

## Chapter 3

### How Has the Cambodian Garment Industry Evolved?\*

Yoko Asuyama<sup>†</sup> and Seiha Neou<sup>‡</sup>

#### Abstract

This chapter explores how the Cambodian garment industry has grown, even under the harsher business environment, by examining various contributing factors related to the international trade and investment environment, government policy and firm behaviors. Although the international trade and investment environment has been favorable to Cambodia, it was the Cambodian government and firms which seized every chance and took full advantage of it. The FDI-friendly policy and frequent dialog among various stakeholders contributed to the smooth and sustainable industry growth. Productivity improvement was also a key to the success of the industry. Finally, recent evidence seems to indicate that the Cambodian garment industry is continuously evolving towards a new stage of development.

**Keywords:** *Cambodia, garment industry, Multifibre Arrangement (MFA), productivity*

---

\* We would like to thank the managers of Cambodian garment firms who kindly participated in our surveys, Garment Manufacturers Association in Cambodia (in particular, Ly Tek Heng and Kaing Monika), Better Factories Cambodia (Yim Pichmalika and Bun Ying), His Excellency Hing Thoraxy, staff of the Economic Institute of Cambodia (in particular, Sok Heng Sam, Thong Meas, Theary Saphon and Tikun Keo Heng for managing the IDE Survey 2011, and Dane Hor for research assistance), Kazunori Sakae, Takahiro Fukunishi and the members of the FY2011 IDE research project “Dynamics of the Garment Industry in Low-income Countries following the MFA Phase-out”. All errors are our own.

<sup>†</sup> Research fellow, Institute of Developing Economies, Japan External Trade Organization (IDE-JETRO).

<sup>‡</sup> Chief Finance Officer at the Westline Education Group, Research Advisor to the Educational Development Institute, and former Research Manager and Economist at the Economic Institute of Cambodia (EIC).

## **1 Introduction**

The garment industry has played an important role in the Cambodian economy, coming to prominence in the late 1990s. The industry represented about 15% of total GDP and 50% of the manufacturing employment in 2010. It employs about 327,000 workers (Figure 1), and a multiple of that number is employed in its supporting sectors. About 90% of the workers are women from rural villages; their remittances back home sustain an estimated 20% of the country's 14 million people (USAID 2005, p.1).

In its history, Cambodia did not record any experience in the modern garment industry before the 1990s. The industry was launched around 1994 by foreign investments from Hong Kong, Taiwan, Malaysia and Singapore (Bargawi 2005, p.5), and since then, the number of garment factories has increased to number around 300 (Figure 1). Even now, most factories belong to foreign investors who are mainly from Taiwan, China, Hong Kong, Korea, Malaysia and Singapore. The garment factories represent about 30% of the country's foreign direct investment (FDI); less than 5% of garment factories are owned by Cambodians. The employment size of each factory is relatively large; a factory employs more than 1,000 workers on average. Factories are concentrated in and around the inland capital city, Phnom Penh, from which containers are trucked 230 kilometers to be sea-freighted from the deep-sea port in Sihanoukville.

Cambodia's garment industry is an export-oriented industry. All garment production is destined for export. Its exports have grown dramatically, amounting to about US\$3.0 billion in 2010 (Figure 1). Garments now account for nearly 70% to 80% of the country's merchandise exports. The main export markets for Cambodian garments are the United States (US) and the European Union (EU). The US buys roughly two-thirds of Cambodia's exports, and the EU buys the majority of the remainder. Most Cambodian garment factories only engage in "cut, make and trim" (CMT) activities and are dependent on imported fabrics and accessories from China, Taiwan, Hong Kong and ASEAN countries.

As shown in Figure 1, the Cambodian garment industry continuously grew (except during 2008 and 2009 when Cambodia was hit by the global financial crisis) in terms of exports, number of factories and employment. The global presence of Cambodia as a garment exporter also expanded. According to trade statistics of the World Trade Organization (WTO), Cambodia moved up significantly in the world garment export rankings, from 39th to 24th, between 2000 and 2010. With regard to the garment imports of the US and the EU27 (external trade), Cambodia ranked 8th and

12th, respectively, in 2010 (based on the World Trade Atlas database). Why and how was this possible for Cambodia, which just started to rebuild the country in the early 1990s after the prolonged civil war that had persisted since 1970s? Why and how was Cambodia able to expand its garment exports despite intensified competition since 2005 after the expiration of the Multifibre Arrangement (MFA) regime? Under the MFA regime (1974-2004), quota restrictions were imposed on garment exports from many developing countries. Thus, before 2004, it was anticipated that after the termination of MFA, small garment exporting countries such as Cambodia and Bangladesh would find their garment exports reduced due to the intensified competition with large garment exporters such as China and India (Nordås 2004). However, the Cambodian garment industry continuously expanded after 2005.

This chapter aims to answer the above question as to why and how the Cambodian garment industry has evolved, both in the initial stage and in the post-MFA stage, by examining the effects of the international trade/investment environment, government policy (Section 2) and firm behaviors (Section 3). This chapter contributes to the literature in two ways. Firstly, we further examine the reasons for the productivity increase which were found in Asuyama et al. (2012) by analyzing a unique dataset collected by the authors and detailed trade and industry data. As claimed in Asuyama et al. (2012), “almost no research has been conducted on changes in the performance of the garment industry at the firm level before and after termination of the MFA”. Secondly, we provide a full picture of the evolution of the Cambodian garment industry from the mid-1990s to 2011 by comprehensively analyzing various factors which contributed to the industry growth. To the authors’ knowledge, the scope of other studies on the Cambodian garment industry is much narrower, focusing only on trade environment and government policy, labor issues or much a shorter temporal period.<sup>1</sup>

## **2 International Trade/Investment Environment and Government Policy**

### **2.1 International Trade and Investment Environment**

The timeline of the international trade environment related to the Cambodian garment industry is summarized in Table 1. In the initial stage in the mid-1990s, foreign

---

<sup>1</sup> For example, see Bargawi (2005), Chan and Sok (2007), Beresford (2009), Polaski (2006, 2009), World Bank (2009), and Arnold and Shih (2010).

investors set up garment factories in Cambodia primarily because Cambodia had quota-free access to the US market, while Asian garment exporters, in particular China, were already highly quota-constrained at that time (Bargawi 2005, p.5). Gaining most favored nation (MFN) status from the US in 1996 and Generalized System of Preferences (GSP) status from the EU in 1997 also facilitated access to the US and EU markets (Neak and Robertson 2009, p.99).

In 1999, being concerned with the rapid growth in garment imports from Cambodia, the US started to impose quotas on 12 (later 13) garment categories imported from Cambodia under the US-Cambodia Textile and Apparel Trade Agreement (TATA). TATA was a unique trade agreement in the sense that it linked quota expansion to improvement in working conditions at Cambodian garment factories. It stipulated an automatic 6% annual quota growth rate. In addition, it offered an increase in the potential quota growth rate up to 14% until 2001 (and 18% until 2004 under the extended TATA since 2002), if the Cambodian garment industry achieved substantial compliance with Cambodian labor law and international labor standards (Bargawi 2005, p.15; Kolben 2004, p.90). In order to enhance the transparency and credibility of the monitoring process, the International Labour Organization (ILO) started to monitor Cambodian garment factories in 2001. Participation in the monitoring was made mandatory. In order to acquire an export license, all garment firms were required to accept unannounced inspections by the ILO. The monitoring was also extremely comprehensive and exhaustive; over 500 items covering various issues such as child labor, labor contracts, wages, working hours, leaves, welfare, labor relations, and occupational safety and health were monitored (ILO, Better Factories Cambodia website).

Although quotas were imposed on Cambodia, Cambodian garment exports to the US continuously increased, thanks to the generosity of the quotas. The quota growth rate of Cambodia was much higher and the number of quota-imposed categories were far fewer compared with other Asian exporters such as China, Bangladesh, and Sri Lanka (Bargawi 2005, p.15). Several studies also emphasize the benefits of TATA and ILO's monitoring project (currently called "Better Factories Cambodia" (BFC)) for the Cambodian garment industry in terms of improving workers' welfare and establishing a reputation as a socially responsible manufacturing platform, which attracts buyers. For instance, Wells (2006) cited the cases of Nike and Disney which once stopped sourcing from Cambodia due to labor rights abuse problems but re-started after the ILO's project was introduced. A survey conducted in 2004 of 15 international buyers accounting for

45% of Cambodian garment exports also revealed that the importance of the level of labor standards and practices is higher than that of other country-specific factors, such as tariff preferences and access to material supply, for those buyers (FIAS 2004). Working conditions in Cambodian garment factories substantially improved. As described by Asuyama et al. (2012), according to ILO-BFC monitoring reports, as of October 2006, “80% to 90% of factories monitored were already in compliance with labor law and standards in every category of working conditions (contracts, wages, hours, leave, welfare, labor relations, and occupational safety and health)”, and compliance level has continuously improved in general since then. According to Polaski (2009), the project was successful because TATA provided positive incentives for labor compliance, the monitoring by ILO enhanced transparency, the project involved all stakeholders in the discussion and thus set ambitious but realistic goals, and the free-rider problem was avoided by requiring mandatory participation of exporting firms.<sup>2</sup>

Regarding the EU market, the bilateral textile trade agreement between the EU and Cambodia in 1999 granted duty- and quota-free access to the EU for Cambodian garments. However, because many Cambodian garment factories are dependent on imported fabrics, from China for instance, most items do not satisfy the EU’s rule of origin, and thus many firms did not enjoy duty-free access to EU. The Cambodian government also gradually expanded Cambodia’s access to the world market. Cambodia joined ASEAN in 1999 and gained MFN and GSP statuses from many other countries by 1999. Last but not least, Cambodia became a full member of WTO in 2004, to maintain the competitiveness of its garment exports in the post-MFA era.

