When the Floodgates Open: "Northern" Firms' Response to Removal of Trade Quotas on Chinese Goods

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Abstract

Using the dismantling of the Multi-fibre Arrangement quotas on Chinese textile and clothing products in conjunction with China's accession to WTO, within firms adjustments to intensified low-wage competition is analyzed. Employing Danish employer-employee matched data supplemented with transaction-level data from between 1995 and 2007, the analysis shows a significant increase in skill and capital intensity associated with downsizing in response to heightened competition. Competition is found to negatively affect employment, value-added and intangible assets of the Danish firms, and firms are found to refocus their innovative efforts away from goods where China's competitive advantage becomes higher. The results show an important role of the distributional impact of low-wage competition within firms in restructuring the industry and support theories that indicate compositional changes in the scopes and operations of "Northern" firms in response to competition from "South".

Keywords: Textile and Clothing Industry, Multi-fibre Arrangement, China, Denmark, Low-Wage Country Competition, Within Firm Adjustments, Occupation Characteristics, Product Scopes

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1 Introduction

Increased trade between advanced countries and low wage countries is one of the most important consequences of globalization, and has had a profound effect on the business environment of firms. As the macroeconomic shift unfolds, firms undertake internal structure changes in order to operate in the new environment. An understanding of such changes is important to better understand the welfare consequences of globalization or policy changes that intensify foreign competition. But due to a lack of appropriate micro level data which can provide details on within firm changes at multiple margins and due to scarcity of policy experiments that can allow researchers to deduce causal implications, empirical insight into within firm changes is wanting.[1]

By making use of the expiration of the Multi-fiber Arrangement (MFA) quotas for China due to its WTO membership, in this paper the impact of competition on firm strategies is analyzed. By providing empirical analysis of changes happening at several margins of adjustment in Danish textile and clothing (T&C) industry, including labor and product-level strategies within firms, the aim is to shed light on the type of restructuring happening in advanced countries' traditionally labor intensive manufacturing sectors faced with the stiff competition from low-wage countries.

The Multi-fiber Arrangement (MFA) regulated world trade in textile and clothing from 1974 until 2005. Under this agreement a large portion of textile and clothing export from low wage developing countries to developed countries was subject to physical quotas. The arrangement basically served the purpose of providing 'temporary' protection for developed country textile and apparel industry against competition from developing country products. The Agreement on Textiles and Clothing under WTO provided a schedule for the gradual dismantling of the MFA quotas in four phases; Jan 1995, Jan 1998, Jan 2002 and Jan 2005. By being outside of the WTO during the 1990s, China did not benefit from the first two phases of quota

[1] Many recent studies focus on a relationship between import competition and productivity improvement within firms and plants. Being the measured outcome of a number of changes within firms and plants, these studies do not provide particular insight into the inner workings of the firms and the changes that may or may not result in productivity improvement in response to competition.

abolishment. One of the immediate concrete changes that WTO membership brought to China was dismantling of the first three phases of MFA quotas on China in January 2002 and allowing it to benefit from the scheduled last phase in January 2005.

I make use of very detailed employee level data as well as transaction level product data. These data-sets are matched at the firm-level and are combined with more traditional firm-level accounting data. The resulting data-set is used to analyze the response of firms to heightened competition in the context of exogenous changes in the MFA quota system due to China's WTO accession.

To do that, first firms with product portfolios containing products that were subject to MFA quotas before the WTO accession of China are identified. Using the difference in differences approach, I then measure any disproportionate changes in such firms when compared to other T&C manufacturing firms in response to the quota removal experience after controlling for firm-fixed effects and aggregate shocks.

Both sales and value-added are found to be significantly and negatively affected by the intensified competition from China. The negative effect of competition is also manifested in employment. Specifically, employment in full-time units decreases disproportionately after the WTO accession of China, by about 20 %, among firms that had been protected from Chinese competition by MFA quotas. Disentangling any imported input effect using a triple difference approach also shows that, those firms, who are found to produce MFA quota goods, are significantly less affected by the competition, if they are also importing MFA quota goods.

Interestingly, the analysis of employment characteristics also shows that the negative effect of competition on employees depends on the type of occupation. A significant negative effect is documented on employees with occupations that require only basic skills or no skills, while no significant impact is found on professional and technical skill required occupations. An analysis of education characteristics of employees also shows results in line with the occupational characteristics results. More specifically, after the WTO accession of China, a 25 % disproportionate decline is documented in the number of employees who have at most high school diploma at MFA quota goods manufacturers, when compared to other T&C manufacturing firms. The number of employees with some college education within firm, on the other hand,

is found not to be affected by the competition. As a result, a significant concentration of high-skilled employees is found within affected firms. Exploiting education information further, the use of employees with skill education in T&C production, such as knitting or textile operators (at the high school level) is found to be negatively affected while the use of employees with T&C related technical design education (at the college level) is found to be positively affected by the competition. Further analysis reveals that the positive effect on the number of employees with T&C related technical design education is due to the firms which both produce and import MFA goods. These findings indicate possible changes in the production strategies of firms, that maybe firms limit their in-house production facilities towards technical and skill intensive products and product developments, while outsourcing or subcontracting less technical parts and operations. These results are consistent with the models of factor proportions as in Helpman and Krugman (1985).

