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Slow and Steady Wins the Race: How the Garment Industry Leads Industrialization in Low-income Countries

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April 2013

Abstract

This paper investigates how the garment industry escapes this vicious cycle and argues for the validity of labor-intensive industry as a starting point for full-fledged industrialization, even though it might at first seem to be a digression from the path to an innovation-led economy. By examining original firm-level data on garment-producing firms collected in 2002 and 2008 in Bangladesh, Cambodia, Kenya and Madagascar, the following conclusions are drawn: (1) low wages, though still sufficient for poverty reduction, are the main source of competitiveness in low-income countries; (2) after the successful initiation of industrialization causes wages to begin to rise, there is still a possibility for productivity enhancement; and (3) skill bias in technological progress is not yet a major factor, implying that the garment industry is still a labor-intensive industry. In sum, labor-intensive industry should not be discounted as a part of the development strategy of low-income countries.

Keywords: Competitiveness, Garment, Race to the bottom, Bangladesh, Cambodia, Kenya, Madagascar

JEL classification: D24, F63, L67, O14, O33, O53, O55

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Slow and Steady Wins the Race: How the Garment Industry Leads Industrialization in Low-income Countries[†]

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Abstract

The narrow scope of innovation in labor-intensive industries has long led many to regard them as non-strategic sectors. Advocates of the "race to the bottom" model assume that specialization in these industries causes a country to fall behind in terms of productivity enhancement and innovation, since an emphasis on labor-intensive industries can lead instead to price competition and endless wage cuts which only impoverish workers. However, this race to the bottom is not observed in the garment industry, a typical labor-intensive industry in low-income countries. This paper investigates how the garment industry escapes this vicious cycle and argues for the validity of labor-intensive industry as a starting point for full-fledged industrialization, even though it might at first seem to be a digression from the path to an innovation-led economy. By examining firm-level data on garment-producing firms collected in 2002 and 2008 by the authors and their colleagues in Bangladesh, Cambodia, Kenya and Madagascar, the following conclusions are drawn: (1) low wages, though still sufficient for poverty reduction, are the main source of competitiveness in the garment industry in low-income countries; (2) after the successful initiation of industrialization causes wages to begin to rise, there is still a possibility for productivity enhancement and quality improvement; and (3) skill bias in technological progress is not yet a major factor, implying that the garment industry is still a labor-intensive industry, at least for the time being, and this allows less educated workers to secure a job in the industry. In sum, labor-intensive industry should not be discounted as a part of the development strategy of low-income countries.

Keywords: Competitiveness, Garment, Race to the bottom, Bangladesh, Cambodia, Kenya, Madagascar

JEL Classifications: D24, F63, L67, O14, O33, O53, O55.

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1. Introduction

The textile industry was a starting point of industrialization in many countries around the world. The Industrial Revolution of the mid-18th to mid-19th century was led by the textile industry in the UK (Clark 2007, Mokyr 1990). Japan's industrialization in the mid-19th century began with the silk and cotton textile industries substituting for textiles made in the UK (Ito 1992, Lockwood 1954). In the period after World War II, the industrialization of Korea, Taiwan and Hong Kong also began with the textile industry (Amsden 1989, Ranis 1979, Wade 1990, Suehiro 1982).

The competitive edge of late-comers to the textile industry lay in the labor-intensive nature of the industry and the low labor costs associated with low per capita income in these countries. However, as innovations such as the spindle and loom spread during the Industrial Revolution, the upstream processes of the textile industry became more capital intensive, and only the downstream process, that is, sewing, remains a labor-intensive process in the textile value chain. The sewing process is currently undertaken mainly in developing countries (Gereffi and Memedovic 2003). The top exporter of apparel to the world economy is China, with many other lower-income countries such as Bangladesh and Cambodia among the leading exporters (Lopez-Acevedo and Robertson 2012, Robertson et al. 2009, UNIDO 2004). Since the export-oriented garment industry provides ample employment opportunities for workers with less skill, the industry has contributed to poverty reduction in low-income countries (Fukunishi et al. 2006, Yamagata 2009).

Competition based on low wages, however, raises concerns about sustainability. Low wages may not continue as an economy grows because the wage rate must rise sooner or later (Kaldor 1957). In the absence of increasing productivity, a country must accept repeated wage/cost cuts to sustain competitiveness. In this case, a country that participates in this keen competition may find itself impoverished. This is the main feature of the race to the bottom (Tonelson 2002, UNIDO 2002: p. 111).

However, recent studies have found barely any empirical evidence for this race to the bottom. In fact, since price competition has intensified after the Multi-Fiber Arrangement (MFA) was phased out in 2005, the prices of wearing apparel have tended to decline globally (Harrigan and Barrows 2009). Contrary to the predictions of the Stolper-Samuelson Theorem[1], average wages in the garment industry in low-income exporting countries have increased.

[1] The theorem implies that when the price of a commodity declines the price of the factor intensively employed for the production of the commodity declines in both nominal and real terms. For a simple explanation of the theorem, see Jones (1965).

Studies based on large-scale labor surveys have demonstrated that wages in the garment industry in many countries, including Bangladesh, Cambodia, Pakistan and Vietnam, have not declined, even after controlling for workers characteristics, and furthermore, wages in the garment sector are not necessarily lower than wages in other formal sectors (Lopez-Acevedo and Robertson 2012). As exports from many low-income countries increased after the removal of quotas, both total employment and job quality have increased, as discussed in detail later. The successes in the abovementioned countries have recently led to a greater appreciation of the role of the garment industry in poverty reduction through employment creation (World Bank 2012).

While recent studies have shown the contributions of labor-intensive industries to employment, the mechanism by which employment and quality increase are realized has not been thoroughly investigated. Understanding the conditions under which labor-intensive industries contribute to poverty reduction in low-income countries would also have meaningful policy implications. This paper focuses on the individual firm in addressing the question of how garment industries and firms in low-income countries achieve growth without a reduction in job quality. We analyze determinants of competitiveness for low-income exporters before and after the removal of quota. More specifically, we address whether low wages are still the most important source of competitiveness.

We mainly utilize unique firm-level data collected in Bangladesh, Cambodia and Kenya for fiscal years 2002 and 2008, and in Madagascar in 2008. These data are comparable among the country because the same questionnaire was used.[2] Though the dataset is highly unbalanced due to the high rate of firm turnover, it contains detailed information on production, employment, sales and accounting with entry and exit data. It allows, for example, better measurement of output value, which in the garment industry is especially problematic due to the underreporting of material costs, as well as better estimation of wage changes when controlling for firm-specific effects. See Appendix 1 for a summary of the dataset.

There are three main findings in this paper. First, production costs, and in the case of labor-intensive industries, labor cost, are still a critical determinant of competitiveness for a country with disadvantages in terms of productivity, location and infrastructure. Second, even if wages in that country rise, there is still potential for productivity enhancement. Cambodia, for example, has shown the potential for improvement in its efficiency of production. Third, skill-biased technological progress, which might weaken the cost advantage in production for labor-intensive industries in low-wage countries, has not yet spread to the garment industry. Innovations in the garment industry have not yet changed its labor-intensive nature. These

[2] Enterprise Survey conducted by World Bank is another well-known firm dataset covering a number of countries. However, substantial differences in survey design and coverage, e.g., different survey years and low coverage of garment firms, makes comparison difficult. See World Bank (2010).

characteristics allow low-income countries to sustain competitiveness and increase employment without decreasing job quality.

The rest of the paper is organized as follows. The prospective determinants of competitiveness in the garment industry are elaborated in the following section. A simple formula for factor decomposition of unit costs is given and discussed in the context of the enhancement and evolution of competitiveness. The third section explores the development of the global apparel market and garment suppliers, in particular those of low-income countries. The section also provides a general overview of the evolution of demand for and supply of wearing apparel in the world over the past several decades. The fourth section is a survey of empirical studies supporting the views of this paper. The concluding section summarizes the discussions.