The MFA regime concluded at the end of 2004, and global garment trade was liberalized. However, as can be seen from Figure 1, the Cambodian garment industry

---

<sup>2</sup> Since TATA expired at the end of 2004, there have been no more incentives to improve working conditions in terms of gaining additional quotas. However, the Cambodian government decided to continue with ILO’s monitoring project, and working conditions actually improved after 2005. Benefits of the project since 2005 include attraction of buyers who care about labor compliance, reduction of the duplication of monitoring, and enhancement of productivity at factories. According to Better Work (2010), “the number of buyers that have stopped their own social audits grew from 6 to 31” since 2006. ILO-BFC also started to reduce factory costs for monitoring by collecting subscription fees from buyers who view the monitoring results of each factory (as of 2011, the subscription fee is US\$750 per factory per year, according to the ILO-BFC website). Improvement of working conditions also contributes to a productivity increase to some extent by reducing accidents and improving workers’ health, etc., as is recognized by buyers and some factories (FIAS 2004 and authors’ interviews with firms in 2011).

continuously grew without a reduction in its exports, number of factories or workers. One reason for the growth since 2005 is that US and EU re-imposed quotas on garment imports from China by concluding bilateral trade agreements with China in mid-2005. As will be shown in Section 3, Cambodia experienced an increase in its export share of garment items for which quotas were re-imposed on China, and thus Cambodia managed to avoid direct competition with China to some extent.<sup>3</sup> Since the share of Chinese investors is relatively high in the Cambodian garment industry, the quotas on China have a greater impact on Cambodia than on other countries because they influence the decisions on order allocation between China and Cambodia.

At the beginning of 2008 for the EU and 2009 for the US, the bilateral trade agreements with China expired, and quotas were no longer imposed on China. However, at that time, Cambodia and many other garment exporting countries were hit hard by the global financial crisis. Fortunately for Cambodia, when Cambodia started to recover from the crisis, garment factories in China and Vietnam began suffering from a wage increase and labor shortage. Consequently, some orders from China and Vietnam shifted to Cambodia and boosted Cambodian garment exports.

Finally, thanks to relaxation of the rule of origin regarding exports to Japan (due to the ASEAN-Japan Comprehensive Economic Partnership (AJCEP) which came into effect in December 2009) and the EU (due to the EU's relaxation of the rule of origin for least developed countries since January 2011), exports to those countries have rapidly expanded recently.<sup>4</sup>

## **2.2 Government Policy**

Fortunately, the international trade and investment environments have been favorable for the Cambodian garment industry. However, it was the Cambodian government and garment firms which seized every chance and took full advantage of it. Lobbying activities for preferential trade treatment by the government and the industrial organization, Garment Manufacturers Association in Cambodia (GMAC), might also have contributed to the realization of the preferential trade scheme.

Cambodia's FDI-friendly policy also made it possible to build up an export-oriented garment industry from scratch in a relatively short period. Except for

---

<sup>3</sup> However, it seems that even for items on which quotas are re-imposed on Chinese exports, competition has become harsh since 2005 because the levels of the re-imposed quotas were much larger than those previously imposed under MFA (Brambilla et al. 2010, p.20).

<sup>4</sup> Now, the Cambodian garment industry can enjoy duty-free exports to the EU and Japan even when using imported materials (those from ASEAN for exports to Japan).

land ownership, Cambodia treats domestic and foreign investors equally, and 100% foreign-owned firms are also allowed. Under the 1994 Law on Investment (LoI) and its sub-degree in 1997, the Cambodian government provided very generous incentives for investors in the garment industry, including 1) 9% concessionary corporate income tax, 2) corporate income tax exemption (tax holiday) up to 8 years, 3) tax exemption for reinvestment in Cambodia and repatriation of profits or proceeds of investments, 4) import duty exemption on material and equipment, and 5) export tax exemption (Table 2).<sup>5</sup> In order to increase tax revenue, under the revised Law on Investment (LoI) in 2003 and its sub-degree in 2005, the first and third incentives were abolished. The formula for determining the duration of a tax holiday was also revised. However, according to IMF (2006, p.10), the revised incentives still seemed to be “broadly as generous as those provided in neighboring countries”. Furthermore, the government tried to improve the efficiency of its one-stop service investment promotion agency, the Council for the Development of Cambodia (CDC). In addition, for the garment industry, the government sometimes provided special treatment. For example, the government granted an additional two-year tax holiday for 180 out of 270 garment firms in 2006 (Ear 2011, p.79).

Through frequent dialog among the various stakeholders including the Cambodian government, GMAC, labor unions, buyers, and ILO, their various interests have been coordinated, thus contributing to the smooth and sustainable industry growth. Hand-in-hand governance by the government and GMAC is emphasized by the World Bank (2009, pp.22-25). This report by the World Bank claims that many other sectors in Cambodia lack such good governance. In particular, the industrial organization, GMAC, has actively promoted industry growth. It substantially influenced the industrial policy through lobbying for the Cambodian and other countries’ governments. Other activities of GMAC include introducing factories to buyers, participating in overseas exhibitions, offering various training programs, and holding seminars to inform participants of new regulations. Several channels through which the voices of labor unions are collected have been also established, as exemplified by the tripartite minimum wage setting procedure, ILO-BFC program, and the memorandum of understanding between labor unions and GMAC. The Buyers’ Forum organized by ILO-BFC also provides a discussion platform where all stakeholders including buyers participate.

---

<sup>5</sup> Incentives are not garment-sector specific. Similar incentives were offered for many other industries both under the 1994 LoI and 2003 LoI.

## 3 Firm Behaviors

### 3.1 Firm Growth under Intensified Competition

Table 3 reports the estimated average firm performance in the Cambodian garment industry between 2000 and 2010. These figures are computed by using trade and industry statistics. Although they are merely rough estimates entailing some shortfalls (e.g., neglect of the different timing of material imports, production, and export as well as absence of cost information other than material and payroll), they are useful for examining the overall performance trend of garment firms in Cambodia.

Over the 2000s, Cambodian garment firms have been increasingly faced with intensified competition. The unit export price continuously declined after 2004, that is, after the end of MFA. It dropped by 32.7%, from US\$46.3 per dozen in 2004 to US\$31.1 per dozen in 2010. While firms had to sell their products at much lower prices, production costs increased. Firstly, labor cost per worker increased over the 2000s. When deflating the nominal labor cost by the garment (and footwear) price index of the US, which is the largest garment export market for Cambodia, real labor cost per worker increased by 56.1% ( $= [150.7/96.5 - 1] * 100\%$ ) from 2000 to 2010. This continuous labor cost increase primarily resulted from the several increases in minimum wages and other statutory allowances and from the ILO-BFC monitoring program which ensures the enforcement of labor laws, including payment regulations, at the firm level.<sup>6</sup> In contrast to the decline in product prices, living costs of workers, which are measured by the consumer price index (CPI) of Cambodia, substantially increased during the 2000s. Thus, for the garment workers, the real wage increase was not so significant, as shown in Table 4, which is based on the garment firm survey project conducted by IDE in 2003 and 2009 (hereafter “IDE Surveys 2003 and 2009”).<sup>7</sup> Some high-skilled positions such as managers/executives, engineers and quality controllers even experienced a real wage decline between 2002 and 2008.<sup>8</sup> On the other hand, low-skilled workers such as

---

<sup>6</sup> The monthly minimum wage in the garment and footwear industry increased from US\$40 in 1997 to US\$45 in 2000, US\$50 in 2006, and US\$61 in 2010 (Kang and Dannet 2009). A US\$6 statutory allowance, called the cost of living allowance (COLA) was also introduced in 2008. COLA has been included in the definition of the minimum wage since 2010.

<sup>7</sup> See Appendix 1 for an overview of the IDE Surveys 2003 and 2009.

<sup>8</sup> Our field survey in 2011 (See IDE Survey 2011 in Appendix 2) shows that about two-thirds of 30 interviewed Cambodian garment firms have replaced foreign workers such as supervisors with Cambodian personnel. This replacement effort may have contributed to the restraint of high-skilled wages.



operators and helpers and female workers enjoyed a real wage increase.<sup>9</sup> Secondly, material prices also increased. The Cambodian garment firms are almost fully dependent on imported fabrics and accessories. However, the unit price of imported fabrics increased over the 2000s. For instance, fabric that was US\$2.5 per yard in 2002 rose to US\$5.4 per yard in 2010 (Table 3).

Despite the more competitive environment in conjunction with the declining product prices and rising production costs, Cambodian garment firms grew on average. Table 3 clearly shows that output (gross product), value added, profit, employment and labor productivity of Cambodian garment firms continuously increased on average over the 2000s. Such firm growth is also observable from our firm survey data (IDE Surveys 2003 and 2009). Table 5 confirms that not only output, value added, profit (before-tax), employment and labor productivity but also capital value and capital value per worker increased on average between 2002 and 2008. In addition, the total factor productivity (TFP) of firms, which is estimated in Asuyama et al. (2012) also increased.<sup>10</sup> TFP serves as a more appropriate measure for productivity which simultaneously controls for the quantity of multiple inputs such as capital and labor, compared with other productivity measures such as labor productivity. The unweighted average TFP index grew from -0.262 in 2002 to 0.479 in 2008, and the difference between the two periods is statistically significant at the 1% level.

### **3.2 Reasons for Productivity Growth**

As Asuyama et al. (2012) have claimed, Cambodian garment firms were able to grow, despite the falling product prices and rising production costs, by raising their productivity. How were Cambodian garment firms able to raise their productivity on average? Following the classification by Syverson (2011), industry productivity growth can be examined from two perspectives: “reallocation-based selection across existing businesses or entry and exit” and “productivity growth at a given plant or firm” (Syverson 2011, p358).

#### **3.2.1 Reallocation Effect through Frequent Firm Turnover**

The Cambodian garment industry is characterized by very frequent firm turnover. When

---

<sup>9</sup> Asuyama et al. (2012) have shown the relative wage increase of low-skilled workers compared with high-skilled workers through a more rigorous examination of the wage data.

