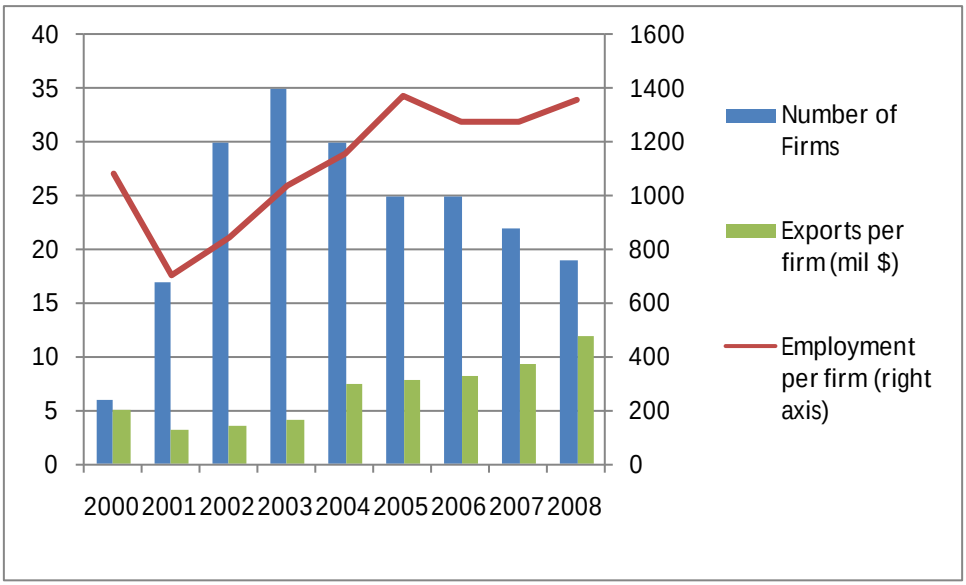
Source UN Comtrade

Figure 3 Export and Import Value of Garments



Source UN Comtrade

Figure 4 Number and Size of EPZ firms



Source: Kenya EPZ Authority (2005) [2000-2004], Kenya National Bureau of Statistics (2010) [2005-2008].