Competition is also found to have a weakly significant positive effect on average wages. When analyzed further, the significant positive effect is found to be due to the significant increase in average wages of the basic-level occupations only (employees with occupations that require basic skills). This is due to the selection effect, that firms lay off less productive/skilled workers first, causing an increase in the average wages of basic-level employees within firms. Both the analysis on average wages among workers with different educational backgrounds and the analysis on education and experience level within basic-level occupations confirm this insight. These results are in line with the general structure of the Danish labor market, which is characterized by liberal rules for firing together with a high degree of unionization resulting in downwardly inflexible wages.[2]

Whether increase in low-wage country imports causes decline in low-skill wages was an important question especially in the context of the significant increase in income inequality observed in the 1990s in many advanced countries, including the US. The question re-gained its importance with intensified Chinese imports especially in developed countries in the wake of its WTO accession. Recent studies show the importance of low-wage country imports in caus-

[2]The Danish labor market model is generally referred as a 'flexicurity model'. It combines flexible hiring and firing with a generous social safety net and an extensive system of labor market activation policies.(Andersen, (2011))

ing reallocation between plants towards more capital-intensive (Bernard, et al. (2006)), or knowledge-intensive (Bloom et al. (2011)) establishments. Bloom et al.(2011) find that European firms increase their innovation activities as measured by patent counts and research and development (R&D) expenditure as a result of intensified competition from China. Utar and Ruiz (2011) find that while plant growth and employment in offshore plants of American companies located in Mexico declines significantly in response to heightened Chinese competition in the US market, competition also leads to increase in plant efficiencies, skill intensities and triggers sectoral reallocation away from low value-added offshore sectors such as apparel. These studies provide empirical substance to the potential role of trade in explaining the within industry growth of skill demand in advanced countries.[3] Recently, Autor, et al. (2011) document the labor market outcomes of Chinese imports in the US and find a significant and negative effect of intensified Chinese imports on manufacturing employment, but no significant effects of Chinese imports on low-skill manufacturing wages. Using the removal of textile and clothing quotas for China due to its WTO membership as a quasi-experiment, the findings presented here on employment and wages support theirs, in that the stiff competition with low-wage countries operates more on the quantity margin within manufacturing sectors. The findings in this paper also complement Khandelwal et al. (2012) who show that due to an additional misallocation caused by the execution of the MFA quotas by the Chinese government, the removal of the MFA quotas resulted in a significant efficiency gain via a substantial entry of more efficient Chinese exporters. Attributing an important role for these new, more efficient, entrants in the significant surge of the Chinese T&C exports and associated decline in prices, their results imply that the substantial negative impact of the quota removal experience on Danish producers as shown in this paper may have been smaller if the quotas were allocated by the Chinese government more efficiently.

Innovation is an important dimension of advanced country firms' response to increased low-wage country competition, and this link has rightly received focus in the literature. Most of this focus, however, has been on the innovative efforts themselves, as measured by patent counts or R&D expenses. To contribute to a fuller understanding of the link between the low-wage

[3]Among other recent studies on Chinese competition, Iacovone et al. (2010) find no effect of Chinese competition on innovative activities of firms including R&D expenditure among Mexican manufacturing firms.

country competition and innovation, this paper includes analysis of firm assets, importantly intangible assets, as well as measures of innovation. Analyzing firms' assets, the impact of competition with Chinese textile and clothing products is also found to be positive and significant on the capital-labor ratio of firms. This is observed due to the decline in employment levels rather than an increase in capital assets. While the physical assets of firms are not found to be negatively affected by the stiff Chinese competition, intangible assets are. The ratio of intangibles over the total assets is also found to respond negatively to the intensified competition with Chinese products. High-end product images, trademarks, exclusive distribution rights etc. may have been harmed by the surge of significantly cheaper and similar versions (maybe even counterfeit products).[4] These findings may lend substance to European industrialists' complaints about the potential competitive harm of the rapid surge of Chinese textile and clothing products.[5] They also show that effects of intangible assets are important welfare consequences of competition with low-wage countries.

Import competition may drive innovation if firms find it profitable to escape competition by introducing new products or upgrading already existing products. As MFA was a temporary system of protection, the European Commission has held that the textile and clothing industry in Europe can survive the stiff competition with low-wage country imports by concentrating on its strength, mainly on high quality and design oriented products, innovation and superior technology. The Commission advocated policies that encourage R&D in the industry such as facilitating the participation of small and medium T&C enterprises in EU funded R&D programs (European Commission Documents, (2004)).

The empirical analysis in this study shows that firms facing heightened competition from China under the quota-free environment, increase their new product and variety introductions

[4]In 2008, about 200 million counterfeit items were detected at the European borders with the majority of cases involving articles of clothing and accessories. Two thirds of the counterfeit products seized at the European border in 2008 were produced in China. (United Nations Office on Drugs and Crime Report, (2010))

[5]The European Commission set up a High Level Group to produce recommendations on the future of textile and clothing industry in Europe in early 2004. The group consists of top decision makers from textile and clothing industry. In 2004, the group's first recommendation to deal with the challenges in the new 'quota-free' system was to increase the effectiveness of intellectual property rights. (European Commission Documents, (2004))

within categories that were not covered by the MFA quotas. Low-wage competition is also found to trigger product droppings with weakly negative effect on the product scopes. The results show that the competition triggers substantial shuffling of the products within firms. While firms' incentive to introduce new products significantly increases with the heightened competition, firms are found to channel their innovative efforts away from the products where China's competitive advantage is now higher.[6]

Competition from south could also trigger offshoring basic skill required jobs which can result in increased skill-intensity within firms as in Grossman and Rossi-Hansberg (2008), it can also cause endogenous selection of products within firms as in Bernard, Redding, and Schott (2010). Thoenig and Verdier (2003) show that with an increased threat of imitation by low-wage countries, firms in developed countries tend to respond by biasing the direction of their innovations towards technologies that are intensive in skilled labor. The present results on the firms' product portfolio strategies, together with the significant concentration of skilled labor found within firms, are in line with the notion of "defensive skill-biased innovation" as introduced by Thoenig and Verdier (2003). In a related study, Thesmar and Thoenig (2000) develop a model to assess the interaction between organizational choice and the macroeconomy. The model is a Schumpeterian growth model a la Aghion and Howitt (1992) where the creative destruction rate measures the rate of product market instability. Firms' organizations decisions rely on the tradeoff between efficiency and adaptability. The intuition is that firms have to pay high sunk costs to achieve high efficiency by investing in a highly tuned organization, but that such an organization is not adaptable. Conversely a less tuned organization with low (or no) sunk costs, but higher skill level is more adaptable. According to their model, markets with higher creative destruction should exhibit higher share of skilled labor. The findings in this study on the negative effect of competition on intangible assets as well as increased product turnover within firms indicate product instability, or in the Schumpeterian language, the 'creative destruction rate' increases with heightened competition with China. The findings

[6] Also complementing the findings of Bernard et. al. (2006) that shows US firms switch industries to escape competition from low-wage countries, these results show that the product mixes of the firms are endogenous and respond to the competition. Hence studies that link import competition to productivity, while fixing the product mix of firms, may produce biased results. See for example De Loecker (2011).

of increased skilled and educated workers within firms due to Chinese competition provide empirical support of their theoretical argument.