<sup>10</sup> For the estimation method of the TFP index, see the brief explanation in Section 3.2.2 and Asuyama et al. (2012) for more details. We thank Takahiro Fukunishi, since the TFP analysis including the construction of variables was primarily done by him in Asuyama et al. (2012).

comparing the GMAC member lists of 2003 and 2009, 47.2% of the 195 firms operating in 2003 exited before 2009, while 62.5% of the 273 firms operating in 2009 were newcomers that entered the industry after 2003.<sup>11</sup> Asuyama et al. (2012) have shown that such a frequent firm turnover contributed to the average TFP increase in the Cambodian garment industry. As reported in Table 5, the TFP index is highest (0.516) for the group of “continuing firms” in the 2008 sample, which were already operating in 2002 and still maintained their business as of 2009. The TFP index of the “continuing firms” increased from -0.168 in 2002 to 0.516 in 2008, indicating that the group of “continuing firms” increased their productivity between 2002 and 2008. The TFP index of “entering firms” which entered the industry after 2002 is 0.465, much higher than -0.354, which is the TFP of “exited firms” that exited between 2003 and 2009. In sum, the TFP growth of continuing firms, as well as the entry of high-productivity firms and exit of low-productivity firms, contributed to improvement of the industry’s average productivity between 2002 and 2008.

### 3.2.2 Productivity Increase at Each Firm Level

In Table 5, the TFP is estimated by the index number approach (Caves et al. 1992). As explained in Asuyama et al. (2012), the TFP index of each firm is estimated as follows:

$$\ln TFP_i = (\ln Y_i - \overline{\ln Y}) - \sum_n \left( \frac{s_i^n + \overline{s^n}}{2} \right) (\ln x_{n,i} - \overline{\ln x_n}) - (\ln u_i - \overline{\ln u}), \quad (1)$$

where  $Y$  is value added,  $x_n$  denotes input  $n$  (where  $n$  is capital, high-skilled labor, and low-skilled labor),  $s^n$  is  $n$ 's factor share,  $u$  is operation hours, and subscript  $i$  indicates 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 of the hypothetical average firm over the pooled sample is set equal to zero.<sup>12</sup>

It is clear from equation (1) that our TFP index is the value-added residual which cannot be explained by the measurable usage of capital and labor. Thus, any

---

<sup>11</sup> Associate member firms are excluded. We consider the firm exited when the name of a firm disappears from the GMAC member list. Likewise, we consider the firm newly entered when the name of a firm is newly added to the GMAC member list. It is often said that, in the Cambodian garment industry, some firms deliberately shut down their factories and reopen new ones by changing the name, location, ownership, etc., in order to enjoy benefits such as tax incentives. The presence of such re-entrant firms may inflate the firm turnover rate in the Cambodian garment industry. However, it is extremely difficult to identify those re-entrant firms (even for the Cambodian government).

<sup>12</sup> See Appendix 1 for the construction of variables.

unobservable or immeasurable factors concerning value added, capital and labor as well as management practice, learning-by-doing, intangible capital (e.g., reputation, brands, and know-how) and firm structure, can be included as TFP (Syverson 2011).

In order to examine which factors are associated with higher TFP, we first regress our TFP index on various factors by matching our firm survey data (IDE Surveys 2003 and 2009) with firms' production item data from the GMAC member list 2003 and 2009 (Table 6).<sup>13</sup> The estimation method is Ordinary Least Squares (OLS). This examination is complemented by trade statistics and our qualitative interviews with 30 garment firms, conducted in 2011 (hereafter "IDE Survey 2011").<sup>14</sup>

**Value added:** Since our TFP index measures output by value added defined as revenue minus material costs and other small costs, variation in product price and material costs leads to a difference in TFP at various firms. Firstly, not all product prices may have necessarily declined, although the garment export price dropped on average as previously shown in Table 3. In fact, as the exact price index (EPI) in Figure 2 illustrates, the price of garment products exported to the US continuously declined, while those exported to the EU increased over the 2000s, in US dollar terms.<sup>15</sup> For example, between 2002 and 2008, the period corresponding to that of IDE Surveys 2003 and 2009, the EPI of the garment exports to the EU increased from 97.8 to 111.6. This export price increase for the EU is mainly due to the depreciation of the US dollar against the euro.<sup>16</sup> In fact, the EPI for the EU market in terms of the euro declined for most of the 2000s. Since Cambodia is a dollarized economy and garment firms pay wages to workers in US dollars, it seems natural that it is primarily the US dollar-based EPI that affects the firms' revenue, although further investigation on the settlement currency of firms is necessary. The TFP regression result in Table 6 shows that the variable *eumkt* which approximates the export market share of the EU is positively

---

<sup>13</sup> GMAC member lists provide information on each firm's production items, which are expressed as US-specific and EU-specific trade codes. Thus, we can identify what each firm produces and to which market (US or EU) it exports.

<sup>14</sup> See Appendix 2 for an overview of the IDE Survey 2011.

<sup>15</sup> The EPI is a more precise price measure than unit value (UV, or average unit price of total exports), because EPI basically tracks the price movement of the same item at the HS10-digit level (US) or HS8-digit level (EU), while UV reflects two effects: price movement of the same item and the compositional shift among items with different prices. In this setting, we neglect within-item quality change and assume that the change in unit price of each HS10- or HS8-digit level only reflects price change and does not contain any quality change. See Appendix 3 for the estimation method of EPI and other indices in Figure 2.

<sup>16</sup> The euro per US dollar rate calculated as the EU's annual garment imports from Cambodia in euro divided by those in US dollars is 1.051 in 2002 and 0.684 in 2008.

associated with TFP. This result supports our assumption that TFP becomes higher as firms export more to the EU where export prices were increasing, and thus, lead to higher revenue of the firms.

Secondly, the intensity of price competition may also depend on the degree of trade liberalization of each garment item. Although the termination of MFA at the end of 2004 substantially liberalized the international garment trade, quotas were still imposed on some items imported from China by the EU (until 2007) and the US (until 2008) under the bilateral agreements between China and the EU or US. Since China is the most competitive and large garment exporter in the world, it is expected that, as of 2008, quota-free items since 2005 were faced with stiffer price competition than were items for which a quota was re-imposed on China up to 2007/2008 (hereafter “China-quota-imposed items”). If that is the case, producing more quota-free items in 2008 may lead to lower revenue (and thus lower TFP) for the firms. This expectation is verified by Table 6. The positive coefficients of *china\_q04* and the negative coefficients of *china\_q04\*y2008* indicate that exporting more items for which a quota was imposed on China until 2004 was associated with a higher TFP in 2002 (when a quota was imposed), while it is associated with a lower TFP in 2008 when a quota was no longer imposed. Although the coefficient is also negative for the interaction term between the share of China-quota-imposed items and year 2008 dummy (*china\_q07/08\*y2008*), it is statistically insignificant and the size of the coefficient is much smaller than that of *china\_q04\*y2008*. In fact, Cambodian garment firms seem to have increased the share of China-quota-imposed items after the end of MFA. Figure 3 illustrates that the share of China-quota-imposed items in Cambodian garment exports to the US increased from 2005 until 2008, after which quotas were no longer imposed.

Thirdly, it is also possible that a shift to production of more high-quality items may have contributed to the rise in TFP by pushing up revenue. However, this is not the case in Cambodia at least for the period of 2002 to 2008, i.e., our survey period. As can be seen from Figure 2, the quality index (QI) of Cambodian garment exports declined for both the US and the EU from 2002 to 2008. The decline in QI indicates that Cambodian garment firms shifted to production of more lower-price items. If we neglect any within-item quality change, the production shift to less expensive items represents quality downgrading of Cambodian garment exports on average. However, it should be noted that the QI has become stable since 2008. In addition, according to our firm interviews in 2011 (IDE Survey 2011), out of 24 firms, nine firms have shifted to production of more higher-quality (or higher-value) products since they started

operation, while only one firm shifted to production of lower-quality (or lower-value) products, and the remaining 14 firms answered that their product quality has not changed. This recent evidence indicates that Cambodian garment firms have stopped shifting to lower-quality products recently.

Finally, reduction in material costs may also have contributed to the rise in the value added, thus pushing up TFP. The IDE Surveys 2003 and 2009 show that our sample firms actually reduced their material cost share in gross output (Table 5). For the firms with non-zero material costs, the material cost share dropped substantially, from 45.6% in 2002 to 31.6% in 2008. From the industry aggregate statistics (Table 3), the estimated material cost reduction was not so significant. However, compared with the increase in unit fabric import price, the movement of the material cost share is much more stable, indicating that Cambodian garment firms have made continuous efforts to save material costs. In fact, we found from the IDE Survey 2011 that, out of 29 firms, 15 firms teach or train workers, 3 firms have introduced machines (e.g., CAD/CAM, plotter, fabric layer machine and cutting machine), and 5 firms have adopted both measures in order to save material waste. In addition, two firms answered that they have shifted their source country for fabrics from countries such as China and Taiwan to Cambodian neighbors such as Vietnam and Thailand in order to reduce transportation costs.

**Capital:** The productive effects of capital can be also included in TFP if quality of capital is not captured by our capital input measure. However, our capital input measure has been carefully constructed by using the perpetual inventory method (Appendix 1). Thus, we assume that the quality of capital is already largely controlled. In this case, our TFP measure does not contain the effect of capital quality to a very large extent, although quality upgrading of capital may have contributed to the substantial improvement in labor productivity. Examples of quality upgrading of capital include introduction of new, advanced machines and replacement of old machines with new ones with more advanced functions. For example, the IDE Survey 2011 shows that two-thirds of 28 respondent firms have introduced either CAD/CAM or a plotter. Factory visits in 2010 and interviews with industry experts also reveal that some Cambodian garment firms have already introduced capital-intensive equipment, such as a hanger conveyor system.