Figure 5. Distribution of TFP index by firm survival as of 2005

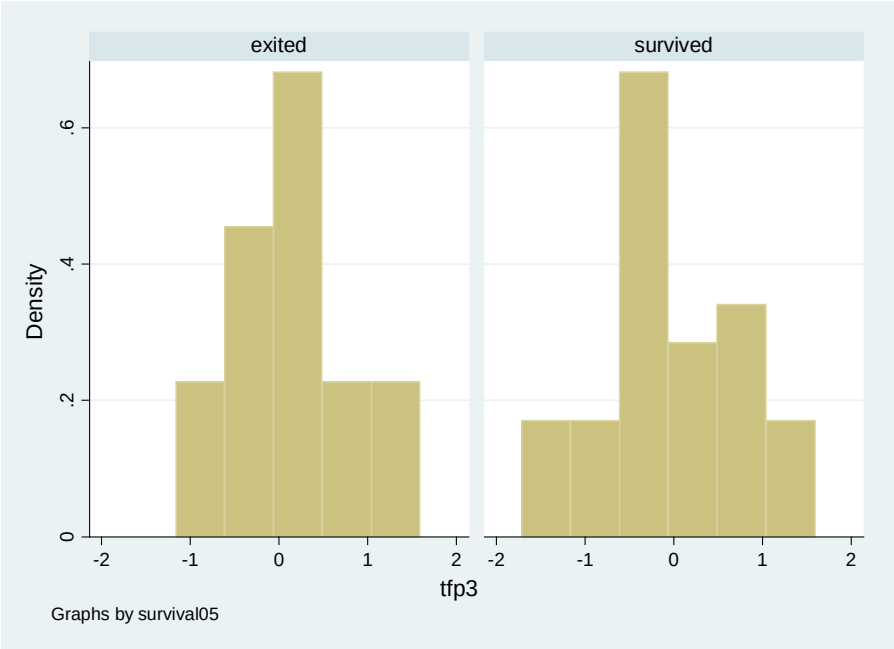
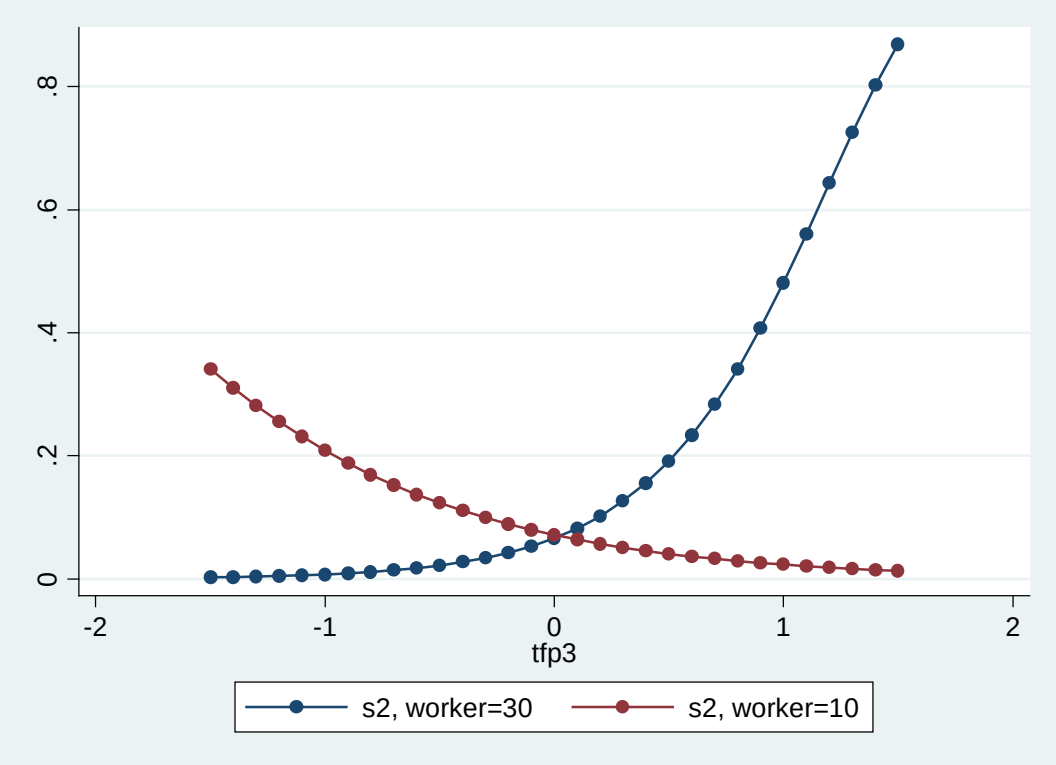
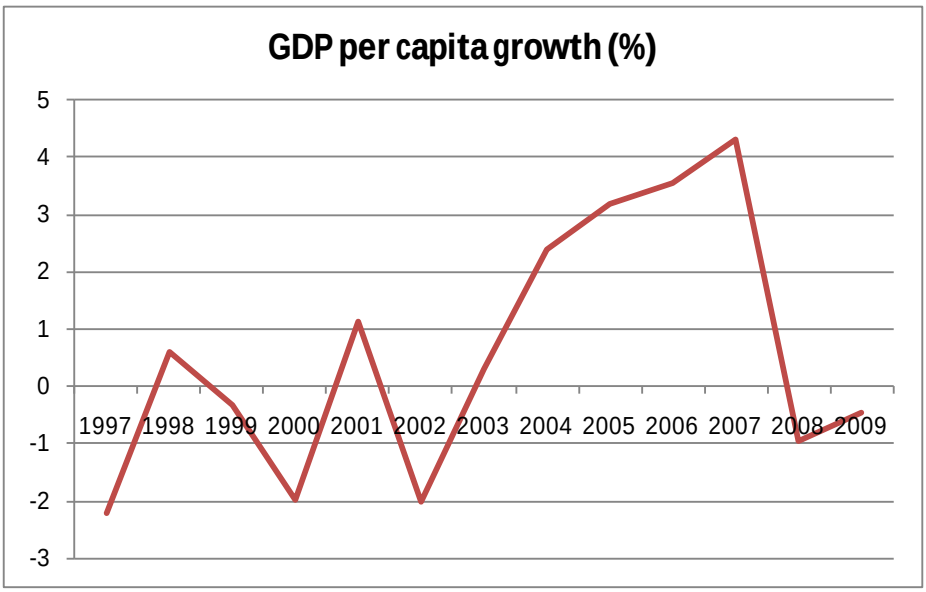


Figure 6. Simulation of Hazard Rate by TFP Index and Firm Size



Note: Based on estimation results shown in column 1 of Table 11.