The rest of the paper is organized as follows: In the next section the data sets used in this study are described. An empirical analysis of the effect of the MFA quota expiration on Danish imports is presented next. In section 4 the empirical model is outlined, and results are interpreted in section 5 followed by conclusions in section 6.

2 Data

For the purpose of this study firm-level data on Danish textile and clothing industry are combined with employer-employee matched data and transaction level data. The data-sets are from Statistics Denmark (Danmarks Statistik). The details of the data-sets and constructing of the matched data-set are explained in the appendix.

The traditional firm-level variables such as labor, total wages, capital assets, investment, total sales, profits, etc.. are from the longitudinal firm accounting data. This data-set is complemented with detailed employee characteristics that are compiled from person-level data (IDA) with matched employer code. Since firm accounting data contains all firms that employ at least 0.5 full-time equivalent labor, and since the person data is comprehensive (covers all people between the ages 15 to 70), one can say that the main data-set covers all T&C firms in Denmark.[7] The final data-set is comprised of 1090 unique T&C firms between 1995 and 2007 with 43 % of them in clothing and the rest in textile industry.

Firms' product information is compiled from domestic and international trade data-sets. Domestic data contains 10-digit product-firm-year level domestic firm sales for all firms that have 10 or more employees. The international data-set is compiled from Danish customs records; it contains 8-digit product-firm-destination-year level international transactions for all firms with any size. Since domestic trade data is not available after 2005 and does not contain data for firms with less than 10 employees, the product portfolio analysis is based on a sample that

[7] Due to data cleaning procedures some of the very small firms are cleaned out from the final data-set due to the data quality issues.

consists of 875 firms between 1995 and 2005.

Quota information is reported in the SIGL (Système Intégré de Gestion de Licenses) database which is constructed by the European Commission and is publicly available. The SIGL manages licences for imports of textiles, clothing, footwear and steel to the EU. The textile and clothing license database is classified according to 163 grouped quota categories defined by the EU. These categories are mapped to CN/HS 6 digit products as appropriate.[8] In some cases a quota category does not have a one-to-one match at the 6-digit level. In those cases matches are made with a combinations of 8-digit products. Thus a total of 88 CN/HS 6-digit and 45 CN 8-digit products are identified as being the subject of 2002 quota abolishment for China (phase I, II, and III). In 1999 these goods constitute about 9 % of the total textile and clothing imports and 8 % of the total textile and clothing export in Denmark during the sample period. 210 CN/HS 6-digit and 47 CN 8-digit product categories are identified as being the subject of 2005 quota abolishment. In 1999 the 2005 quota goods constitute about 20 % of the total Danish textile and clothing imports and 16 % of the total textile and clothing export. Firms that produce goods that were subject to 2002 MFA quota removal and firms that produce goods that were subject to 2005 MFA quota removal for China are identified using domestic and foreign sales data.

3 Perspective on T&C Industry and Trade Policy

3.1 Overview of the Danish Textile and Clothing Industry

Europe's T&C industry is dominated by a large number of small and medium-sized enterprises, with the average company employing 19 employees in 1999 as reported by Stengg (2001). Most companies are privately owned, and a few are listed on the stock exchange. Danish T&C resembles overall European T&C industry. As reported in Table B-1 in the Appendix, the

[8]The HS/CN codes corresponding to quota categories are based on Combined Nomenclature 1999. Since firms that produce quota category goods in 1999 are identified as treated firms in the main empirical specification, changes in CN categories across the years do not apply to these firms. For all other cases, quota category products based on CN-1999 are linked back and forth through years using correspondence tables linking CN 1995 through CN 2007 as provided by the European Commission-Eurostat.

average number of employees is found to be 20 during the sample period of 1995-2007. All firms in the sample are private firms and around 26 % of them are proprietorships and 91 % of the firms are single plants on average.[9]

A restructuring in Danish and also in European industry overall has been happening since the 1980s due to increasing competition with low wage countries. From 1980 to 1995 the European textile industry lost 47 % of work places, while the corresponding figure for clothing is 40 % (Stengg (2001)). Similarly over the period 1973 to 2002 the loss of jobs amount to 50000 in the Danish T&C industry (Olsen et al.(2004)). Typical manual processes such as sewing, folding, packing, and cutting have been moving abroad during the period, while more capital intensive processes such as dyeing, printing, weaving, knitting and spinning as well as design, logistics and distribution have remained within Denmark to a large extent (Olsen et al.(2004)).

3.2 Evolution of The MFA Quota System

When GATT was signed in 1948, world trade in textile and clothing was excluded from the agreement. Trade in T&C was governed by bilateral agreements. As the number of agreements grew, the Multi-fibre Arrangement was introduced in 1974 to govern the world trade in textile and clothing. For the EU, most MFA quotas were negotiated for the bloc as a whole, and since 1993 any member state specific restrictions were removed and the quotas started to be managed at the EU level. In 1995 the Agreement on Textiles and Clothing (ATC) replaced the MFA, and made provision for phasing it out in four steps over a period of 10 years, - at the beginning of 1995, 1998, 2002 and 2005. Based on the volume of imports in 1990, quotas were to be eliminated equivalent to 16 % of 1990 imports at the beginning of 1995, 17 % at the beginning of 1998, 18 % at the beginning of 2002, and the remaining 49 % at the beginning of 2005.

Between 1986 and 1994 the EU executed MFA quotas towards 19 countries. These were Argentina, Brazil, China, Czechoslovakia, Hong Kong, Hungary, India, Indonesia, the Republic

[9]Firm ownership-type information is available only between 1999 and 2006. So 26% is the average across these years. There is a very little change between the years (min. 25.7%, max. 27.6 %). Single-plant information is based on the whole sample (1995-2007).

of Korea, Macao, Malaysia, Pakistan, Peru, Philippines, Poland, Romania, Singapore, Sri Lanka and Thailand.