**Labor:** Our labor input measure when estimating TFP already controls for labor quality differences between high-skilled and low-skilled workers. However, firms' variations in human capital quality within these worker groups are not controlled for

and thus are included in our TFP measure. Between 2002 and 2008, the average human capital quality of Cambodian garment workers seems to have improved. Firstly, the estimated average years of education increased from 10.0 to 10.2 years for supervisors, from 6.6 to 7.1 years for operators, and from 6.3 to 7.4 years for helpers (Table 7). In fact, the average educational level of operators and helpers is associated with a higher TFP as shown by the coefficient for *eduy\_oh* in Table 6.<sup>17</sup> Somewhat unexpectedly, the educational level of supervisors (*eduy\_super*) is associated with a lower TFP. Secondly, many firms indicate that improvement in worker experience has contributed to productivity improvement (IDE Survey 2011). We found that the ratio of experienced workers with six years or more of experience (*exp6*, or *skilled\_exp6* and *unskilled\_exp6*) is associated with a higher TFP, although this is not statistically significant (Table 6). Thirdly, the incidence of training is relatively high in the Cambodian garment industry.<sup>18</sup> However, provision of formal training (*training*) is negatively associated with TFP in Table 6. This might be due to reverse causality: firms with lower productivity may be more likely to provide training to raise productivity.<sup>19</sup> In addition, the content of training which is not controlled for in our regression also matters. According to the IDE Survey 2011, most of the firms provide training on Cambodian labor law and basic sewing skills. These training programs may not contribute to substantial productivity improvement.<sup>20</sup> Finally, introduction of incentive wages can also contribute to an increase in productivity, as reviewed by Bloom and Reenen (2010). Some Cambodian garment firms claimed that workers' productivity improved after introduction of incentive wages (IDE Survey 2011). In fact, out of 30 interviewed firms, 28 firms provide group and/or individual incentives (e.g., target bonuses) and 6 firms

---

<sup>17</sup> In the IDE 2011 survey, one firm reported that workers' skill improved because of their improved educational background which made training workers easier. The estimated average schooling years required for operators and helpers by garment firms also increased between 2002 and 2008, from 1.0 to 3.8 years for operators and from 0.8 to 4.5 years for helpers (IDE Surveys 2003 and 2009). This evidence indicates that firms value the school education of operators and helpers in order to increase productivity and profit.

<sup>18</sup> Based on the IDE Surveys 2003 and 2009, around 75% of the surveyed firms provided formal training to their employees in both 2002 and 2008. This incidence of training is much higher than that of Bangladesh, where the incidence was 12.6% in 2002 and 31.5% in 2008.

<sup>19</sup> Omitting *training* from the explanatory variables of the regression does not change the regression results in general.

<sup>20</sup> By contrast, according to IFC (2009), supervisory skills training which was conducted by Gap Inc. and IFC in 2005-06 (and is currently conducted by ILO-BFC) resulted in a 20% improvement in worker-supervisor relationships, 25% higher workers' awareness of their production targets, 10% higher incidence of receiving guidance and feedback from supervisors and 10% increase in output.

provide bonuses for skilled operators who can operate multiple machines.

*Other factors:* The learning-by-doing effect measured by years in operation (*opeyear* in Table 6) is positively associated with TFP, while firm size (*ln(emp)* in Table 6) is negatively associated with TFP, although they are not statistically significant. With regard to the effect of production management which is considered an important determinant for productivity by industry experts, we just examine the simple association between production management and productivity by regressing our TFP measure on the production management dummy (which becomes one when the firm implemented any scientific production management techniques such as plant layout, line balancing, time-motion study, total quality management or total quality control, etc., in 2008). Although the sample size is very small (N=35), we found that our production management dummy raises our TFP index by 1.34 at a 10% significance level.

#### **4 Concluding Remarks**

The Cambodian garment industry continuously grew even under the harsher business environment in the post-MFA era. The average product price has fallen, while production costs such as wage rate and material unit price have increased. In the meantime, however, the industry expanded thanks to fortuitous international trade and investment environment. However, such a favorable environment alone cannot explain the sustainable growth of the Cambodian garment industry. It was the Cambodian government and firms which seized every chance and took full advantage of the environment. The FDI-friendly policy of the Cambodian government made it possible to build up the export-oriented garment industry from scratch in a short period. Frequent dialog among various stakeholders including the government, industrial organization, labor unions, buyers and ILO contributed to the smooth and sustainable industry growth by coordinating various interests. Last, but not least, productivity improvement was a key to the success of the industry. The industry improved its average productivity through frequent firm turnover. Firms took advantage of the changes in the international trade environment, reduced material costs, benefitted from the improved skill of workers and adopted production management techniques.

There still remain several challenges in the Cambodian garment industry. For example, concerning high unofficial costs and electricity costs, there seems to be little improvement, but some signs of improvements and a transition to the new stage can be also observed recently. Regarding labor disputes and labor union problems, the situation

seems to have improved thanks to increased dialogue between labor unions and other stakeholders. Dependence on the US market has also declined. As shown in Figure 4, Cambodia recently diversified its export markets by increasing its export shares to the EU, Canada, and other countries such as Japan and China. We can also observe movement towards higher value-added activity,<sup>21</sup> and some firms have started to make more demanding or high-quality items to earn more profit margin, as described in Section 3.2.2. Some have begun to expand their factory's functions to incorporate tasks such as directly negotiating with buyers, proposing materials and making samples, all of which were previously conducted by the overseas headquarters. GMAC is also planning to expand its training center by adding more advanced training programs such as pattern-making, industrial engineering and fashion.<sup>22</sup> Localization is under way: Many foreign (especially Chinese) supervisors who raise wage costs and generate communication problems with operators have been replaced by Cambodian supervisors.<sup>23</sup>

Thanks to the relaxation of the EU's rule of origin and the shift of orders from China and Vietnam, more investors have recently come to Cambodia, and the number of new garment factories opened during the period of January through October, 2011, was 48, already greatly exceeding the annual figure for 2010 (which was 28) (Figure 5). Such a promising situation, as well as the above-mentioned movement, seems to indicate that the Cambodian garment industry is continuously evolving towards a new development stage.

## References

- Arnold, Dennis, and Tho Han Shih. 2010. "A Fair Model of Globalisation? Labour and Global Production in Cambodia." *Journal of Contemporary Asia* 40 (3): 401-424.
- Asuyama, Yoko, Dalin Chhun, Takahiro Fukunishi, Seiha Neou, and Tatsufumi Yamagata. 2012. "Firm Dynamics in the Cambodian Garment Industry: Firm

---

<sup>21</sup> This information is based on the IDE Survey 2011, and the authors' interview with GMAC.

<sup>22</sup> With the aid of the Japanese government, GMAC established a training center called the Cambodian Garment Training Center (CGTC) in 1999. CGTC has been offering production management training for supervisors and sewing skill training for workers. According to the interview with GMAC in July 2011, CGTC had trained about 3,000 workers by that time. A two-year pattern-making training program already started in October 2011 with the aid of Japan.

<sup>23</sup> See Footnote 8.



- Turnover, Productivity Growth, and Wage Profile under Trade Liberalization.” *mimeo*. Institute of Developing Economies.
- Bargawi, Omar. 2005. “Cambodia’s Garment Industry: Origins and Future Prospects.” ESAU Working Paper 13, London: Overseas Development Institute.
- Bloom, Nicholas, and John Van Reenen. 2010. “Human Resource Management and Productivity.” NBER Working Paper 16019.
- Brambilla, Irene, Amit K. Khandelwal, and Peter K. Schott. 2010. “China's Experience under the Multifiber Arrangement and the Agreement on Textile and Clothing.” In *China's Growing Role in World Trade*, edited by Robert Feenstra and Shang-Jin Wei. Cambridge, MA: NBER.
- Beresford, Melanie. 2009. “The Cambodian Clothing Industry in the Post-MFA Environment: A Review of Developments.” *Journal of the Asia Pacific Economy* 14 (4): 366-388.
- Better Work. 2010. “Better Work and Employers.” (<http://www.betterwork.org/EN/resources/Pages/brochures.aspx>, accessed on February 3, 2012).
- Caves, Douglas W., Laurits R. Christensen, and W. Erwin Diewert. 1982. “Multilateral Comparisons of Output, Input, and Productivity Using Superlative Index Numbers.” *Economic Journal* 92 (365): 73–86.
- Chan, Vuthy, and Sok, Hach. 2007. “Cambodia’s Garment Industry Post-ATC: Human Development Impact Assessment.” In *Export Diversification and Value Addition for Human Development: Addressing the Impact of the Agreement on Textile and Clothing Expiration on Cambodia*, 1-86. Phnom Penh: Economic Institute of Cambodia.
- Ear, Sophal. 2011. “Growth in the Rice and Garment Sectors.” In *Cambodia’s Economic Transformation*, edited by Caroline Hughes and Kheang Un, 70-93. Copenhagen: NIAS Press.
- Feenstra, Robert C. 1994. “New Product Varieties and the Measurement of International Prices.” *American Economic Review* 84 (1): 157-177.
- FIAS (Foreign Investment Advisory Service). 2004. *Cambodia: Corporate Social Responsibility & the Apparel Sector: Buyer Survey Results*.
- Kang, Chandararot, and Liv Dannet. 2009. *Study on Minimum Wage for Cambodia’s Garment Industry*. Cambodia Institute of Development Study and Community Legal Education Center.
- Kolben, Kevin. 2004. “Trade, Monitoring, and the ILO: Working to Improve Conditions