2. Determinants of Competitiveness: Factor Decomposition of Unit Costs

In this section, we discuss the determinants of competitiveness. The method we use is a simple factor decomposition of unit costs. We must first define competitiveness. Quality, delivery and price are basic factors affecting competitiveness in export markets when the design of the garment is fully specified by buyers. However, for the standardized products, which are the specialties of low-income countries, price is most important (Lall and Wignaraja 1994). Though delivery with a short lead time is increasingly important in the globalizing world, price is still an important factor even with the downward trajectory of export prices. We adopt unit cost, or more specifically cost per output value, as a measure of competitiveness, since a garment producing firm can out-compete opponents with lower prices. We define unit costs, specifically the cost per output value as a measure of competitiveness, because a garment firm with a lower cost per unit can accept orders at a lower
price.[3]

Total costs of production (*C*) are decomposed into labor costs (*W*), transportation costs (*T*), energy costs (*E*) and other costs (*O*) as follows:

$$C = W + T + E + O. \quad (1)$$

Unit cost, or total cost divided by output value (*Y*), can then be defined as the following:

[3] Cost per physical unit of a product (per piece or per dozen) is a straightforward measure of price competitiveness. However, comparing this cost across products differing in quality is difficult from a practical perspective. Given the assumptions that garment firms are price takers and the market price is shared across firms, cost per value added can be compared consistently across firms and countries.

$$\frac{C}{Y} = \frac{W}{L} \Big/ \frac{Y}{L} + \frac{T}{Y} + \frac{E}{Y} + \frac{O}{Y} = \frac{w}{\lambda} + t + e + o, \quad (2)$$

where w, λ, t, e and o represent the wage rate, labor productivity[4], unit transportation costs, unit energy costs and other unit costs, respectively. Other costs include factor costs such as interest on loans and rental costs for land and buildings, as well as all other miscellaneous costs. Price competitiveness is therefore determined by how low w, t, e and o are and how high λ is.

Labor costs make up a large portion of total costs in labor-intensive industries. In other words, W/C is high in those industries. Therefore, w/λ matters more in a labor-intensive industry. As Kaldor's stylized facts of economic growth indicate (Kaldor 1957), wages are generally low in low-income countries. However, low wages are effective in lowering unit costs only if labor productivity (λ) is not too low, as equation (2) shows. Labor productivity also depends on various factors including education, organization, motivation and capital deepening, although several studies have shown, extensive education is not required for efficient operation of sewing machines in Bangladesh and Cambodia (Fukunishi et al. 2006, Hoque et al. 1995, Yamagata 2006, Zohir and Paul-Majumder 1996).

Unit transportation costs (t) depend on the distance between the market and the areas of production of materials, as well as the physical and institutional transportation infrastructure. The economic geography literature incorporates distance into transportation costs as a crucial determinant of where a factory is located, to which market the factory delivers, and where the factory procures material (Fujita, Krugman and Venables 1999, Fujita and Thisse 2002, among others). Transportation costs are critical for the textile industry for two reasons. First, the involvement of multinational enterprises led mostly by ethnic Chinese is highly visible in the global garment business. These multinational enterprises strategically choose the locations of production, procurement and sales. Second, the production processes of manufactured goods are becoming more fragmented in terms of location (Deardorff 2001). This widens the geographical division of labor for the garment business.

3. Development of the Garment Industry in Low-income Countries

3.1 Growth of Exports

The world garment trade has been driven by demand in developed countries. The value of imports to the US, the European Union and Japan accounted for 77.8% of the world's total imports in 2010 (WTO 2011). Although there is trade within developed countries, most of the

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[4] Note that if we define L as total factor, then λ is defined as total factor productivity, without changing the basic structure of the equation.

trade flow is from developing countries to developed countries, and the increase in exports from low-income countries has been particularly rapid. Table 1 shows the top 15 exporters to the US market, highlighting low-income countries starting in 2000. It is clear that the number has increased in the 2000s. Figure 3-1 indicates the share of imports from low-income countries as of 2000 in US apparel import value.[5] While it was less than 1% in 1970, the share increased rapidly during the 1990s and 2000s to reach 27.0% in 2008. Although only data after 2000 are available for the EU market, we can observe that the share of imports from low-income countries is as high as it is in the US market. The growth and presence of garment exports from low-income countries is evident in the world garment market.

The rise of low-income countries as garment exporters entails the exit of middle- and high-income exporters from the world market. Until the 1990s, relatively rich East and Southeast Asian countries and some Latin American countries were in the top 15. After 2000 they gradually stepped down and were replaced by low-income countries such as Indonesia, India, Vietnam and Bangladesh (Table 1).[6] This shift in production and transfer of technology to low-income countries was realized mainly through FDI. Direct investment by Korean, Hong Kong and Taiwanese garment firms was high during the 1990s. In the 2000s Chinese, Indian and Southeast Asian firms began investing in low-income countries. It has been argued that the technology of the garment assembly process is incorporated into sewing machines. These machines were designed to allow low-skilled workers to sew accurately and steadily. Efficient production is therefore possible even with unskilled workers and poor infrastructure, provided that management skills are present (Lall and Wignaraja 1994).

While the rise of low-income countries in the garment industry is consistent with their overall comparative advantages, it should be noted that certain features of apparel production and its trade institutions have facilitated the global spread of production. As discussed in the introduction, apparel production is highly fragmented due primarily to large differences in factor intensity across the process. While the sewing and knitting processes are labor intensive, the spinning and weaving processes are more capital intensive and the design process is more knowledge intensive. Because of these differences in factor intensity, the separation of each process can help minimize production costs, although coordination of the processes generates additional transaction costs, particularly when production is separated by large distances. Recent developments in international communication and transportation, however, have made greater geographical separation of each process more feasible. Buyers in developed countries provide detailed specifications for products and place their orders with trading companies located mostly

[5] Since countries categorized in the low-income group are reviewed and revised every year, we see changes of exports from a stable group of countries set as low-income countries in 2000.
[6] Indonesia was classified as low income until 2002, as was India until 2006 and Vietnam until 2009.

in East Asia, which then assign the orders to textile and assembly firms from around the world (UNCTAD 2002, Gereffi and Memedovic 2003). As communication and transportation infrastructure develops, trading companies can choose from ever more distant locations and reduce costs even further.

Trade restriction can also drive the shift in production to low-income countries. Previously, garment exports to the US and EU markets fell under the MFA, which imposed a quota on the main exporting countries. The quota was expanded by the quota-imposing countries as long as the quota-fulfillment rate was high. However, since the sum of quotas given by developed countries was smaller than the production capacity of large exporters, garment-producing firms from quota-constrained countries sought out countries with no quota, which turned out to be late-comer low-income countries. Thus, the rapid development of exports from low-income countries did not always reflect their genuine competitiveness, and in fact, some predicted a loss for low-income countries as well as significant growth of China and India after the MFA phase-out (e.g., Nordås 2004).

The MFA was terminated at the end of 2004. Although time-limited export restrictions for Chinese garment items remained in place until 2007 in the EU market and 2008 in the US market, for other garment exporting countries significant trade liberalization was observed (Kowalski and Molnar 2009). As predicted, export prices fell in many countries (Figure 3-2); according to estimations made by Harrigan and Barrows (2009), prices fell in 12 of the top 20 exporters including China, Bangladesh and Cambodia after controlling for quality changes. Exports from China and India grew and African countries including Kenya experienced reductions (Table 2). However, many low-income exporters such as Vietnam, Bangladesh and Cambodia maintained as high a growth rate as they did before 2004. Heterogeneous performance after the trade liberalization implies that competitiveness differed among low-income countries, and more importantly, so did the responses of firms to increased competition, as discussed in the next section.