Under ATC the selection of MFA products to be integrated into the normal WTO system, was left to the decision of importing countries. The EU started its phasing out process by integrating mainly products or MFA categories with no quotas vis-à-vis WTO members. The same approach was chosen by the USA. During the first two phases, the EU integrated 34 MFA categories, but only very few existing quotas vis-à-vis WTO members (OETH (2000).

But during the same time the EU also liberalized quotas mainly on a bilateral basis for neighboring countries in Eastern Europe (Europe Agreements) and the Mediterranean. In 1997 about 70 % of the total EU import value of textiles and clothing was imported without any quantitative restrictions, while the other 30 % was imported under quota. The exporting countries with the highest quota utilization were China, India, Pakistan and Indonesia (OETH, 2000).

In 1998, China's share of T&C import in Denmark was a little over 10 % compared to 2.8 %, 0.7 % and 1.3 % respectively for India, Pakistan and Indonesia. By 2007 China's share reached 26 %, while the respective shares of India, Pakistan and Indonesia were 6 %, 1 %, and 0.5 %.

4 The Impact of the MFA Quota Abolishment on Chinese Imports in Denmark

As shown in figure 1, imports in textile and clothing from China into Denmark has increased significantly with the WTO membership of China. In order to quantify increase in Chinese imports attributable to MFA quota removal, transaction level import data between 1995 and 2007 in those goods that are subject to MFA quotas are aggregated into country (k), 8-digit product (j) and year (t) level. Those goods that are subject to 2002 quota abolishment for China (phase I-II-III goods) are denoted with $MFAQ2$ while goods that are subject to 2005 quota abolishment for China are denoted with $MFAQ5$. Collectively the goods covered by all four phases are denoted with the variable MFAQ. Equation 1 is estimated separately among

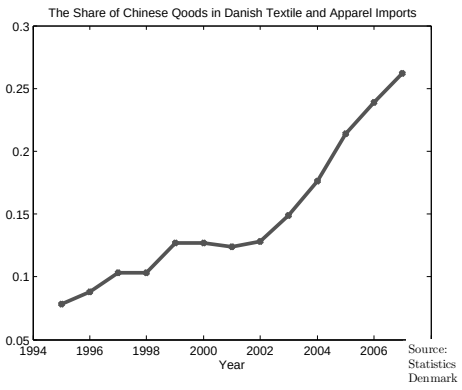

Figure 1: The Chinese Import Share in Danish Textile and Clothing Imports 1995-2007

phase 1 to 3 goods (MFAQ2) and phase 4 goods (MFAQ5) imports. X_{kjtn} is the variable of interest; physical amount and unit price respectively. Subscript n denotes industry, 'textile', or 'apparel'. Unit prices are not deflated in these regressions but instead industry by year fixed effects are included to account for industry specific shocks including inflation rates and exchange rate variations. $Dum02_t$ and $Dum05_t$ are the time dummies:

$$Dum02_t = 1 \quad \text{if YEAR} \geqslant 2002$$
$$Dum02_t = 0 \qquad otherwise$$

similarly,

$$Dum05_t = 1 \quad \text{if YEAR} \geqslant 2005$$
$$Dum05_t = 0 \qquad otherwise$$

.

$$lnX_{kjtn} = \alpha_0 + \alpha_1 Dum02_t * China + \sum_{kj} \delta_{kj}^{FP} Country_k * Product_j + \sum_{t} \delta_{tn}^{YI} Year_t * Industry_n + \epsilon_{kjt} \quad (1)$$

The results, presented in Table 1, indicate that quotas were binding for China as the quantity of imports from China increases substantially with removal of those quotas. The coefficient in Panel A indicates a more than 5 times disproportionate increase of the Chinese imports in the 2002 quota goods in comparison to other countries' imports of the same 8-digit goods.[10] As the quota limitation disappears, products imported from China get cheaper as well. Brambilla, et al. (2010) show similar results regarding the quota removal experience in the US data. Unit prices may decline as a result of a new equilibrium, which is reached with no quantity limitation. Part of the unit price decline could also be due to changes in the quality of the products in response to the relaxation of the quota restrictions. However, examining Chinese T&C exports during the MFA quota removal period, Khandelwal et al. (2012) suggest that most of the decline in the unit prices were due to the entry of more efficient Chinese firms into the export market rather than quality downgrading.

[10]The European Commission on Trade also reports the percentage utilization of the quotas. Most of the quotas for China has been reported as above 90 percent utilization rates.

Table 1: MFAQ Imports

Panel A: MFAQ2 Products (1995-2007)	Textile and Apparel Products	Textile and Apparel Products
Variables	Log Amount	Log Price
Dum02*China	1.855***	-0.320***
	(0.155)	(0.042)
Year By Industry Fixed Effect	yes	yes
Product (CN-8) by Country Fixed Effect	yes	yes
Number of Observation	24924	24924
F	20.880	20.676
Panel B: MFAQ5 Products (1995-2007)		
Variables	Log Amount	Log Price
Dum05*China	1.314***	-0.162***
	(0.116)	(0.035)
Year By Industry Fixed Effect	yes	yes
Product (CN-8) by Country Fixed Effect	yes	yes
Number of Observation	47556	47556
F	40.043	32.827

Robust standard errors are reported in parentheses. They are clustered for each CN 8 digit product categories and country pair. Clustering by only country leads smaller standard errors, and available upon request. Constant is included but not reported. The sample used in panel A results only includes products under phase I, II, III categories (MFAQ2); the sample in panel B only includes products under the phase IV (MFAQ5) categories. Transaction level import data set is between 1995-2007 and it is aggregated into CN-8 product and country categories for each year. Data source: Statistics Denmark

While China substantially increases its export to Denmark with cheaper prices, is there a disproportionate decline in import prices of quota categories in comparison to other textile and clothing products? It is possible that China merely replaces other import partners of Denmark from the developing world without significantly affecting the prices and hence without significantly increasing the competition for the Danish producers at home. To see this, import data is aggregated into 8-digit product-year level and equation 2 is estimated, where $MFAQ2_j$ and $MFAQ5_j$ are indicator variables that take 1 if product j is a product, for which quotas on Chinese imports to the EU were removed in 2002 and 2005 respectively.