- in Cambodia's Garment Factories." *Yale Human Rights and Development Law Journal* 7:79-107.
- Harrigan, James, and Geoffrey Barrows. 2009. "Testing the Theory of Trade Polity: Evidence from the Abrupt End of the Multifiber Arrangement." *Review of Economics and Statistics* 91 (2): 282–294.
- IFC (International Finance Corporation). 2009. *Supervisory Skills Training in the Cambodian Garment Industry: A Randomized Impact Evaluation*.
- IMF (International Monetary Fund). 2006. "Cambodia: Selected Issues and Statistical Appendix." IMF Country Report No.06/265.
- Neak, Samsen, and Raymond Robertson. 2009. "Globalization and Working Conditions: Evidence from Cambodia." In *Globalization, Wages, and the Quality of Jobs: Five Country Studies*, edited by Raymond Robertson, Drusilla Brown, Gaëlle Pierre, and María Laura Sanchez-Puerta, 97-129. Washington, D.C.: World Bank.
- Nordås, Hildegunn Kyvik. 2004. "The Global Textile and Clothing Industry Post the Agreement on Textile and Clothing." Discussion Paper 5. Geneva: World Trade Organization.
- Polaski, Sandra. 2006. "Combining Global and Local Forces: The Case of Labor Rights in Cambodia." *World Development* 34 (5): 919-932.
- Polaski, Sandra. 2009. *Harnessing Global Forces to Create Decent Work in Cambodia*. Geneva: International Labour Office.
- Syverson, Chad. 2011. "What Determines Productivity?" *Journal of Economic Literature* 49 (2): 326–365.
- USAID (US Agency for International Development) 2005. *Measuring Competitiveness and Labor Productivity in Cambodia's Garment Industry*. Washington, DC: USAID.
- Wells, Don. 2006. "'Best Practice' in the Regulation of International Labor Standards: Lessons of the U.S.-Cambodia Textile Agreement." *Comparative Labor Law & Policy Journal* 27 (3): 357-376.
- World Bank. 2009. *Sustaining Rapid Growth in a Challenging Environment: Cambodia Country Economic Memorandum*. Phnom Penh: World Bank.
- WTO (World Trade Organization). 2011. "Trade Policy Review: Report by the Secretariat, Cambodia, Revision." WT/TPR/S/253/Rev.1.
- Yamagata, Tatsufumi. 2006. "The Garment Industry in Cambodia: Its Role in Poverty Reduction through Export-Oriented Development." *Cambodian Economic Review* 2: 81-136.

Table 1. Timeline of International Trade Environments Related to the Cambodian Garment Industry

1996	● Cambodia gained most favored nation (MFN) status from the US.
1997	● Cambodia gained Generalized System of Preferences (GSP) status from the EU.
~1999	● Cambodia gained MFN/GSP status from 28 countries (Neak and Robertson 2009, pp.99-100).
1999	<ul style="list-style-type: none"> <li>● US-Cambodia Textile and Apparel Trade Agreement (TATA) which imposed a quota on the US's garment imports (12-13 categories) from Cambodia.</li> <li>● EU-Cambodia Textile Trade Agreement which granted duty- and quota-free access to the EU for Cambodia's garments which satisfy the rule of origin (In 2001, Cambodia gained "Everything But Arms" (EBA) treatment for the least developed countries from the EU. EBA also granted duty-free access for Cambodian garments which satisfy the rule of origin).</li> <li>● Cambodia became an ASEAN member.</li> </ul>
2004. Oct.	● Cambodia became a WTO member and gained MFN/GSP from all WTO member countries.
End of 2004	● Termination of the Multifibre Arrangement (MFA) regime. No more quotas on global garment trade in general.
2005-2007	● Bilateral agreement between the EU and China imposed quota restrictions on the EU's garment imports from China.
2005-2008	● Bilateral agreement between the US and China imposed quota restrictions on the US's garment imports from China.
2007	● Vietnam became a WTO member.
Late 2008-2009	● Global garment trade shrank due to the global financial crisis.
2009. Dec.	● ASEAN-Japan Comprehensive Economic Partnership (AJCEP) came into effect between Cambodia and Japan. Even when using imported fabrics from ASEAN, Cambodia can enjoy duty-free export treatment.
2011. Jan.	● EU relaxed its rule of origin in EBA. Cambodia can enjoy duty-free export treatment even when using imported fabrics.

*Source:* Compiled by the authors from various sources including Bargarwi (2005) and Neak and Robertson (2009).

Table 2. Major Incentives for Cambodian Garment Industry: Comparison of 1994 and 2003 Law on Investment

<b>1994 Law on Investment, and Sub-Degree No. 88 (1997)</b>	<b>2003 Law on Investment, and Sub-Degree No. 111 (2005)</b>
9% concessionary corporate income tax after tax holiday (against a standard rate of 20%)	⇒ Abolished with 5-year transition period (20% corporate income tax rate is applicable after tax holiday)
Corporate income tax exemption (tax holiday) up to 8 years, beginning from the first year of profit	Tax holiday: Trigger period (the first year of profit or 3 years after the first revenue, whichever is sooner) + 3 years + Priority period (determined by the Council for the Development of Cambodia (CDC)). Instead of tax holiday, 40% special depreciation can be chosen.
Corporate income tax exemption for reinvestment in Cambodia	⇒ Abolished
Withholding tax exemption for the repatriated profits or proceeds of investments	⇒ Abolished (repatriated profits are subject to a 1% withholding tax)
100% import duty exemption on construction materials, production equipment, intermediate goods, raw materials etc., for export-oriented projects	
100% exemption of export tax	
	Approve investment applications within 28 days under the “one-stop service” at the Cambodian Investment Board (CIB) under CDC.

*Note:* The minimum investment capital requirement for an investment in the garment industry to be eligible for the above incentives is US\$0.5 million. Since 1999, VAT on the imported production input by garment-exporting factories is exempted (Letter No. 110 SCN.CS of the Council of Ministers).

*Source:* WTO (2011, pp.25-27), IMF (2006, pp.10-19), and original laws and sub-degrees.

Table 3. Estimated Average Firm Performance of Cambodian Garment Industry

	Source	2002=100 (except for material cost share and unit price)											2002 prices		
		2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2002	2008	Unit
Gross product	GTA	66.0	84.2	100.0	118.7	134.9	137.0	142.9	155.2	156.4	154.5	187.7	8,283	12,956	USD1,000
	MEF	-	87.0	100.0	122.0	140.7	143.4	145.1	150.1	146.6	143.0	184.8	6,929	10,157	USD1,000
Value added	GTA	64.8	90.2	100.0	125.1	137.0	134.0	142.7	157.5	163.1	163.3	171.5	4,433	7,230	USD1,000
	MEF	-	-	100.0	123.7	144.9	143.6	144.4	145.7	144.7	136.4	155.9	4,264	6,169	USD1,000
Profit	GTA	65.0	91.7	100.0	127.3	138.9	137.4	147.4	161.7	167.7	167.6	172.0	3,611	6,057	USD1,000
	MEF	-	-	100.0	125.6	148.8	149.4	149.8	147.3	145.1	134.5	152.7	3,443	4,996	USD1,000
Number of workers	MOC	66.4	88.4	100.0	108.5	115.4	107.3	106.7	111.0	107.7	105.9	112.4	1,063	1,145	persons
Labor productivity	GTA	97.6	102.0	100.0	115.3	118.7	124.8	133.8	141.9	151.5	154.2	152.6	4,168	6,314	USD
	MEF	-	-	100.0	114.0	125.5	133.8	135.4	131.3	134.4	128.8	138.7	4,010	5,387	USD
Labor cost per worker	MOC	96.5	94.7	100.0	106.7	111.3	110.9	114.5	125.4	132.6	136.1	150.7	773	1,024	USD
Material cost share	GTA	47.5	42.7	46.5	43.6	45.7	47.7	46.6	45.7	44.2	43.4	51.1			%
	MEF	-	-	38.5	37.6	36.7	38.4	38.7	40.3	39.3	41.3	48.1			%
Unit garment export price															nominal
	MEF	-	42.6	44.2	45.9	46.3	41.9	37.8	36.6	33.7	32.0	31.1			USD per dozen
Unit fabric import price															nominal
	MEF	-	-	2.5	3.7	3.4	4.2	4.4	4.4	4.4	4.8	5.4			USD per yard

*Note:* All indicators are annual performance per factory. Nominal price is deflated by the clothing and footwear price index for US GDP. The definition of each indicator is as follows:

- (1) Gross product = garment exports of Cambodia / number of garment factories,
- (2) Value added = [garment exports of Cambodia- material imports of Cambodia] / number of garment factories,
- (3) Profit = [(2) – total payroll of garment industry] / number of garment factories,
- (4) Number of workers = number of total garment workers / number of garment factories,
- (5) Labor cost per worker = total payroll of garment industry / (4),
- (6) Labor productivity = (2) / (4),
- (7) Material cost share = material imports of Cambodia / garment exports of Cambodia\* 100 (%)

The number of garment factories and workers are computed by averaging over months during the period. When using GTA's trade data, garment exports of Cambodia are computed by summing up all the reporting countries' garment imports from Cambodia, while material imports of Cambodia are computed by summing up all the reporting countries' material (fabrics, yarn, and accessories, defined by HS codes 50-56, 58-60, 9606, and 9607) exports to Cambodia. When using MEF trade data, material imports include only fabric imports. Considering the nature of the Cambodian garment industry, we assume that all factories export 100% of their products (i.e., production equals export) and import 100% of their material (i.e., material cost equals material imports).

*Source:* Global Trade Atlas (GTA) and Cambodia's Ministry of Economy and Finance (MEF) for trade data; Cambodia's Ministry of Commerce (MOC) for number of garment factories and workers and for payroll data; and US Bureau of Economic Analysis for the price deflator.

Table 4. Average Monthly Wages by Job Classification and Types of Workers

Position	2002	2008		Nomnal	Real Change
	Nominal USD	Nominal USD	Real USD	Change (%)	(%)
Manager/Executive	615	700	454	13.9	-26.1
Other Officer	144	256	166	77.3	15.0
Engineer	154	196	127	27.3	-17.5
Supervisor	129	201	130	56.2	1.3
QC	69	98	64	41.7	-8.1
Operator	58	93	60	61.9	5.0
Helper	48	87	56	81.5	17.7
High-skilled	115	179	116	55.4	0.8
Low-skilled	58	93	60	60.7	4.2
Male	80	123	79	52.5	-1.1
Female	61	95	62	57.0	1.5

*Note:* The number of sample firms was 164 in 2002 and 122 in 2008. Wages are weighted by employment. Real wages are in 2002 US dollar prices and were constructed by deflating nominal wage by Cambodia's CPI. The categories of engineer, supervisor, quality controller (QC), operator and helper apply only to the garment section (sewing and knitting sweaters/socks). High-skilled workers include manager/executives, other officers, engineers, supervisors and QC in both garment and other production sections. Low-skilled workers include operators, helpers and holders of other miscellaneous jobs (e.g., cutters, ironers, cleaners, security guards and messengers).