3.2 Garment Industry in Bangladesh, Cambodia, Kenya and Madagascar

There is significant diversity among the garment industries of Bangladesh, Cambodia, Kenya and Madagascar. The largest industry is that of Bangladesh, where the value of exports has exceeded 10 billion dollars, followed by Cambodia, Madagascar and Kenya (Table 3). As shown in Table 2, after the liberalization of trade, except for Kenya the other three countries continued to grow their exports until markets were hit by the financial crisis of 2009. Exports from Bangladesh and Cambodia recovered in 2010, though Madagascar showed an even sharper decline in that year, was mainly due to the suspension of duty-free access to US markets after the political turmoil in the country.

The garment industry has created large formal employment opportunities; in Bangladesh, the exporters association estimated that employment exceeds 3 million (Table 3). Employment in the garment industry of Madagascar previously exceeded 100,000 workers, a remarkable size for formal employment in one sector in sub-Saharan Africa. Recent detailed studies of wages indicate that wages in the garment sector are not necessarily lower than in other formal sectors. Wages are also clearly higher than those of the informal sector, and are increasing in real terms (Robertson et al. 2010, Asuyama et al. 2011, 2013). There is evidence that non-wage working conditions are also improving (Lopez-Acevedo and Robertson 2012). Mounting ethical concerns from consumers and a high rate of inflation in low-income exporters have driven significant improvements in working conditions and nominal wages. We can note that these outcomes mean that the growth of employment coincided with increasing job quality in contrast to the predictions of the race to the bottom argument and the Stolper-Samuelson theorem[7].

However, detailed investigation shows that there is also substantial variation in wages among low-income countries (Table 4). Bangladesh is the lowest and Kenya is the highest in both years, with Cambodia and Madagascar in between. Table 4 shows the substantial increase in wages in Bangladesh, Cambodia and Kenya with nominal growth rates ranging from 36.5% to 65.8% (a detailed analysis of changes in wages is presented in the next section). Even after this high growth in wages, however, wage levels in low-income exporters are still well below those in China, Mauritius, Turkey, Mexico and El Salvador.[8]

4. Evolution in Determinants of Competitiveness

4.1. Before MFA Phase Out

The emergence of low-income countries in the garment export market clearly indicates that labor cost is a crucial determinant. When countries subject to MFA quotas looked for alternative sourcing countries, successful garment-exporting countries such as Bangladesh and Cambodia were chosen for their lower labor costs. Though comprehensive cross-country data on productivity in the garment industry is not readily available, some sparse data (mainly on labor productivity) indicate that low-income exporters tend to be less productive (e.g. World Bank

[7] The Stolper-Samuelson theorem implies that wage rate must decline in both nominal and real terms when the price of a labor-intensive commodity declines under the condition that profit is zero because of perfect competition.

[8] Wages of four countries are averaged values for female machine operators with 1–5 years of experience in the IDE survey, whereas others are the average of operators in a survey by ILO. The two are therefore different with respect to gender and experience.

2010: Table 10). Most low-income countries in Asia and Africa are neither located near markets nor equipped with effective transportation infrastructure, while their energy costs are also likely to be high due to insufficient physical and institutional infrastructure. Their success must therefore be due to their low wages.

Bangladesh has been among the lowest-wage countries since they began challenging export markets in the 1980s. Yunus and Yamagata (2013) demonstrated that in the manufacturing sector as a whole, real wages rose only slowly in the 1980s and 1990s despite steady growth of garment exports (Figure 4-1). They argue that this is primarily because of the availability of abundant labor in rural areas where reservation wages stay low. Firm-level data indicates that the Bangladeshi garment industry had quite low unit cost even among low-income countries. In 2002, its cost per gross product was 0.618, and the costs per value added was 0.312, which indicates that a share of cost is 61.8% and 31.2%, respectively (Table 5). These figures are far lower than those of the Cambodian industry (cost per gross product of 0.791 and cost per value added of 0.650) and the Kenyan industry (0.986 and 0.895).[9] Further investigation by Fukunishi (2009, 2013) showed that the average total-factor productivity did not differ significantly among the three countries in 2002. Therefore, given similar productivity, the Bangladeshi industry was most competitive in terms of cost among three due to the lowest wage. These results indicate that wage is a crucial factor of competitiveness even among low-income exporters.

4.2 Changes after MFA Phase-Out

Continued growth in low-income exporters after the MFA phase-out appears to prove the fundamental strength of low wages in market competition. Yet there are reasons to believe that this condition is changing. On the one hand, the continued decline of export prices does not necessarily allow low-income exporters to stay competitive, as discussed below, while on the other hand, the recent sharp rise of wages in low-income countries may erode their cost advantage.

In order to better understand the impacts of the MFA phase-out, let us consider the theoretical implications of quota abolishment. It has been shown that setting quotas in terms of physical quantity causes two types of effects: an increase in price and an increase in quality. When a low-cost country receives a quota, it restricts the supply of products from the low-cost country and allocates supply to relatively high-cost countries, and hence quota rent emerges and pushes up price. Furthermore, with a quota defined by total physical quantity of imports from

[9] Unlike equation (2) that indicates cost per gross output, we derived cost per value added here, because many firms do not purchase material under subcontract operation, in which material is provided by a buyer. Thus, energy, transportation and other costs are not incorporated in Table 5.

each country, garment producing firms add same amount of quota rent onto price across products regardless of price. Consequently, this leads to lowering relative price of initially expensive products, such as high-quality ones, and hence, demand for high-quality products increases (Feenstra 2004). Quota abolishment has the opposite effect—prices and quality both fall—as confirmed by Harrigan and Barrows (2009) using imports in the US market.

Quality downgrading is likely to increase demand for the exports of low-income exporters since they tend to specialize in low-end products. However, the effects of reductions in price are not necessarily favorable to low-income exporters as this tends to drive out high-cost producers. A decline in price necessarily raises the unit cost (cost per value of output) of garment firms through a reduction of the value of output even if other conditions, such as productivity or factor prices, are held constant. For firms that are producing at sufficiently low cost, unit cost would stay under their break-even point, meaning that cost is smaller than revenue. However, for firms with relatively high unit cost, it may become above the break-even point. If low-income exporters tend to be high-cost producers due to their low productivity or high transportation costs, they are more likely to be forced out of the market. A steady increase in wages further erodes the competitive advantage of low-wage countries when the rate of change there is greater than that of high-wage countries. Since wage and transportation costs are beyond the control of a garment firm, garment firms must enhance productivity in order to survive. The abolishment of quotas may therefore stimulate productivity growth in garment producing firms.

Turning to empirical evidence, IDE studies in which the authors were involved have observed notable heterogeneity in changes in competitive advantage across countries. In the Bangladeshi garment industry, average productivity did not grow after trade liberalization (Table 6). This indicates that the industry there managed to grow by relying on its advantage in labor costs. However, this pattern of development was not shared by Cambodia and Kenya; the Cambodian garment industry achieved substantial productivity growth after liberalization (Table 6), while the Kenyan industry, which faced the highest wage costs, experienced a reduction in exports. The responses of these three countries were consistent with differences in their wage rates. The lowest-wage country, Bangladesh, continued to grow, while the highest-wage country, Kenya, lost market share. Cambodia, with wage levels between those of Bangladesh and Kenya, maintained growth through productivity enhancement.[10]

Detailed analysis clearly demonstrates the effects of wage and productivity on unit cost. As Figure 4-2 shows, the average unit cost for Bangladeshi firms rose substantially at the

[10] Productivity growth in the Cambodian industry was caused not only by improvements in the productivity of individual firms but also by firm turnover. As some empirical studies on firm dynamics show, replacing unproductive firms with more productive ones contributed substantially more to average productivity growth (Asuyama et al. 2013).

same time as it fell for Cambodian firms.[11] While both industries continued to grow in export, there were noticeable differences in their cost structures after trade liberalization; Bangladeshi firms saw significantly smaller shares of profits while Cambodian firms saw increased profits. Figure 4-3 shows a decomposition of unit cost into factor prices, human capital, productivity, production scale, input allocation and output price based on Fukunishi (2013).[12] We compare the contribution of each factor, plus unit cost, for 2002 and 2008 to determine which factor contributed to increases or reductions in unit cost during the period. For ease of comparison, values in 2002 are standardized at 1. For example, panel A shows that increases in wage for unskilled workers raised unit cost about 1.5 times while the accumulation of human capital of workers slightly contributed to reductions in unit price. The two panels show that increases in wages, and in particular the wages of unskilled workers, are the primary cause of increases in unit cost in Bangladesh firms, while in contrast, the Cambodian firms managed to reduce unit cost thanks to large improvements in productivity that completely offset the effects of increased wages.