$$lnP_{jt} = \alpha_0 + \alpha_1 Dum02_t * MFAQ2_j + \alpha_2 Dum05_t * MFAQ5_j + \sum_j \delta_j^P Product_j + \sum_t \delta_{tn}^{YI} Year_t * Industry_n + \epsilon_{jt} \quad (2)$$

lnP_{jt} is the logarithm of the unit price of imported product j at year t. The results presented in Table 2 column (a) indicate that both 2002 and 2005 quota removals are associated with

a significant decline (about 16 % and 7 % respectively) in the unit prices of goods that were subject to quota restrictions for China. When the dummy variable for all the phases combined (MFAQ) is included (column b), the interaction variable is found to be negative and significant as well.

Notice that cheaper imported goods in the domestic market is not the only way that Chinese competition can affect the Danish producers. Danish manufacturers are also expected to face intensified competition with China in export markets such as in other EU countries and in the US due to the end of differential treatment of China with its WTO membership.

Table 2: Trade Data (1995-2007): All T&C Imports

Sample	Textile and Apparel Products	
	(a)	(b)
Variables	Log Price	Log Price
$Dum02 * MFAQ2_j$	-0.161***	
	(0.042)	
$Dum05 * MFAQ5_j$	-0.071*	
	(0.033)	
$Dum02 * MFAQ_j$		-0.092***
		(0.025)
Year By Industry Fixed Effect	yes	yes
Product (CN8) Fixed Effect	yes	yes
Number of Observation	15823	15823
Number of (CN8) Products	1632	1632
F	12.545	13.174

Robust standard errors are reported in parentheses. They are clustered for each CN-8 digit product categories. A constant is included but not reported. Transaction level import data set is between 1995-2007 and it is aggregated into CN-8 product categories for each year. Data source: Denmark Statistics.

5 Empirical Strategy

The empirical strategy exploits the exogenous trade shock due to China's accession to the WTO and the associated removal of T&C quotas. Seen from the perspective of the time before China became a WTO member, all firms producing goods protected from Chinese competition by MFA quotas faced a potential threat. This threat became real, and competition intensified, with the WTO membership of China, but during the long period of China's negotiation for membership, mainly with the US and EU, there was a great deal of uncertainty about the

membership and its timing.[11] The first step of the removal of quotas on Chinese T&C was in January 2002, immediately after the membership. At that point there was no longer any uncertainty, either, regarding the timing and coverage of the next round of quota removal, scheduled for 2005.[12] Hence the empirical strategy is focused on the WTO accession of China.

The majority, about 80 percent, of the firms that produce MFAQ2 (Phase I-II-III) products are also found to produce MFAQ5 (Phase IV) products. A group of firms that are most threatened by Chinese competition is then defined by all these firms producing any MFAQ products and indicated by the variable $MFAQProd_{it}$. By constructing the share of MFAQ goods in total firm sales, it is also possible to create a continuous measure of competition. Continuous measures are denoted with the word 'share' in the respective variable name; e.g. $MFAQShare_{it}$ denotes the share in overall sales of firm i in year t from goods that were subject to quotas for China under MFA. While the discrete variable may be a more suitable competition measure when analyzing the impact of competition on strategic decision changes such as upgrading or innovation, a continuous measure may well provide an additional source of identification analyzing the first order impact of competition on sales, profits and employment levels where one expects a linear relationship between the degree of competition and the outcome variable.[13] So both measures are used as appropriate.

As time goes by, some of the firms that produce MFA goods will respond to the increased Chinese competition by dropping products with a high level of Chinese comparative advantage. Firms which continue to produce such goods will be the stronger or more competitive and

[11] "Chinas entry into the WTO is far from a foregone conclusion. It has been trying to join the multilateral trading system since 1986. Its hopes have been disappointed many times before."–quoted from the article called "China and WTO" published in the Economist in April 1, 1999. The main message conveyed in articles about the negotiations published in the Economist between 1999 until 2002, contained this uncertainty. See also The Economist (2000a) and The Economist (2000b).

[12] Due to excessive surge of Chinese imports in the first few months of 2005 at the EU ports in response to the final phase of the quota removal, the EU has re-negotiated the quotas with China and they agreed on additional export quotas (governed by the Chinese government) on certain T&C categories until 2008. Those categories as provided by the European Commission are excluded from the MFAQ5 group. This event is popularly referred and publicized as "Bra War".

[13] See for example Aghion et al. (2005) for a theory and evidence on possible non-linear relationship between competition and innovation.

probably bigger ones, who are able to differentiate themselves. This leads to endogeneity bias. To prevent that, the treatment group is set as those firms which in 1999, before China's WTO accession, produced goods that were subject to MFA quotas for China. Respective dummy variables are indicated by dropping the t subscript and adding 99 at the end of the variable name; e.g. $MFAQProd99_i$ is the dummy variable that takes 1 if firm i is found to have produced any MFA quota goods in 1999.[14] It is important to note that the analysis is done among T&C manufacturers, so the $MFAQProd$ dummy will not capture trade firms with the products in their portfolio. Thus in the empirical strategy the first difference comes from the two alternative treatment variables, $MFAQProd99$ and $MFAQShare99$. The second difference is the time when China became a WTO member.

By exploiting the exogenous shocks to the competitive environment, the two main regressions that are used to understand the response of firms to the competition are as follows.

$$X_{it} = \alpha_0 + \alpha_1 * MFAQProd99_i * Dum02_t + \sum_i \delta_f^F Firm_i + \sum_t \delta_t^Y Year_t + \epsilon_{it} \qquad (3)$$

$$X_{it} = \alpha_0 + \alpha_1 * MFAQShare99_i * Dum02_t + \sum_i \delta_f^F Firm_i + \sum_t \delta_t^Y Year_t + \epsilon_{it} \qquad (4)$$

As defined earlier, $MFAQProd99_i$ is the indicator variable for the group of firms that produce MFA quota goods in 1999, $MFAQShare99_i$ is the share of sales for the MFA quota goods in year 1999 and X is the variable of interest.[15] By interacting with the WTO time dummy, the purpose is to capture the response of firms to the increased competition. The aggregate trends in the industry are controlled for by using year fixed effects. It is possible that firms which produced the MFA quota goods are systematically different than the rest of the firms. The panel aspect of the data-set also allows for control of the firm fixed effects that can be

[14] Among 630 T&C firms in 1999, 193 of them were found to have produced at least one of MFA category goods.