*Source:* Asuyama et al. (2012) and IDE Surveys 2003 and 2009.

Table 5. Average Firm Performance (2002 prices) based on the IDE Surveys

	Unit	Sample 1					Sample 2				
		2002		2008		2008 /2002	2002		2008		2008 /2002
		Mean (SD)	N	Mean (SD)	N		Mean (SD)	N	Mean (SD)	N	
Gross product	1000 USD	7,632 (9,783)	93	14,266 (22,499)	36	1.87	8,448 (11,819)	117	12,906 (19,862)	61	1.53
Value added	1000 USD	3,638 (5,330)	93	10,897 (19,921)	36	3.00	4,202 (7,065)	117	10,113 (17,748)	61	2.41
Profit	1000 USD	2,542 (4,652)	93	9,110 (19,069)	36	3.58	2,503 (4,611)	95	8,526 (18,421)	39	3.41
Number of workers	persons	1,097 (1,234)	93	1,329 (1,153)	36	1.21	1,026 (1,133)	164	1,103 (997)	121	1.07
Labor productivity	USD	3,647 (3,848)	93	7,614 (7,188)	36	2.09	3,809 (3,967)	117	7,402 (6,749)	61	1.94
Labor cost per worker	USD	930 (349)	93	1,189 (323)	36	1.28	978 (382)	117	1,172 (344)	58	1.20
Capital value	1000 USD	399 (571)	93	704 (1,055)	36	1.76	396 (566)	95	680 (1,011)	41	1.72
Capital value per worker	USD	522 (1,176)	93	556 (790)	36	1.07	517 (1,164)	95	544 (742)	41	1.05
Material cost share	%	45.6 (24.1)	85	31.6 (22.7)	21						
TFP index: Unweighted average total		-0.262 (1.052)	93	0.479 (1.013)	36						***
Continuing firms		-0.168 (1.083)	46	0.516 (1.050)	10						*
Exited firms		-0.354 (1.025)	47								
Entering firms				0.465 (1.020)	26						***

*Note:* Sample 1 is based on the firms used in TFP analysis. Regarding material cost share (in gross output), subcontractor firms with zero material cost are also excluded. Such restriction does not apply to Sample 2, but Sample 2 excludes outliers (firms with negative value added, an extremely low share of labor cost in value added and an average wage lower than 80% of the minimum wage) from the flow data. Nominal prices are deflated by the clothing and footwear price index for the US GDP except for capital (Due to the differences in deflators, some figures in this table are different from those in Table 1 of Asuyama et al. (2012)). Capital value is in 2000 prices and constructed as mentioned in Appendix 1. The TFP index of the hypothetical average firm over the pooled sample of two years is set equal to zero. Continuing firms are those continuously operating over the period 2002-2009. Exited firms are those exited after 2003. Entering firms are those entered between 2003 and 2008. The figures in parenthesis are standard deviation. \*\*\* and \* indicate that the TFP average for 2008 differs significantly from that for 2002 at the 1% and 10% levels (entering firms are compared with exiting firms).

*Source:* Asuyama et al. (2012) and IDE Surveys 2003 and 2009.

Table 6. OLS Regression of TFP on Various Firm Characteristics

	(1)	(2)	Variable Definition
<i>opeyear</i>	0.095 (0.147)	0.093 (0.148)	Years in operation
<i>opeyear*opeyear</i>	-0.012 (0.010)	-0.012 (0.011)	Years in operation squared
<i>ln(emp)</i>	-0.129 (0.125)	-0.123 (0.127)	Logarithm of total employment
<i>eumkt</i>	0.630 * (0.366)	0.621 * (0.368)	Number of export items for EU / number of export items for US and EU
<i>china_q07/08</i>	1.020 ** (0.458)	1.022 ** (0.460)	Number of export items for which quota is imposed on China up to 2008 (by US) or 2007 (by EU) / number of export items for US and EU
<i>china_q04</i>	1.228 * (0.679)	1.239 * (0.682)	Number of export items for which quota is imposed on China up to 2004 / number of export items for US and EU
<i>china_q07/08*y2008</i>	-2.182 (1.860)	-1.856 (2.012)	Interaction between <i>china_q07/08</i> and <i>y2008</i>
<i>china_q04*y2008</i>	-4.443 ** (2.209)	-4.107 * (2.359)	Interaction between <i>china_q04</i> and <i>y2008</i>
<i>eduy_oh</i>	0.153 *** (0.048)	0.150 *** (0.048)	Estimated average years of education of operators and helpers
<i>eduy_super</i>	-0.084 ** (0.039)	-0.084 ** (0.039)	Estimated average years of education of supervisors
<i>training</i>	-0.258 (0.264)	-0.258 (0.265)	Dummy = 1 if providing any formal training
<i>exp6</i>	0.642 (0.517)		Ratio of workers with experience of 6 years or more
<i>skilled_exp6</i>		0.306 (0.629)	Ratio of skilled workers with experience of 6 years or more
<i>unskilled_exp6</i>		0.377 (0.694)	Ratio of unskilled workers with experience of 6 years or more
<i>y2008</i>	3.566 ** (1.790)	3.244 * (1.949)	Dummy = 1 if year 2008
constant	-0.563 (1.026)	-0.594 (1.034)	
Number of Obs.	115	115	
R-squared	0.285	0.286	
F-statistics	3.090	2.860	

*Note:* The dependent variable is the TFP index of garment firms. Specifications (1) and (2) differ in terms of whether the ratio of experienced workers is separately controlled ((2)) or not ((1)). Quota is considered as being imposed if the fill rate of the item is greater than or equal to 90% in 2004 based on Brambilla et al. (2010)'s data for US and SIGL data for EU. \*, \*\*, and \*\*\* indicate 10%, 5%, and 1% significance levels, respectively. Standard errors are reported in parentheses.

*Source:* GMAC member list 2003 and 2009, Brambilla et al. (2010), and European Commission's Système Intégré de Gestion de Licenses (SIGL) data, for *eumkt*, *china\_q07/08*, and *china\_q04*; IDE Surveys 2003 and 2009, for other variables.



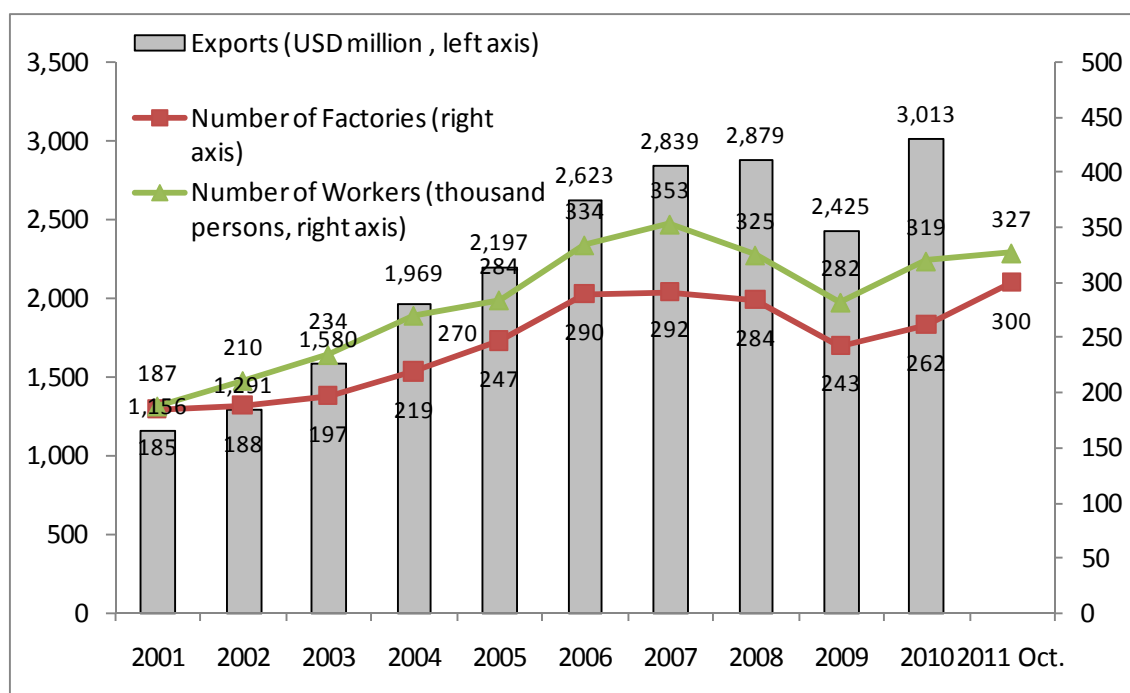
Table 7. Average Educational Level of Employees (based on managers' recognition)

	(%, years)									
	Manager		Engineer		Supervisor		Operator		Helper	
	2008	2008	2002	2008	2002	2008	2002	2008	2002	2008
Below Primary	0.0	3.0	0.0	1.8	0.6	12.5	1.9	15.3		
Primary	0.0	3.0	9.3	7.3	79.8	40.2	87.2	30.6		
Lower secondary	2.6	23.0	55.9	43.6	17.2	43.8	9.6	38.7		
Higher secondary	38.3	52.0	29.2	46.4	2.5	3.6	1.3	14.4		
Bachelor's or higher	59.1	19.0	5.6	0.9	0.0	0.0	0.0	0.9		
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0		
Estimated years of education (years)	<b>14.4</b>	<b>11.7</b>	<b>10.0</b>	<b>10.2</b>	<b>6.6</b>	<b>7.1</b>	<b>6.3</b>	<b>7.4</b>	***	
N	115	100	161	110	163	112	156	111		

*Note:* We asked firm managers about the average education level by job category. Based on this information, estimated average years of education have been computed by assigning the following years of education to the original education categories in the questionnaire: Below primary (0 years), Primary (6 years), Lower secondary (9 years), Higher secondary (12 years), and Bachelor's degree or higher (16 years). \*\*\* indicates that the estimated average years of education in 2002 and 2008 were statistically different at the 1% significance level.