In other words, productivity growth was an underpinning of improved job quality. This coincided with an increase in the quantity of jobs, in contrast to the predictions of the race to the bottom argument. IDE survey data demonstrates that real wages in unskilled job categories, namely operator and helper, rose at both Bangladeshi and Cambodian firms, while real wages in skilled job categories, namely manager and officer, fell (Asuyama et al. 2011, 2013). This implies that the wage premium on skill fell. Meanwhile, the wages of unskilled workers are more closely tied to the minimum wage. Faced with a decline in export price, garment firms presumably intended to lower wages, at least in real terms, but were prevented from doing so by substantial increases in the minimum wage for unskilled job categories. It should be noted that Cambodia saw improvements in labor conditions in addition to the increases in wage and salary. In cooperation with the International Labor Organization, industry and government promoted improvements in labor conditions under a program entitled “Better Factories Cambodia”. Third-party monitoring of a broad range of working conditions, including safety, social welfare and skill development is key to the program, which has helped to establish the reputation of Cambodian products as sweat-shop free.[13] One analysis of IDE data has demonstrated that

[11] Figures for the Kenyan industry are not available for 2008 due to the reduction of exporting firms and a high rate of non-response to questions on financial issues.

[12] In addition to factor prices and productivity included in equation (2), human capital, production scale, input allocation and output price are incorporated in the decomposition of unit cost. Human capital is assumed to augment an effective unit of labor based on estimations of the production function. “Input allocation” reflects allocative efficiency which is measured by how close the actual combination of inputs (capital, skilled labor and unskilled labor) is to that given by cost minimization. A fall in output price raises unit cost, which is defined as the ratio between costs and value of output. See Appendix 2 for details of the methodology used.

[13] See Better Factories’ website (http://www.betterfactories.org) for details.

Cambodian firms were able to absorb the additional costs of labor compliance by improving productivity (Asuyama and Neou 2012).[14]

Firm level evidence indicates that competitiveness is derived from both internal and external factors for low-income garment exporters. One external factor, the abolishment of MFA quotas, has significantly lowered export prices in the global apparel market. At the same time, an internal factor, the steady increase of wages in low-income countries, has substantially eroded the cost advantage enjoyed by low-income countries. As a result, garment firms have been forced to improve productivity, with the exception of those located in the lowest-cost countries. Even firms in these low-cost countries will find it necessary to increase productivity in the near future, given the continued downward trend in export prices and the upward trend in wages. To sum up, while low wages are an important component of competitiveness in the garment industry, that cost advantage can eventually be eroded, and productivity enhancement is then required to maintain competitiveness.

From the viewpoint of job quality, wage increases which exceed inflation are indispensable for improving the welfare of workers. Productivity growth is key in breaking the positive association between output price and wage predicted by the Stolper-Samuelson theorem, as well as in realizing increased employment and improved quality of job. The case of Cambodia proves that garment firms in low-income countries are capable of improving productivity.

4.3. Technological Change

The final discussion in this paper concerns the direction of technological progress. Throughout the world the level of education is increasing. This implies that highly educated labor is abundant with respect to other factors of production. There are both theoretical and empirical works showing that technological progress is likely to be directed (in other words, biased) toward using abundant resources and saving scarce resources.[15] In fact, it has been shown that after the number of university graduates in the United States increased in the 1960s–

[14] In general, the price of a commodity reflects both the utility derived from the usage of that commodity and market power. In other words, price incorporates both the genuine quality of the commodity and the profits generated by marketing strategy and good reputation. Change in productivity as measured by the value of the output incorporates profits gained through marketing (Foster et al. 2008). The price of Cambodian products may have increased because of their reputation in the US market as sweat-shop free. Measured productivity may have therefore risen even in the absence of quality or efficiency gain. Asuyama and Neou (2012) attempted to use trade data to decompose the changes in price into quality change and other factors, and showed that there were no positive price changes due to the other factors. Productivity growth can therefore be accounted for by gains in efficiency and/or quality upgrades.

[15] This sort of technological progress is called “directed technological change” (Hicks 1932, Acemoglu 2002, 2009: Chapter 15) or “induced innovation” (Hayami and Ruttan 1970).

80s, the skill premium in wage of tertiary education over lower education initially declined. This was followed by skill-biased technological progress which demanded more educated workers. This resulted in a rise in the skill premium (Katz and Murphy 1992, Hornstein, Krusell and Violante 2005). Since improvements in the level of education are more or less universal, skill-biased technological progress may appear to take place irrespective of geographical region and industry. The flip side of skill-biased technological progress is that unskilled labor-saving technical change may occur under the name of automation.

In fact, the upstream processes of the textile value chain were drastically reorganized to incorporate unskilled labor-saving technical changes during the Industrial Revolution. Automated spinning machines and looms became symbols of the revolution, replacing manually operated machines (Clark 2007: chapter 12, Mokyr 1990: chapter 5). Pre-Revolution technology was represented by Mahatma Gandhi's "charkha", a spinning wheel with which he sought to mobilize the general public for income generation.

However, the downstream process, that is, sewing, was transformed from a skill-centric process to one which dispenses with high skill and instead intensively employs machines and labor. Before the sewing machine had fully spread to factories during the postwar period, the downstream process was undertaken solely by skilled tailors (or by a consumer of textiles at home). A key improvement to the sewing machine, the lock stitch, was invented in 1846 (Mokyr 1990: pp. 141-142). Since then, machine-assembled garments have surpassed tailor-made apparel. Machine-assembled garments can be mass produced, which requires far less skill for operation. Examining firm-level data from Bangladesh in 2002, Fukunishi et al. (2006) showed that it takes on average less than one year for a helper to go from doing only chores on the shop floor to operating a sewing machine.

Evident skill bias does not appear to occur in the contemporary technological advances in sewing machines, either. When we examine the major inventions of JUKI Corporation, one of the world's leading manufacturers of sewing machines, Yamagata and Asuyama (2011) found no strong tendency for skill bias in inventions made by the company in the 1950s–90s. Time-, labor- and skill-saving inventions were almost evenly produced.

The bottom line is that skill-biased technical change, which is widely seen outside the garment industry, has not been the norm in the industry. Hence, the industry is likely to continue to be a labor-intensive sector providing ample employment opportunities for less educated people in developing countries, at least for the time being.

5. Conclusion

The garment industry distinguishes itself among formal industrial sectors with its exceptionally high labor intensiveness, particularly in relation to unskilled labor. This characteristic can provide a foothold for industrial development in low-income countries that may otherwise have little chance of penetrating the markets of developed countries. Based on the historical experience of many developing countries where growth in the garment industry was followed by the development of more capital- or knowledge-intensive industries, a possible role of the garment industry may be to realize dynamic comparative advantage through, for example, the facilitation of capital accumulation and the development of basic management skills for exporting. However, this development strategy has lost support under the rapid pace of globalization. It appears that spillover from garments to other industries is considered no more effective in a world which emphasizes technological innovation and economies of agglomeration. It also accelerates the fall of output prices, and may result in wage cuts, as predicted by the Stolper-Samuelson theorem and the race-to-the-bottom model.