[15] 'Treated' firms are identified using domestic and export trade data. There is no size restriction for the record of export transactions; but only those firms with 10 or more employees are included in the domestic trade data. So very small firms may be missed in the treatment group but this should affect the estimates downwards.

correlated with the regressors and thus further help to reduce the endogeneity concerns in the empirical analysis.

6 Results

6.1 The Impact of Competition on Sales

The first order effect of competition must be on sales and value-added. Table 3 in columns (a), (b) and (c) presents the results for the estimation of equations 3 and 4 where the dependent variables are the logarithm of firm turnover (sales), the logarithm of value added and the logarithm of profit respectively. As expected, competition from China is found to have significantly negative effects on these variables. The results are stronger in panel B of table 3 when MFAQShare is used as a treatment variable. As one can expect, the greater the intensity of sales from MFA products in 1999, the more the decline in firms' sales, value added and profit. On average, the group of firms that are found to have produced MFA quota protected goods in 1999 experience an 11 % disproportionate decline in their sales after 2001 in comparison to others. The impact is higher on value-added, with a 14 % disproportionate decline. The difference between the magnitudes of the impact on sales and value-added can indicate a possible increase in production fragmentation, since competition may lead firms to move part of the production processes out of the firm. But the difference can also be due to decline in markups. The results in column (c) in panel B indicate a weakly negative effect of competition on firms' profits. Unfortunately due to the logarithm transformation, information on firms that switch from positive to negative profits are lost. In column (d) the dependent variable is a measure production fragmentation which is the logit transformation of value added divided by the gross value of output. The difference in difference coefficient is found to be negative and significant, confirming that the competition with China decreases the contribution of Danish firms on their sales.

6.2 The Impact of Competition on Employment

Table 4 presents the results for the impact of competition on the level of employment. In the top panel of table 4, the specification with the discrete indicator variable as specified in equation 3 is presented, while the bottom panel of table 4 presents the estimation results of equation 4. In column a, the dependent variable is the full-time equivalent number of employment (in logarithm), while in column b, the dependent variable is the logarithm of the number of employees that are on the payroll and actively work. The coefficients indicate a significant and negative employment impact of the removal of MFA quotas on Danish T&C industry. Focusing on the top panel, the coefficient in column (a) indicates that employment in full-time units decreases disproportionately after the WTO accession of China, by about 20 %, among firms that are found to have produced MFA quota goods in 1999. The respective coefficient in column (b) is also negative and significant, but smaller in magnitude, indicating an about 17 % disproportionate decline.[16]

Since the employment is expected to respond to the competition in a continuous manner, the cross-sectional differences in intensities can provide an additional source of identification in equation 4. The results with the continuous version of the treatment group presented at the bottom panel of Table 4 confirm this.

6.2.1 Occupation and Education Characteristics

The analysis so far shows that intensified competition with China brought on by the MFA quota removal causes firms to decrease their level of employment as their sales decrease. Does the competition affect everybody's likelihood of loosing his/her job in the same way? Recently Bloom et al. (2011) find that Chinese competition is associated with an increase in IT inten-

[16]The differences in magnitudes in the coefficients may indicate that the adjustment is both made at the extensive margin as firms fire employees but also at the intensive margin by decreasing the hours of work. Further analysis in section 6 reveals that recent employment loss in the T&C industry, which is not necessarily due to competition with China, occurs more among part-time employees in general. Since the analysis of the effect of MFA quota removal measures disproportionate impact, this may cause a slightly higher coefficient estimate for the FTE analysis compared to the coefficient estimate of the head-count analysis.

sity and patent counts among a sample of European manufacturers. If the competition causes upgrading, or if firms outsource more and concentrate on certain types of production activities, one expects to see traces of these possible strategy changes in a detailed employment analysis. Thoenig and Verdier (2003) and Thesmar and Thoenig (2000) both show that increased competition can lead to a change in within firm organization that biasses towards skilled labor. With these theoretical findings in mind the differential impacts of competition across different types of occupations and employees with different education levels are investigated next.

Table 5 presents results on occupation characteristics.[17] The dependent variable in column a is the logarithm of the number of employees who work in jobs that require no specific skill (such as in cleaning services, transportation services, guard services) or basic skill jobs (such as machine operators in the production facility). The coefficient is found to be negative and significant at the 1 percent level. The dependent variable in column b is the logarithm of the number of employees who work in jobs that require basic skills only. The coefficient is negative and significant at the 1 percent level with even larger magnitude than the corresponding coefficient in column a, indicating an about 27 % decline in the number of employees who occupy jobs that require basic level skills. In column c, the dependent variable is the logarithm of the number of employees in jobs that require professional and technical skills. The coefficient in column c is found to be negative but insignificant and the respective coefficient in Panel B is found to be positive and insignificant.

These results may indicate a possible change in the structure of the production within firms. Firms may decrease their production activities on more standard goods while they outsource more and focus on non-production activities such as technical designs, product developments and marketing. This type of structural change should manifest itself in the educational backgrounds of the employees as well.

[17]The labour data set (IDA) contains information on the major categorization of the positions that the person holds within a firm. The Danish statistics created the Danish version of the ISCO-88, called DISCO-88 in 1996 to replace the previous categorization. So there is a discontinuity between the codes between pre and post 1996 data. Hence the sample starts with 1996 for this analysis. See the appendix for more details. Note also that, due to missing information or other reasons, part of the employees are not assigned to any occupation group, and they are classified under the 'unspecified employees' group. The analysis in Table 5 excludes them.