Figure 7. GDP per Capita Growth (%)



Source: World Development Indicators (2011)

Appendix 1. List of Garment Firms

1. List of Interviewed Firms

Table A1 Interviewed 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
Kenya 100%	0.16	0	African	2006
Kenya 100%	9	0	Asian	2006
Kenya 60%, Africa 35%, UK 5%	10	1	Asian	2006
Kenya 100%	0.23	0	African	2006
Kenya 80%, Africa 20%	1.7	0	Asian	2006
Kenya 100%	0.04	0	African	2006
Kenya 100%	>3.5	1	Asian	2006
Kenya 100%	0		Asian	2006
Kenya 60%, Africa 40%	0		Asian	2006
Kenya 99%, UK 1%	>0	1	Asian	2005, 06
Kenya 100%	0		African	2006
Kenya 100%	0		Asian	2006
Kenya 80%, Africa 20%	0	1	Asian	2006
Kenya 100%	>0	0	Asian	2006
Kenya 100%	0		Asian	2006
Kenya 80%, Africa 20%, EU<1%	16	1	Asian	2006
Kenya 90%, EU10%	0.436	0	European	2005
Kenya 90%, EAC10%	0		Asian	2005
USA 61%, UK Swiss 11%, Kenya 28%	5	0	European	2006
USA 17%, EU 26%, EAC 43%, Local 15%	>0	1	Asian	2006
USA 100%	14	0	African	2005, 06
USA 50%, EU 50%	10.5	1	African	2005, 06
USA 100%	22.5	0	African	2006
Local, Mauritania, Burkina Faso (USA 100%*)	12	1	African	2006
USA	6	0	African	2006
USA 95%, Japan 5%	5.5	0	African	2006
USA 100%	3-40	1	African	2005
USA 100%	23.4	0	African	2005

Appendix 2. Sampling and Data Construction

1. Sampling Method of the 2009 Survey

The surveys in 2009 traced the sample covered in 2003 and also added a new sample. The addition of the new sample was to compensate for the high rate of attrition primarily due to plant closure and to capture entrants which started operations after the first survey. In Kenya, the followed sample was captured by the firm list that we used in 2003, and the additional sample was randomly selected from several incomplete 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 based on firm size from the Bangladesh Garment Industry Association (BKMEA) member list was used to select the additional sample. BKMEA is one of two garment exporters' associations, and the other is the Bangladesh Knitwear Manufacturers Association.

In the Kenyan sample of 83 firms, there are 34 followed firms and 49 added firms (Table 5). The Bangladeshi sample contains 114 followed firms and 116 added firms, for a total of 230 firms. 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 their business line away from 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 the survey questions, and two firms did not in Bangladesh. In addition, the operation status of 18 firms in the Bangladeshi sample was not even confirmed. Attrition of these firms and addition of a new sample made the dataset highly unbalanced.

2. Samples Used in the Analysis

Samples lacking the necessary information to measure productivity and those with low-quality data were excluded. 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 out, and 172 firms (FY2002) and 218 firms (FY2008) were retained in the Bangladeshi sample (Table 5). After this procedure, only one Kenyan EPZ firm was retained in the 2008 sample, and

hence, the main analysis is based on Kenyan non-EPZ firms and Bangladeshi firms.

3. Data Construction

Capital value was constructed by the perpetual inventory method from purchase information. Exchange rate was used for exchange of the value unit from local currency to US dollars, because it appears more appropriate than the purchasing power parity given the prices in Nairobi. All values are deflated at 2002 prices using the GDP deflator for descriptive statistics (Table 6). The input and output value information was deflated at 2002 prices. For the productivity calculation, item-specific deflators were used wherever possible; data used includes 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 both countries for the remaining items.