*Source:* IDE Surveys 2003 and 2009.

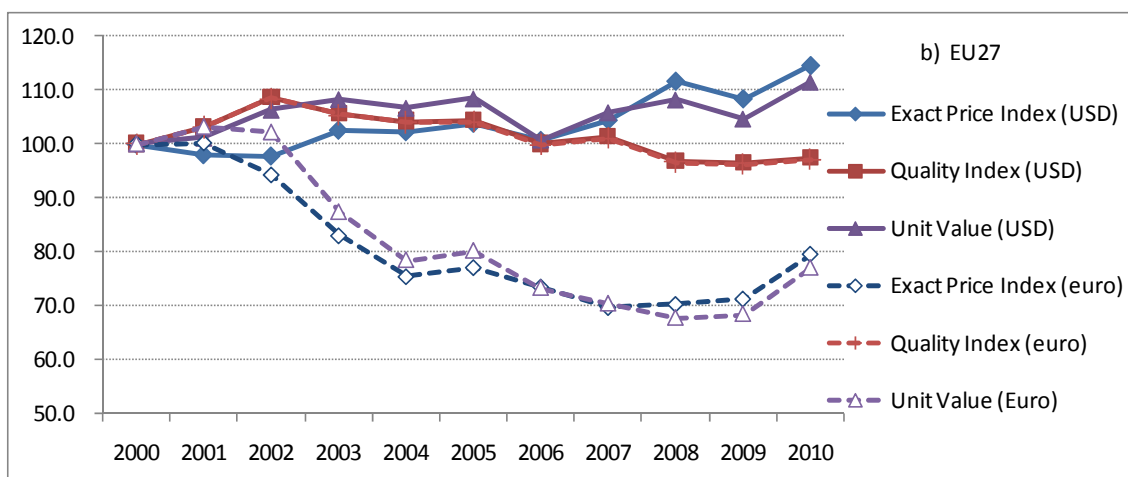
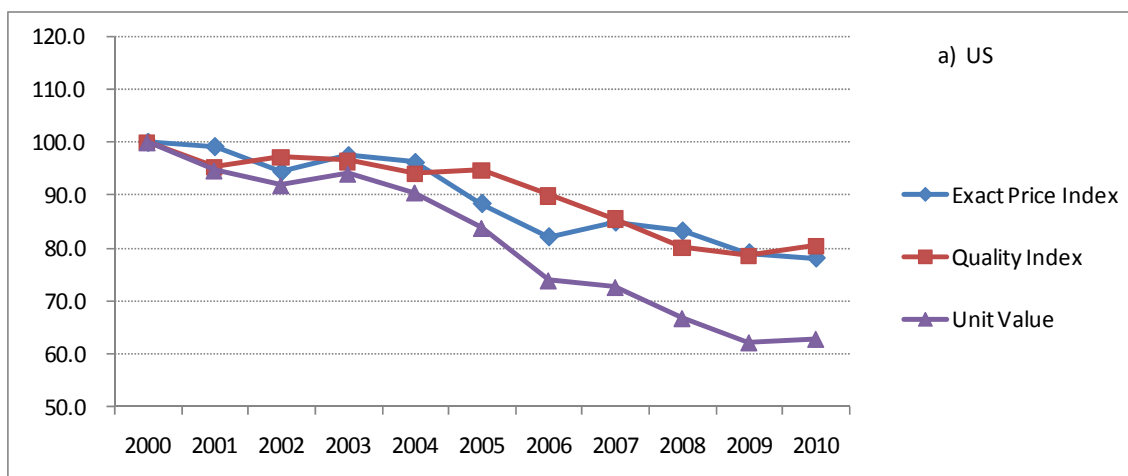
Figure 1. Evolution of the Cambodian Garment Industry: Exports and Numbers of Factories and Workers



*Note:* The numbers of factories and workers are counted at the end of the period.

*Source:* Cambodia's Ministry of Economy and Finance for exports and Cambodia's Ministry of Commerce for number of factories and workers.

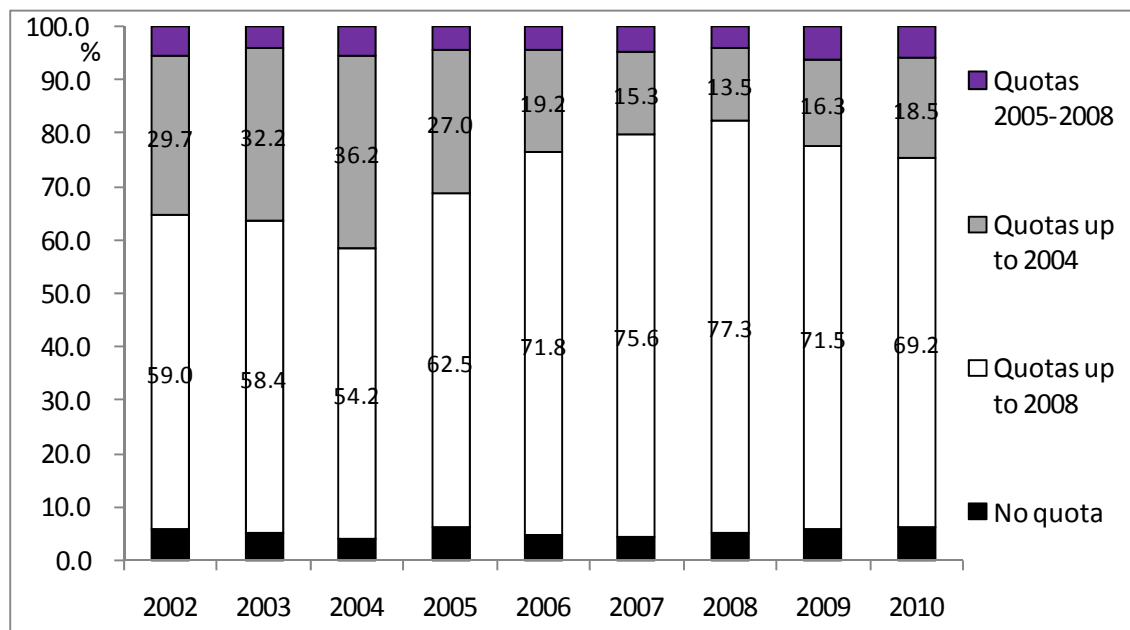
Figure 2. The US's and the EU27's Garment Imports from Cambodia: Price, Quality and Unit Value



Note: 2000=100. See Appendix 3 for the estimation method.

Source: World Trade Atlas (original source: Bureau of Census, US Dept. of Commerce, and Eurostat).

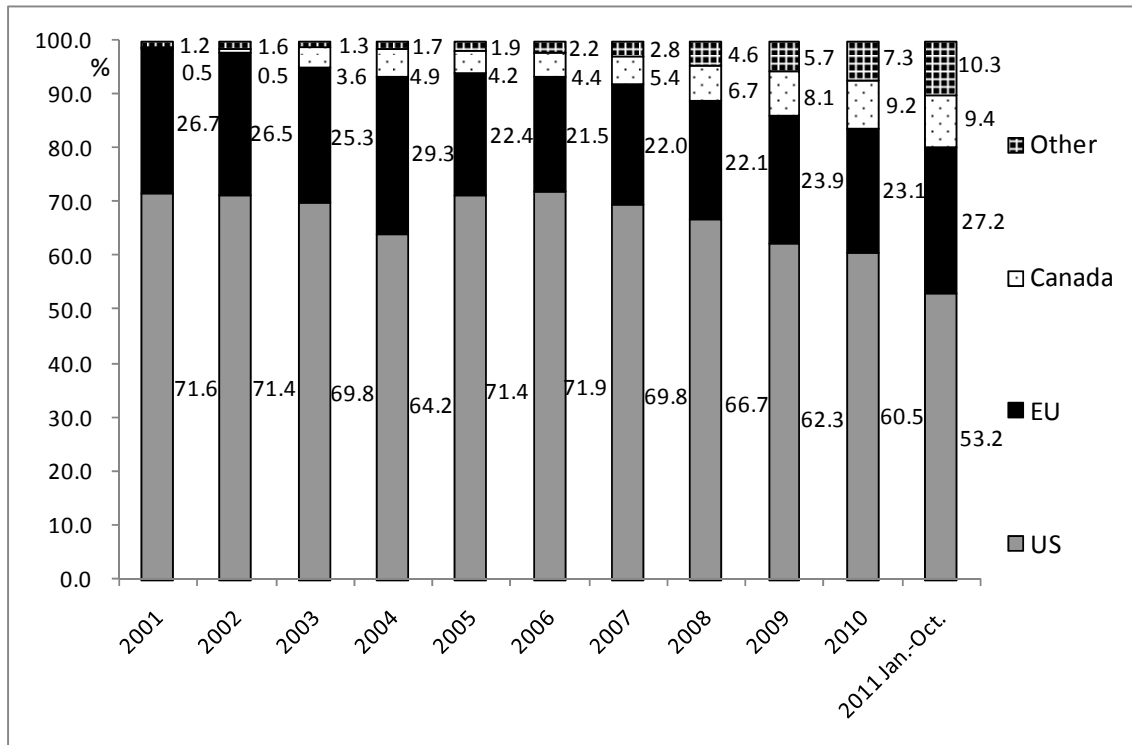
Figure 3. US Garment Imports from Cambodia by China's Quota Status Imposed by the US



*Note:* The above graph shows the share of items (based on import values) classified by the quota status of the US's garment imports from China. A quota is regarded as being imposed if the fill rate of the item is greater than or equal to 90% in 2004, although removing the fill rate restriction does not change the overall trend.