In table 6 in column (a), the dependent variable is 1 plus the number of employees in a firm who have at least some college level education (logarithm).[18] The coefficient is found to be positive but not significant indicating no significant impact of competition on the number of employees with at least some college schooling. In column b, the dependent variable is the logarithm of 1 plus the number of employees in a firm who have at most a high school diploma.[19] The respective difference in difference coefficient is found to be negative and significant at the 1 percent level. The magnitude indicates an about 25 % disproportionate decline after the WTO accession of China in less educated employees of firms that manufacture MFA quota goods compared to other firms. The results are also robust to using MFAQShare as presented in the bottom panel of table 6. In column (c) the dependent variable is the logarithm of 1 plus the number of employees in a firm who have skill education in textile and clothing production.[20] This includes skill education as textile operator, clothing operator, and knitting operator among others.[21] The results in both panels of table 6 in column (c) show a significant negative impact of Chinese competition on production workers. The coefficient estimate at the top panel indicates 15 % disproportionate decline in employees with production floor training among affected firms. Finally in column (d) the dependent variable is the logarithm of 1 plus the number of employees in a firm who have textile and clothing related technical design education. This type of education is at the college level so it is a subset of college educated

[18]The educational backgrounds of the employees are derived from the 8-digit code variable that shows the highest completed education of the person. Since this code is not available for 2007, year 2007 data are not used in the analysis of education characteristics. See the appendix for details on this code and related variables. For higher or more specialized education levels the number of zeros - companies with no such employees - increases. Because of this the transformation 1 plus the number of employees is used when taking logarithms. The addition of unity is arbitrary, but equal to the sample mean of the counts. The results are robust to using the count data without any transformation and use a non-linear estimator to account for the over dispersion.

[19]In Denmark, a high school diploma requires 12 years of schooling after pre-school education. This category does not include skill education in technical high schools. See footnote 19.

[20]Skill education in Denmark is provided by the technical high schools (after 9 years of mandatory schooling) and involves several years of formalized training including both schooling and apprenticeship. For example being a tailor requires between 3 years and 3 years and 4 months skill education or being an industry operator requires between 2 years and 2 years and 8 months education depending on additional qualifications. Employees are identified with skill education in textile and clothing production based on having completed such an education.

[21]See appendix for the complete description of education variables.

employees. This education includes industrial design, product development and textile and garment technologists. The coefficient estimate at the top panel shows a positive and significant impact of competition on technical design employees.

These findings indicate that Chinese competition with Danish T&C industry hits the basic-level employees such as production workers heavily while the amount of professional and technical employees seems mostly not to be affected. Thus an asymmetric impact of competition from a low-wage country is found on different types of employees, indicating that the competition intensified the compositional change within firms. These results also provide supporting empirical evidence on the theoretical channels proposed in Thesmar and Thoenig (2000) and Thoenig and Verdier (2003).

In table 7 the results with skill-intensity measures are presented. In column (a), the dependent variable is the logarithm of the number of college educated people over the total number of employees in a given firm. Both with the indicator variable showing whether a firm has produced any good protected by Chinese imports under MFA in 1999 and with the variable indicating share of those goods in total sales in 1999, the difference in difference coefficients are found to be positive and significant. The magnitude of the coefficient in the top panel indicates a 23 percent or an about 4 percentage point disproportionate increase in the share of college educated employees. Lastly, in column (b), the dependent variable is the logarithm of the wage share of college educated employees, and the coefficients in both panels are found to be positive and significant at the 10 percent level. The magnitude of the coefficient in the top panel indicates a 14 percent or an about 2 percentage point disproportionate increase in the share of college educated people in firms that are directly affected by the intensified Chinese competition. Together with previous results, these results indicate that the competition causes a significant increase in the average education level of employees within firms as firms shrink and lay off only employees that have lower education levels and are mostly employed in jobs requiring basic skills.

6.2.2 Wages

In table 8, the results for the impact of competition on wages are presented. The dependent variable in column (a) is the logarithm of average hourly wage among all employees. The coefficient in column (a) in the top panel is found to be positive and significant at the 5 % level, indicating that the competition with a low wage country has a positive effect on average within firm wages. The dependent variable in columns (b) is the logarithm of average hourly wages among basic skills occupations. The results give a better idea about the sources of the positive wage effect.[22] Competition from China is found to have significant positive effect on the basic skill required occupation wages[23] with no significant effect on wages of professional and technical occupations. Although this seems at first odd[24], if base-level employees are the ones most likely to loose their jobs -as found in Table 5- it could be the selection effect that the low end of the productivity distribution, and so the wage distribution, is downsized first. Another possibility is that, if the competition triggers offshoring of basic-level jobs, offshoring, as shown in Grossman and Rossi-Hansberg (2008), can drive an increase in the productivity of low-skill jobs at home, which in turn cause an increase in real wages. The previous analysis (results on tables 5 and 7) is in line with the selection hypothesis, as a significant increase is found in the concentration of more educated employees within firms.

In columns (c) and (d) average wages of workers across different educational backgrounds are analyzed. Neither the average wages of workers with at most a high school diploma nor the wages of workers with at least some college education is found to be affected by the competition with China.[25] These results support the notion that the positive effect on wages of blue collar

[22]The regressions of the logarithm of average hourly wages among professional and technical occupations do not show any significant result. Since the F-tests for these regressions are too low to reject the null hypothesis that the slope coefficients are jointly zero at any conventional level of significance, they are not presented.

[23]The positive effect is not confirmed by the analysis with the MFA intensity variable.

[24]Assuming imperfectly elastic labor supply, competition from low-wage countries is expected to have the opposite effect on wages of unskilled workers according to trade theory.