4. Share of Entrants

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

Appendix 3: Decomposition of weighted productivity change in Section 3.3

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 1 is expressed as follows.

$$\Delta \ln TFP = \left(\frac{q_{I,t} + q_{I,t+1}}{2}\right)\left(\ln TFP_{I,t+1} - \ln TFP_{I,t}\right) + \left(\frac{q_{X,t} + q_{E,t+1}}{2}\right)\left(\ln TFP_{E,t+1} - \ln TFP_{X,t}\right) +$$
$$\left(\frac{\ln TFP_{I,t+1} + \ln TFP_{I,t}}{2}\right)\left(q_{I,t+1} - q_{I,t}\right) + \left(\frac{\ln TFP_{E,t+1} + \ln TFP_{X,t}}{2}\right)\left(q_{E,t+1} - q_{X,t}\right) \quad (3)$$

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

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

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

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

Inserting this to the equation 3, we get

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

which is the equation 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 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.

$$\log L = \sum_i c_i \log \left(\frac{h_{i,m}}{1 - h_{i,m}} \right) + \sum_i \sum_{k=u_i+1}^{m} \log(1 - h_{i,m})$$

2. Dealing with Unobserved Heterogeneity

Consider the following hazard function,

$$h(a_m, \mathbf{x}, v) = v h(a_m, \mathbf{x}),$$

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 **x**. Then, cloglog transformation of hazard function based on proportional hazard model is

$$\log[-\log(1-h(a_m,\mathbf{x}))] = \beta\mathbf{x} + \gamma_m + u,$$

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 **x**, and v and a_m are independent, survivor function is expressed as,

$$S_v(a_m,\mathbf{x};r) = \int_0^\infty S(a_m,\mathbf{x},v)\,g(v;r)\,dv .$$

If we assume Gamma distribution, it has a closed form express (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 A2 and A3.

Table A2. Estimation Results Incorporating Unobserved Heterogeneity

	1	2	3
TFP	0.581		
	(0.324)		
TFP*Worker	1.028		
	(0.019)		
TE		0.066	
		(0.157)	
TE*Worker		1.158*	
		(0.100)	
LP			0.9997
			(0.000)
LP*Worker			1.00001
			(0.000)
totalworker	0.993	0.921*	0.973
	(0.008)	(0.042)	(0.018)
age	0.912**	0.911**	0.916**
	(0.041)	(0.041)	(0.041)
subcontract	2.074	1.953	2.464
	(1.200)	(1.179)	(1.392)
export	0.677	0.578	0.715
	(0.537)	(0.484)	(0.551)
african	1.067	0.930	1.233
	(0.661)	(0.605)	(0.753)
s2	1.015	1.097	0.976
	(0.541)	(0.594)	(0.514)
$\ln\delta_u^2$	-12.425	-12.676	-9.907
	(513.989)	(29.472)	(31.887)
δ_u	0.002	0.002	0.007
	(0.515)	(0.026)	(0.113)
$\rho=\delta_u/1+\delta_u$	0.000002	0.000002	0.00003
	(0.001)	(0.0001)	(0.001)
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: Coefficients are in exponential form. δ_u is variance of unobserved term.

Table A3. Estimation Results Incorporating Unobserved Heterogeneity (Differed TFP Effect by Period)

	1	2	3
TFP*s1	0.546		
	(0.368)		
TFP*s2	0.057*		
	(0.089)		
TFP*Worker*s1	1.015		
	(0.015)		
TFP*Worker*s2	1.186***		
	(0.078)		
TE*s1		0.017	
		(0.048)	
TE*s2		0.285	
		(0.853)	
TE*Worker*s1		1.158*	
		(0.103)	
TE*Worker*s2		1.183*	
		(0.112)	
LP*s1			0.998
			(0.001)
LP*s2			0.9993
			(0.001)
LP*Worker*s1			1.00004
			(0.000)
LP*Worker*s2			1.00003
			(0.000)
totalworker	0.996	0.918*	0.925
	(0.007)	(0.043)	(0.054)
age	0.879**	0.910**	0.763
	(0.050)	(0.041)	(0.152)
subcontract	3.136*	1.822	9.708
	(2.087)	(1.180)	(21.260)
export	0.641	0.583	0.081
	(0.502)	(0.487)	(0.183)
african	1.662	0.970	1.049
	(1.137)	(0.660)	(2.004)
s2	0.554	0.200	0.374
	(0.383)	(0.309)	(0.645)
$\ln\delta_u^2$	-13.838	-12.654	2.744
	(658.484)	(29.310)	(1.437)
δ_u	0.001	0.002	3.944
	(0.326)	(0.026)	(2.834)
$\rho=\delta_u/1+\delta_u$	0.000	0.000	0.904
	(0.000)	(0.000)	(0.124)

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: Coefficients are in exponential form. δ_u is variance of unobserved term.

[1] 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.