Recent evidence, particularly after the trade liberalization in 2005, shows these concerns to be mostly unfounded. Rather, it shows a trend in which export growth coincides with increases in real wages for low-income garment exporters. This paper investigated the mechanisms that prevented effects predicted by the race-to-the-bottom model by analyzing determinants of competitiveness before and after the trade liberalization. Firm-level data in four low-income countries—Bangladesh, Cambodia, Kenya and Madagascar—demonstrated that low labor costs have been a crucial advantage where productivity is lower and transportation cost is higher than other exporting countries. Nevertheless, when faced with continuing decreases in output prices as an external factor and steady increases in real wage as an internal factor, the relative importance of labor costs in competitiveness have changed. While the lowest-wage country, Bangladesh, sustained its growth by relying solely on its low wages, a relatively high-wage country, Cambodia, made substantial productivity growth while Kenya experienced a reduction of exports. These results indicate that the dynamics of productivity are becoming a key factor in sustaining competitiveness in the garment industry, where low wages were crucial during the initial stages of development.

The most significant contrast between the predictions of the race-to-the-bottom model and the observed data shows up when we examine the consequences of technological changes in the industry. That is, unlike the technologically dormant firms in the race-to-the-bottom argument, garment-producing firms have upgraded their processes and product quality in response to a changing market. Growth in employment coincided with improved working conditions. It is therefore difficult to deny the positive and significant impact of labor-intensive industry on industrial development in low-income countries. Furthermore, productivity enhancement may lead to accumulation of knowledge and skills among entrepreneurs and spillover to other industrial sectors.

There are several policy recommendations that can be made using this data. To motivate firms to improve productivity, market competition should be maintained and minimum wages must be updated in line with the inflation rate. Further intervention to improve work conditions on the shop floor, such as the "Better Factories Cambodia" program, would improve workers' welfare, although the effect on competitiveness needs further investigation. Finally, labor-intensive industry should not be sidelined in the development strategy of low-income countries. When compared with a strategy that emphasizes the role of industries which are more likely to reap dynamic comparative advantages such as geographical agglomeration or learning-by-doing, a strategy which emphasizes the role of labor-intensive industries may provide greater employment opportunities.[16] Furthermore, as discussed throughout this paper, the latter strategy does not rule out the possibility of technological advances.

[16] The strategy stressing the role of labor-intensive industries dates back to Myrdal (1968: part 5). Thereafter Chenery et al. (1974), Amjad (1981) and World Bank (1990) noted the potential for the initiation of industrial development as well as its contribution to poverty reduction.

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Table 1. Top 15 Garment exporters to the US market

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

Source: UN Comtrade
Note: Low-income countries in 2000 are highlighted.

Table 2. Growth Rate of Export Value (%)

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	Average annual growth
World	-0.4	2.6	12.0	10.9	7.3	8.1	7.8	3.6	-10.6	7.9	4.7
Bangladesh	2.0	-3.1	19.0	23.1	2.8	28.7	4.6	13.9	0.8	10.0	9.7
Cambodia	19.7	13.0	17.9	21.1	11.2	23.1	10.8	1.2	-18.7	13.6	10.6
Vietnam	-2.3	117.2	91.4	13.1	6.5	25.6	30.8	19.3	-5.0	14.2	26.4
Pakistan	1.9	1.1	18.9	15.3	-1.4	13.1	7.5	3.9	-10.3	9.3	5.6
Kenya	46.2	92.5	49.2	47.1	-3.2	-3.4	-6.4	-0.6	-21.4	4.3	16.0
Madagascar	20.0	-46.5	56.0	52.1	-4.5	4.9	18.9	-4.9	-18.0	-38.5	-1.4
China	4.2	12.1	23.4	22.6	45.0	13.9	20.9	12.2	-3.3	10.9	15.6
India	0.4	7.0	12.5	12.2	29.2	12.2	5.6	5.7	-3.4	1.5	8.0

Source: UN Comtrade (US and EU report of import value)

Table 3. Overview of the Garment Industry in Bangladesh, Cambodia, Madagascar and Kenya (2010)

	Export value (million $)	Share of textile and apparel in total exports	Employment (thousand, 2008)	Main investing country	GNI per capita	Population (million)
Bangladesh	11,791	71.5% (2007)	3100	Local	700	148.7
Cambodia	3,069	54.4%	325	China, Taiwan, Korea	750	14.1
Madagascar	311 (2010) 617(2008)	28.0% (2010) 53.1% (2008)	107	Mauritius, France	430	20.7
Kenya	213	3.8%	26	India, China	770	39.8

Source: UN Comtrade (export value), World Development Indicators (share, GNI per capita, population), BGMEA, Ministry of Commerce Cambodia, Ministry of Trade and Industry Madagascar, EPZ authority Kenya (employment)

Table 4. Average Monthly Wage of Operator (Nominal, $)

	Bangladesh	Cambodia	Kenya	Madagascar	China (2006)	Mauritius	Turkey (2006)	Mexico	El Salvador
2008	63.0	88.9	105.2	73.8	125.1	256.10	459.9	294.1	188.1
	(22.9)	(19.5)	(8.8)	(27.8)					
	[203]	[33]	[5]	[75]					
2002	38.9	53.6	77.1			143.7		240.7	159.9
	(13.1)	(13.2)	(16.1)						
	[167]	[90]	[3]						

Note: Wages in Bangladesh, Cambodia, Kenya and Madagascar are averaged values for female machine operators with 1–5 years of experience in exporting firms according to the IDE survey. Figures in parentheses are the standard deviation while those in square brackets are the sample size. Wages in other countries are averaged from a sample in an ILO survey.
Source: IDE Garment Firm Surveys (Bangladesh, Cambodia, Kenya, Madagascar), ILO Labor Statistics Database (China, Mauritius, Turkey, Mexico, El Salvador).

Table 5. Cost and Profit in Value of Output (2002)

	Bangladesh	Cambodia	Kenya
Cost per gross product	0.617	0.791	0.986
labor	0.108	0.158	0.374
capital	0.018	0.035	0.070
material	0.463	0.558	0.392
energy	0.007	0.011	0.023
other	0.021	0.029	0.127
Sample size	159	87	4
Cost per value-added	0.312	0.650	0.895
labor	0.268	0.569	0.738
capital	0.044	0.080	0.157
Sample size	173	94	5

Note: Subcontractors are occasionally supplied material by their buyers and thus do not purchase material. As this deflates cost per gross product substantially, firms reporting zero material cost are excluded from the calculation of cost per gross product. This does not solve bias completely since many firms consider subcontracting to be part of their production.