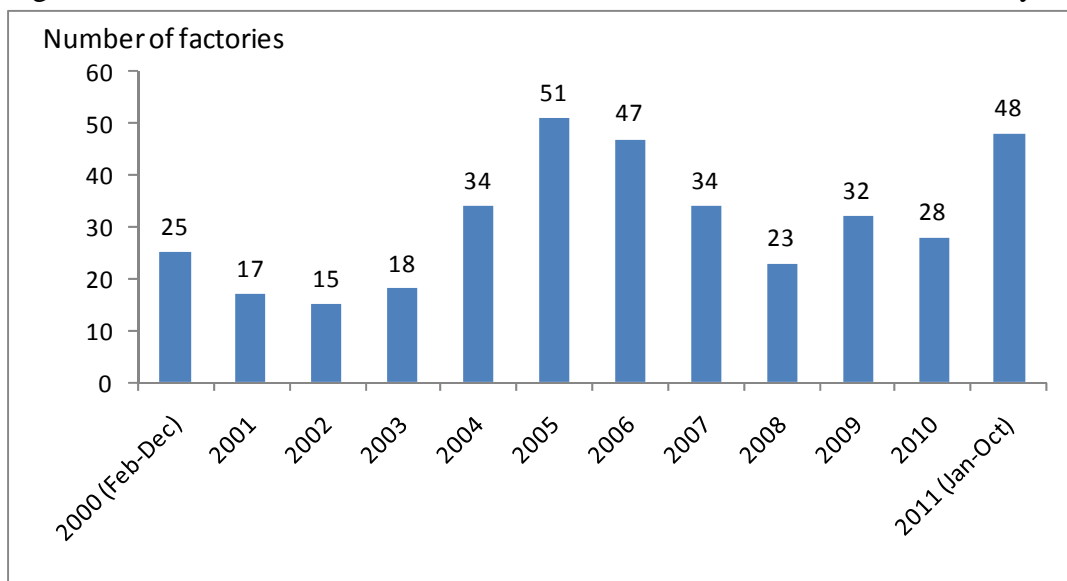
*Source:* International Trade Administration, US Department of Commerce, for US garment imports data and Brambilla et al. (2010) for China's quota status data.

Figure 4. Composition of Export Markets for Cambodian Garments



Source: Garment Manufacturers Association in Cambodia.

Figure 5. Number of New Entrant Factories in the Cambodian Garment Industry



*Note:* Computed as the net increase in registered garment factories.

*Source:* Cambodia's Ministry of Commerce.

## **Appendix**

### **1. IDE Surveys 2003 and 2009**

The IDE Survey 2003 was conducted by the Institute of Developing Economies, Japan External Trade Organization (IDE-JETRO), jointly with the LIDEE Khmer during August through October 2003. During August through November 2009, the second round of the survey, the IDE Survey 2009, was conducted by IDE-JETRO and the Economic Institute of Cambodia (EIC). We contacted all the garment-producing exporters that were members of the Garment Manufacturers Association in Cambodia (GMAC), which embraces almost all the garment exporting firms in Cambodia. Through interviews with firm managers, we eventually collected 164 and 123 questionnaires in 2003 and 2009, respectively. Those figures cover about 85% (in 2003) and 49% (in 2009) of all the garment firms recognized by the Ministry of Commerce, respectively.

The surveys asked for a variety of information, including general firm characteristics (location, year of establishment, ownership structure, etc.) as well as detailed data concerning production and sales, equipment, employment, wages and financial accounts. Most of the data that we asked for is related to the fiscal years 2002 and 2008. In most cases, they correspond to the calendar years 2002 and 2008 starting in January and ending in December. The results of the 2003 survey are presented in detail in Yamagata (2006). Productivity and workers' welfare analysis based on the 2003 and 2009 surveys is conducted in Asuyama et al. (2012).

When conducting TFP analysis, all the input and output values are deflated at 2002 prices, by item-specific deflators: the clothing and footwear price index for US GDP (from the US Bureau of Economic Analysis) for gross product, material cost and payment to subcontracting; the fuel and electricity price index in Cambodia for energy cost; the utility price index for utility cost; and the GDP deflator in Cambodia for the labor cost and the remaining cost items (transportation, office supplies and facilities, insurance payment, etc.). The value of capital, which includes only equipment and excludes land and buildings, is calculated by the perpetual inventory method, using information on the purchase year and price of the equipment (or resale value, when purchase year and equipment price information is missing). A 10% depreciation rate is applied. The price index of special industry machinery released by the US Bureau of Economic Analysis is used as the deflator. Using those real values, value added is constructed as gross product minus the sum of all the costs excluding labor cost and

capital cost. Profit (before-tax profit) is constructed as subtracting labor cost and capital cost from value added.

Finally, outliers (firms with negative value added, an extremely low share of labor cost in value added, and an average wage lower than 80% of the minimum wage) are excluded from the productivity analysis. As a result of the above procedure, only 93 (in 2002) and 36 (in 2009) firm samples are left and utilized for the TFP analysis.

## 2. IDE Survey 2011

IDE-JETRO conducted in-depth qualitative interviews with 30 Cambodian garment firms during July through October 2011, jointly with EIC. The main purpose of the survey is to further investigate what Cambodian garment firms have done to achieve higher productivity and what are the current and future advantages of producing garments in Cambodia. Expecting to find large differences in actions between high-productivity and low-productivity firms, we initially aimed to interview 17 high-productivity firms and 7 low-productivity firms based on the TFP or labor productivity rankings estimated from the IDE Survey 2009 (or 2003). In addition, we also aimed to contact 6 seemingly Cambodian-owned firms in order to explore the growth prospects of the garment industry run by Cambodian business people. However, due to the fact that some firms declined to participate in our survey, we actually managed to interview 17 high-productivity firms, 8 low-productivity firms, 1 Cambodian-owned firm with high-productivity and 4 firms which did not participate in the IDE Survey 2009 or 2003. In addition, we could not find any clear relationship between firms' productivity in 2009 and their actions, partly because it was difficult to obtain precise answers concerning what firms did before 2008. Thus, in this chapter, we just introduce firms' actions which are seemingly related with productivity improvement, regardless of firms' productivity profiles in 2009 or 2003.

## 3. Estimation Method for Price and Quality Indices in Figure 2

The exact price index (EPI), quality index (QI) and unit value (UV) in Figure 2 are estimated by following the approach of Feenstra (1994) and Harrigan and Barrows (2009). Firstly, the US's or EU's expenditure function for garment imports from Cambodia is assumed to be of the constant elasticity of substitution (CES) form, as:

$$e(p_t, I_t, b_t) = \left( \sum_{i \in I_t} b_i p_{i,t}^{1-\sigma} \right)^{1/(1-\sigma)},$$

where  $\sigma$  is the elasticity of substitution,  $b_i$  indicates taste parameter,  $p$  is price,



subscripts  $i$  and  $t$  are product variety (item classified by HS10 (US) or HS8 (EU) code) and time, respectively.  $I_t$  represents the set of items available in period  $t$ .

In this setting, UV, EPI and QI are computed as follows:

$$UV_t = \sum_{i \in I_t} v_{i,t} / \sum_{i \in I_t} x_{i,t} ,$$

$$EPI_t = \prod_{i \in I_{t,t-1}} (p_{i,t} / p_{i,t-1})^{w_{i,t}(I_{t,t-1})} \times (\lambda_t / \lambda_{t-1})^{1/(\sigma-1)} ,$$

$$QI_t = UV_t / EPI_t ,$$

where  $v$  denotes dollar value of imports,  $x$  represents import quantity,  $I_t$  is the set of items imported in year  $t$ ,  $I_{t-1}$  is the set of items imported in year  $t-1$ ,  $I_{t,t-1}$  is the set of “overlap goods” imported in year  $t$  and in year  $t-1$ . The weight  $w$  is given by:

$$w_{i,t}(I_{t,t-1}) = \frac{\left( \frac{s_{i,t}(I_{t,t-1}) - s_{i,t-1}(I_{t,t-1})}{\ln s_{i,t}(I_{t,t-1}) - \ln s_{i,t-1}(I_{t,t-1})} \right)}{\sum_{i \in I_{t,t-1}} \left( \frac{s_{i,t}(I_{t,t-1}) - s_{i,t-1}(I_{t,t-1})}{\ln s_{i,t}(I_{t,t-1}) - \ln s_{i,t-1}(I_{t,t-1})} \right)} \text{ where } s_{i,t}(I_{t,t-1}) = p_{i,t} x_{i,t} / \sum_{i \in I_{t,t-1}} p_{i,t} x_{i,t} .$$

Furthermore,  $\lambda_t = \sum_{i \in I_t} v_{i,t} / \sum_{i \in I_t} v_{i,t}$ , and  $\lambda_{t-1} = \sum_{i \in I_{t-1}} v_{i,t-1} / \sum_{i \in I_{t-1}} v_{i,t-1}$ .

The EPI's first term  $\prod_{i \in I_{t,t-1}} (p_{i,t} / p_{i,t-1})^{w_{i,t}(I_{t,t-1})}$  tracks the price change of “overlap goods”,

while the second term  $(\lambda_t / \lambda_{t-1})^{1/(\sigma-1)}$  which is the ratio of the expenditure share on overlap goods in  $t$  to the expenditure share on overlap goods in  $t-1$ , adjusts the effects of entry and exit of items.

By using the garment import value and quantity data of the US and the EU27 from Cambodia extracted from the World Trade Atlas database, the above three indices are estimated. With regard to the EU27's data, only items for which quantity is recorded in terms of number or pairs are utilized. However, these items account for 97.1% of the total garment imports of the EU27 from Cambodia for the period between 1999 and 2010. As the elasticity of substitution, we use  $\sigma = 5$  following Harrigan and Barrows (2009). However, setting  $\sigma$  equal to two, three, or ten does not change the overall trend observed in Figure 2.