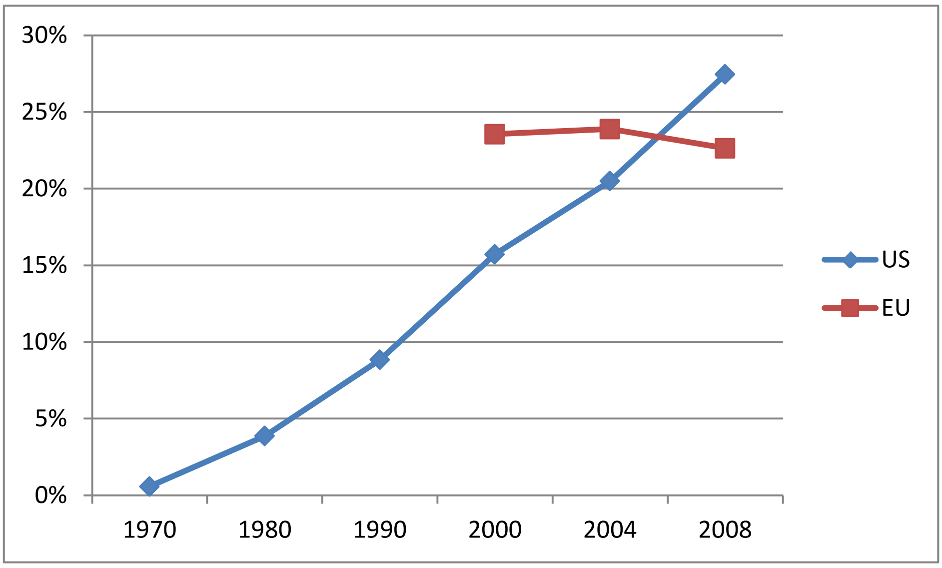
Source: IDE Garment Firm Surveys

Table 6. Change in Average Productivity

	Inputs: unskilled labor, skilled labor, physical capital			Inputs: unskilled labor, skilled labor, physical capital, human capital		
	2002	2008	*t* test 2002-08	2002	2008	*t* test 2002-08
Bangladesh	-0.048	-0.026		0.008	-0.006	
	(0.848)	(0.782)		(0.839)	(0.762)	
Cambodia	-0.105	0.608	***	-0.214	0.564	***
	(1.176)	(1.072)		(1.172)	(1.119)	
t test: Bangladesh–Cambodia		***			***	

Note: Productivity is measured as a residual of production function. See Appendix 2 for estimation methodology.
*** indicates that the means of productivity differ significantly at the 1% level. Standard deviations are in parentheses.
Source: Fukunishi (2013)

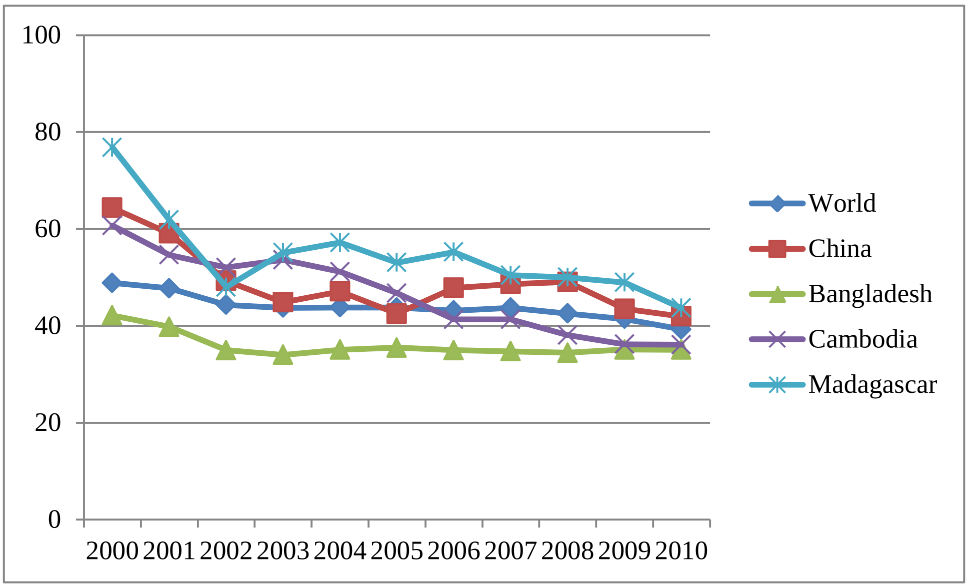
Figure 1. Share of Low-income Countries in US/EU Apparel Imports



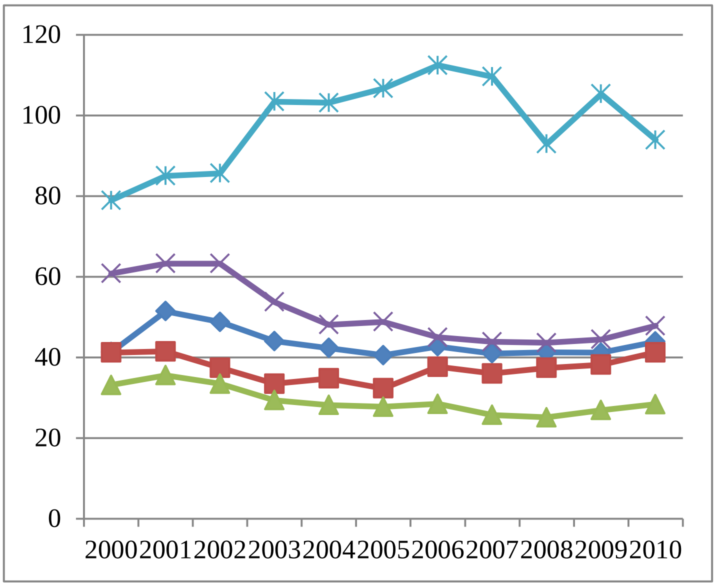
Note: Includes countries defined as low-income in 2000 by the World Bank, with the exception of China.
Source: Calculation by the authors using UN Comtrade (US and EU report of import value)

Figure 2. Unit Price ($ per dozen)

Panel A. US market

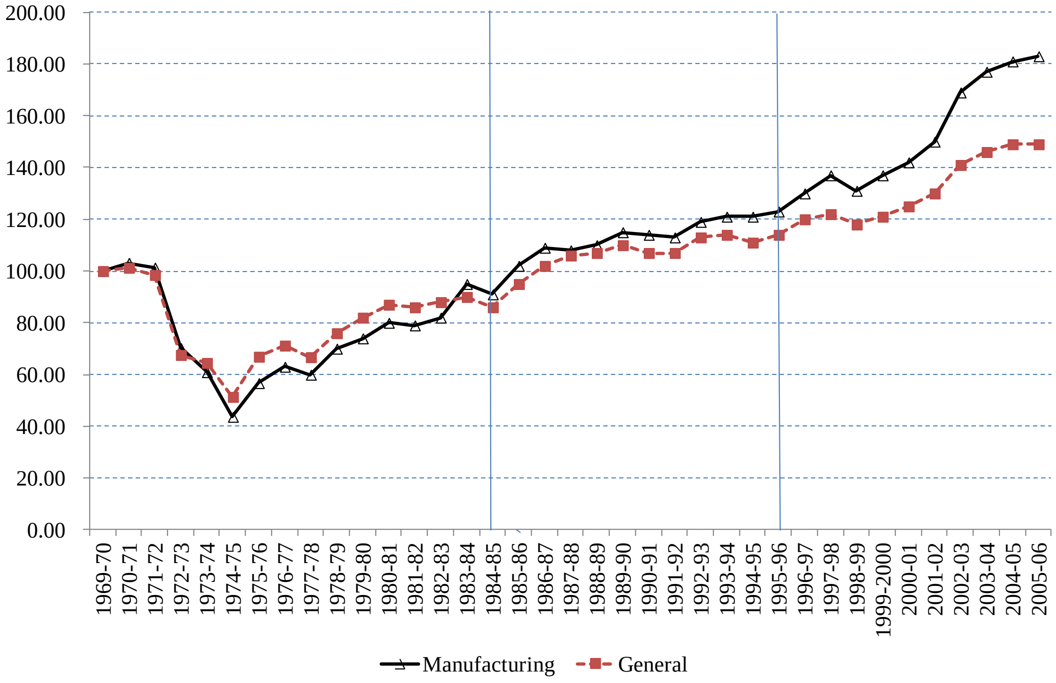


Panel B. EU market



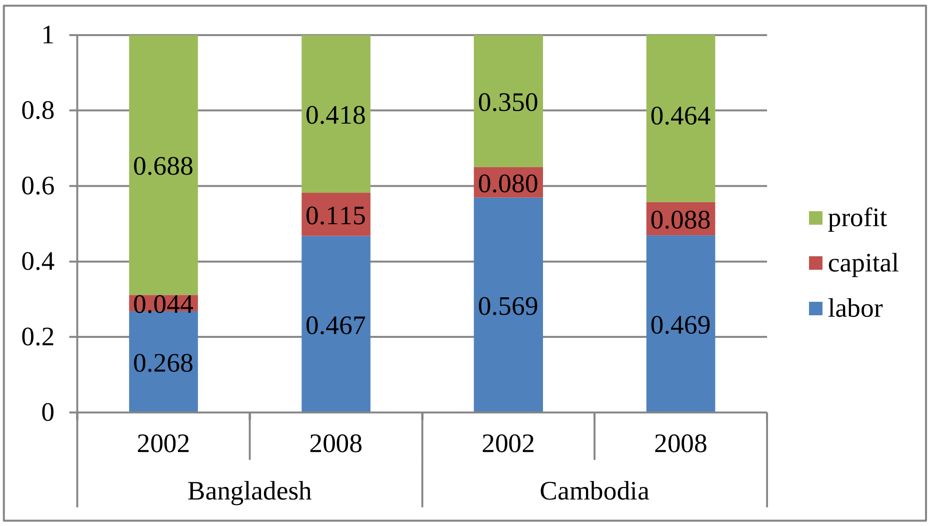
Source: Calculation by the authors using UN Comtrade (US and EU report of import value)

Figure 3. Real Wage Index in Bangladesh (1969–70=100)



Source: Figure 4 in Yunus and Yamagata (2013). Originally from Bangladesh Bureau of Statistics (BBS), *Statistical Yearbook of Bangladesh*, various issues, Dhaka: BBS.

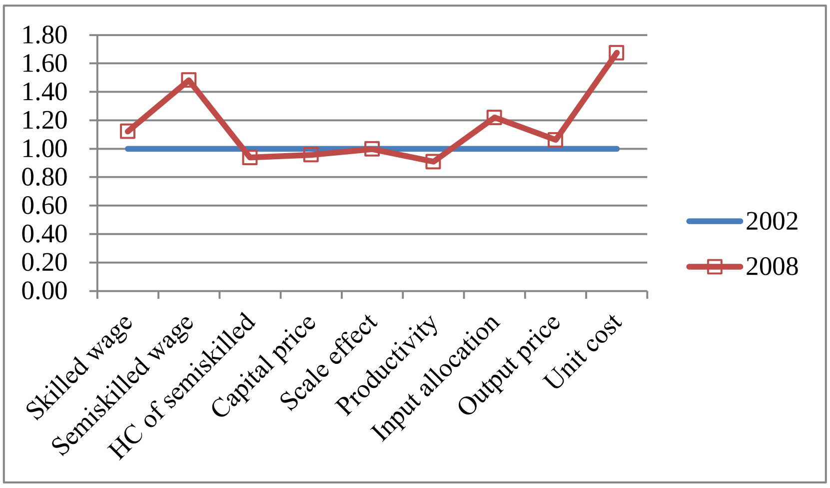
Figure 4. Cost and Profit in Value Added



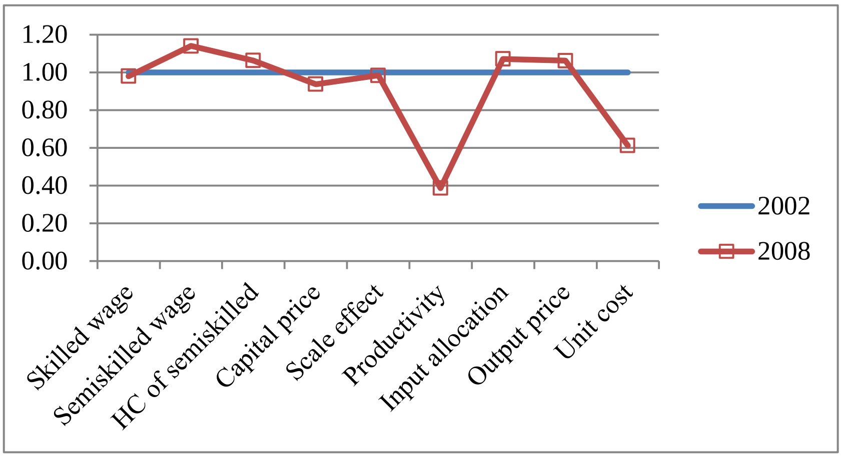
Note: Figures in 2002 are same as those in Table 4-1. Profit includes taxes and any unreported costs.
Source: IDE Garment Firm Survey

Figure 5. Decomposition of Unit Costs

Panel A: Bangladesh



Panel B. Cambodia



Note: The product of each term (from skilled wage to output price) is equal to unit cost. See Appendix 2 for details of the methodology used.
Source: Fukunishi (2013)

Appendix 1. Garment Firm Surveys

Garment Firm Surveys were conducted in 2003 and 2009 by teams from the Institute of Developing Economies and its counterpart institutions, namely the University of Dhaka, the Bangladesh Institute of Development Studies, LIDEE Khmer, the Economic Institute of Cambodia, the Institute of Development Studies at the University of Nairobi, the Institute of Policy Analysis and Research, and the Observatoire pour le Développement National des Ressources Humaines du Niveau de l'Enseignement Supérieur at the University of Antananarivo. Survey data for Madagascar were collected only in 2009. When the survey teams collected information for FY2002 and FY2008, respectively, we indicate this in the text, tables and figures.

In Bangladesh, the sample was drawn from a list of industrial association members (Bangladesh Garment Manufacturers and Exporters Association: BGMEA) using stratified sampling based on firm size for the 2003 survey (Fukunishi et al. 2006). In the 2009 survey, the sample firms chosen in the first round were traced and new samples were added. In Cambodia and Kenya, an exhaustive survey was carried out in 2003 based on a member list provided by the Garment Manufacturers Association in Cambodia (GMAC) (Yamagata 2006). Several incomplete firm lists were used for Kenya due to the lack of a complete list of garment-producing firms (Fukunishi et al. 2006). Madagascar's survey was based on random sampling from an Export Processing Zone (EPZ) firm list and a non-EPZ firm list. Surveys in Kenya and Madagascar include non-exporting firms as well as exporting firms. However, only exporting firms are analyzed in this paper.

The sample size of each data set is shown in Table A-1. With the exception of Bangladesh, where the number of firms is quite high, the coverage of the survey is relatively high. In Cambodia, our sample covers 85.4% of GMAC member firms in 2003 and 49.0% in 2008, and in Kenya our survey covers 48.6% of all EPZ firms in 2003 and 47.4% in 2009. In Madagascar our sample represents 64.9% of all firms registered as EPZ. However, data quality was challenged in the 2009 Cambodian survey and in the two Kenyan surveys as many firms did not disclose input and output data or responses were inconsistent. This substantially reduced the amount of usable data (figures in parentheses in Table A-1), and the decision was made not use the Kenyan 2009 survey data for this paper. It should be noted that in spite of these problems, the averages of input and output in our sample are comparable with averages drawn from industry-level data. Refer to Fukunishi (2013) for details of the surveys in Bangladesh, Cambodia and Madagascar and to Asuyama et al. (2013) for the Cambodian survey. Details of the Kenyan survey will be provided upon request.

Table A-1 Sample Size

		2002	2008
Bangladesh	exporting	222 (172)	230 (218)
Cambodia	exporting	163 (117)	123 (61)
Kenya	exporting	17 (5)	9 (1)
	non-exporting	59 (42)	74 (34)
Madagascar	exporting	-	98 (91)
	non-exporting	-	19 (18)

Note: Figures in parentheses represent the responses where consistent input and output data were available. Because of missing information, the sample used in productivity analysis is smaller for some countries.

Appendix 2. Decomposition of Unit Cost

We begin by defining unit costs as cost per value-added. We assume that three inputs combine to yield value-added, namely capital (*K*), skilled labor (L^s) and unskilled labor. Unskilled labor is composed of human capital (h^u) and effective units of unskilled labor (L^u) to reflect substantial differences in human capital across countries and time. Therefore, the production function is

$$Y = f(K, L^s, h^u L^u, A, TFP),$$

where *A* stands for productivity due to technology that is common across firms and *TFP* indicates individual productivity dispersion from *A*.

The cost function can then be written as

$$C = g(r, w^s, w^u, Y, TFP),$$

where w^u is the wage per effective unit of unskilled labor. When dividing cost by value-added, the unit cost function is expressed as

$$D \equiv C/Y = l(r, w^s, w^u, Y, TFP).$$

With functional form and parameters, unit cost can be decomposed into determinants following the above function. We estimate the parameters of a cost function through the transforming the parameters of a production function rather than directly estimating a cost function. This is primarily because we do not have reliable information on rental price at the firm level. While rental price can be estimated using capital service costs that include interest, dividend and rent, they are occasionally underreported. The clearest examples are the payments to firm owners who have invested personal assets in their own firm. These payments are occasionally not reported in the account books. Firm-level interest rate can also be difficult to determine. To avoid serious bias in parameter estimates caused by measurement error in the rental price, we estimate a production function and derive the cost function parameters using a duality of two functions. One of the shortcomings of this method is the need to impose a Cobb-Douglas form for both functions, otherwise the cost function parameters cannot be specified. We believe that the bias induced through measurement error of the rental price is more harmful than that caused by the use of a Cobb-Douglas assumption. The estimated model is

$$Y_i = \alpha\, K_i^{\beta 1} L_i^{s\,\beta 2} \left(h_i^u L_i^u\right)^{\beta 3} \lambda_i$$
$$h_i^u = e^{\pi_1 Tenure + \pi_2 Education} \qquad , \qquad (3)$$

where *Y* is value-added, *K* is physical capita, L^s is skilled labor, L^u is unskilled labor, h^u is quality of unskilled labor, λ is total factor productivity, *Tenure* and *Education* indicates the average tenure and years of education for unskilled workers and *i* denotes a firm. We control for annual operational hours. The estimation is based on log form of (3) and TFP measure is defined as $TFP_i \equiv \log(\lambda_i)$.

With first order conditions of cost minimization, conditional input demand functions with respect to capital, skilled labor and unskilled labor are derived. Multiplying input demand function by prices respectively, the cost function can be derived as

$$\hat{C}_i = r_i K_i + w_i^s L_i^s + w_i^u (h_i^u L_i^u) = A\, r_i^{\frac{\beta 1}{\beta}} w_i^{s\frac{\beta 2}{\beta}} \left(\frac{\overline{w}_i^u}{h_i^u}\right)^{\frac{\beta 3}{\beta}} \hat{Y}_i^{\frac{1}{\beta}} TFP_i^{\frac{-1}{\beta}} \overline{AE_i},$$

where $\beta = \beta_1 + \beta_2 + \beta_3$, $\overline{w}_i^u$ is wage per physical unit of unskilled labor without controlling for human capital. It should be noted that we incorporate an optimization error in input choice (allocative efficiency). This is the gap between the actual combination of inputs used and the one that fully minimizes costs, denoted as $\overline{AE}$.[17] Dividing this cost function by value-added, we get unit cost function,

$$D_i = A\, r_i^{\frac{\beta 1}{\beta}} w_i^{s\frac{\beta 2}{\beta}} \left(\frac{\overline{w}_i^u}{h_i^u}\right)^{\frac{\beta 3}{\beta}} \hat{Y}_i^{\frac{1-\beta}{\beta}} TFP_i^{\frac{-1}{\beta}} \overline{AE_i} \quad . \qquad (4)$$

Based on this function, unit cost is decomposed into factor prices (r, w^s and $\overline{w^u}$), human capital (h^u), economies of scale (*Y*), productivity (*TFP*) and allocative efficiency ($\overline{AE}$).

The most straightforward comparison of unit cost and determinants across time can be done by taking the ratio as

$$\frac{D_{i,t+1}}{D_{i,t}} = \left(\frac{r_{i,t+1}}{r_{i,t}}\right)^{\frac{\beta 1}{\beta}} \left(\frac{w_{i,t+1}^s}{w_{i,t}^s}\right)^{\frac{\beta 2}{\beta}} \left(\frac{\overline{w}_{i,t+1}^u}{\overline{w}_{i,t}^u}\right)^{\frac{\beta 3}{\beta}} \left(\frac{h_{i,t+1}^u}{h_{j,t}^u}\right)^{-\frac{\beta 3}{\beta}} \left(\frac{\overline{\overline{Y}}_{i,t+1}}{\overline{\overline{Y}}_{i,t}}\right)^{\frac{1-\beta}{\beta}} \left(\frac{TFP_{i,t+1}}{TFP_{i,t}}\right)^{\frac{-1}{\beta}} \frac{\overline{AE}_{i,t+1}}{\overline{AE}_{i,t}} \frac{p_{t+1}}{p_t}, \qquad (5)$$

where $\overline{\overline{Y}}$ is value-added in real terms, *p* is the price of output and *t* denotes time. Since comparisons across time incorporate changes in factor prices and output price, the effect of output price changes is separated from the effects of returns to scale.

We first estimated production function (3) using OLS and obtained parameters (β, π) and TFP. Parameter estimates are reported in Table A-2 and TFP is shown in Table 6. We obtained the estimate of allocative efficiency from the three first order conditions with respect to capital, skilled labor and unskilled labor. As mentioned above, we do not have reliable firm-level figures for rental price. We therefore used the arbitrage condition in rate of return on investment to estimate a national-level rental price at time *t* (thus, the estimated rental price is the same within a country for each time period). Refer to Fukunishi (2009) for details. Using this information and nominal wages, human capital variables, real value-added and output price

[17] Refer to Fukunishi (2009) for details of derivation of cost function and for the exact form of $\overline{AE}$.

indicators, we can calculate each term in the right hand side of the equation (4) for individual firms. The averages of 2002 and 2008 are then taken and expressed in a ratio in the form of equation (5) (Table A-3).

Table A-2 Production Function Estimation

	1	2
ln*K*	0.155***	0.107**
	(0.053)	(0.054)
ln*Ls*	0.245***	0.273***
	(0.067)	(0.067)
ln*Lu*	0.656***	0.634***
	(0.076)	(0.076)
Education		0.221***
		(0.071)
Tenure		−0.0004
		(0.040)
Cons	6.876***	7.111***
	(0.550)	(0.554)
R2	0.394	0.399
N	515	498

Note: Robust standard errors are reported in parenthesis. *** and ** indicate that the coefficient is statistically significant at the 1% and 5% levels, respectively.

Table A-3 Decomposition of Unit Cost

	Wage: Skilled	Wage: Unskilled	HC: Unskilled	Capital price	Scale	TFP	Allocative efficiency	Output price	Unit cost
	a	b	c	d	E	f	G	h	i
Bangladesh									
Average of 2002	6.801	39.380	0.923	0.856	0.820	1.484	0.849	0.942	0.345
Average of 2008	7.627	58.388	0.866	0.819	0.818	1.349	1.035	1.000	0.577
Ratio 2008/2002	1.12	1.48	0.94	0.96	1.00	0.91	1.22	1.06	1.67
Cambodia									
Average of 2002	7.347	67.349	0.747	0.819	0.817	2.369	1.074	0.942	0.872
Average of 2008	7.199	76.737	0.794	0.767	0.803	0.916	1.151	1.000	0.534
Ratio 2008/2002	0.98	1.14	1.06	0.94	0.98	0.39	1.07	1.06	0.61

Note: As shown in equations (4) and (5), the equality of $a \times b \times c \times d \times e \times f \times g \times h = i$ holds for individual firms. However, it does not hold for the above figures because of rounding errors.