[25]While there is an about 6 percent increase found in wages of college educated employees after 2002 in general, that is not attributable to competition with China. Hummels et al. (2010) using the same data-sets but focusing on a sample of bigger Danish manufacturers across all manufacturing industries find a positive association between firms' own import intensity and wages of college educated employees.

workers (basic skill occupations) is due to selection effects. To further confirm, an analysis of the education backgrounds and experience levels within occupation groups is presented in table 9. The results show clearly that average education level as well as average experience increase significantly within basic skill required jobs. In general, the finding that competition with low wage locations leads to an adjustment at the quantity margin rather than adjustment on the wages within manufacturing is in line with the general structure of the Danish labor market with low cost of hiring and firing for firms. The finding that increased average education and experience level is especially relevant within basic skill required jobs can indicate decentralization of authority in accordance with 'lean production' principles. Caroli and Van Reenen (2001) argue that organizational change should be followed by a declining demand for a less skilled labor and that new organizational structure often involve decentralization of authority. The results here are in line with the hypothesis that increased trade with China induces organizational changes that involve further decentralization.

6.3 The Impact of Competition on the Structure and Intensity of Capital

Table 10 presents the results for the estimation of equations 3 and 4 when the dependent variables are logarithm of capital, logarithm of investment and logarithm of capital per labor and logarithm of intangible assets.[26] While the value of capital assets are not found to be significantly affected by the competition, competition is found to have significant and negative impact on investment. This could be due to the possible sensitivity of investments on cash flows of firms, which may in turn be a result of imperfect financial markets. Competition with Chinese products in the T&C industry is also found to cause an increase in the capital labor ratio; this is due to the decline in labor rather than an increase in the capital assets as suggested by the results in column (a) of table 10 and in table 4.

One of the main arguments of European T&C industrialists over the surge of Chinese imports was the harm from those products to the value of 'high end' product images by providing

[26]Capital assets include the value of plants, machinery and other technical installations, lands, buildings, furniture and office equipment. Intangible assets are assets intended for long term ownership or use by the company. It includes licenses, trademarks, copyrights, exclusive distribution rights, software, goodwill, etc. Intangible asset information is collected as part of the accounting statistics (Regnskabsdata).

closely similar products with significantly cheaper price. While this type of harm would not show up in physical assets, it may have an effect on firms' intangible assets. The dependent variable in column (d) is the natural logarithm of intangible assets. The results at the top panel indicates a weakly negative impact of competition on intangible assets, but the results in Panel B show no significant effect when the continuous treatment measure used. It is likely that the impact on actual values of licenses and trademarks occurs after Chinese products penetrated the market. So if we restrict our attention to the 2002 quota removal experience, a stronger effect may be observed.[27] The results in table 11, where the competition proxy is adjusted for the goods that were subject to 2002 quota abolishment for China, corroborate this proposition. The coefficient estimate in column a of panel A indicates that decline in the value of intangible assets were disproportionately higher by about 48 % for those firms that are the most receptive to increased competition by the 2002 quota abolishment. Similarly, in column b, the dependent variable is a measure of firm scale as defined by the logit transformation of the ratio of intangible assets over total assets. The result indicates a strong negative effect of competition from China on firm scale. These results could be due to a decrease in the value of trademarks and licenses as cheaper and similar products (and maybe imitations) from China penetrate the markets. The results in panel B, when the competition proxy is taken as the share of goods that were subject to 2002 quota removal for China, are also robust. Note that penetration of cheaper products in the market may also affect firms' innovative activities. This is investigated next.

6.4 The Impact of Competition on Product Portfolio

In this section, the impact of competition on firms' incentive to introduce new products, to drop products, and on product portfolio strategies is investigated. The availability of the

[27] It is also possible that differences in intermediate goods' share in 2002 and 2005 quota categories contributes to this result, assuming that brand values and similar intangible assets are more intimately related to final goods. In 1999, only 12 % of the 2002 MFA categories in Danish import can be classified as intermediate goods, while this ratio is 30 % for the 2005 MFA categories in 1999. It is important to note, however, that both of these ratios decrease substantially as the Chinese share in these categories increases during the sample period. Broad product classification of products as intermediate goods is based on BEC Rev. 3. (Author's calculation.)

transaction data allows the construction of an objective and time varying measure for firms' innovative activities, which is the number of new products.[28] New products are defined as products that were not produced by the firm in previous years. If the firm appears in the data-set for the first time, then this variable is not defined. Similarly dropped products are defined as products that were not produced in future years, and it is not defined if the firm appears in the data set for the last time.[29] Since 2005 is the last year of the domestic transaction data-set and since dropped products will be undefined in 2005, attention is given to the 2002 quota removal experience only, and $MFAQ2Prod99$ is used as a treatment variable. As defined earlier, $MFAQ2Prod99$ is a dummy variable that indicates if a firm produced any good in 1999 that was subject to 2002 quota abolishment for China.[30]

6.4.1 New Product Introductions and Product Dropping

The analysis of the introduction of new products is presented in table 12. Since the likelihood of introducing new products, or dropping products is expected to increase as firms' product portfolios get larger, size quintiles, where the size is measured as the number of products, are controlled for in these regressions. In column (a) the dependent variable is 1 plus the logarithm of the number of new 6 digit HS products.[31] The difference in difference coefficient is found

[28]Previous literature on product innovation is mostly based on patent counts or innovation surveys. The problem with the former is that they only cover innovations that are sufficiently new and evaluated as 'worth to be patented' by the applicant and that they may never be introduced on the market. The latter, on the other hand, are mainly subjective in nature and depend on the personal judgements of respondents (Mairesse and Mohnen (2010)). Paunov (2011) also uses transaction data to measure firm-level product innovation.

[29]Product classifications are firm-specific and they are defined using export data between 1993 and 2007 combined with domestic trade data between 1995 and 2005 in 6-digit HS categories. Note that the possible time trends due to the construction of the variables are controlled for using time fixed effects in the empirical analysis.

[30]The results are robust to excluding year 2005 data (for new products), basing product classification only on the export transactions data, and taking the treatment to those firms that only export. They are available upon request.

[31]Because of the zeros when taking logarithms the transformation $1 + NewProducts_{it}$ is used where $NewProducts_{it}$ is the number of product introduction by firm i at year t. The addition of unity is arbitrary, but equal to the sample mean of the counts. Similar transformations are used for other count data variables with presence of zeros, e.g. the number of new varieties, or dropped products. An alternative approach is to use

to be positive and significant at the 10 percent level, indicating a positive effect, on average, of competition on the introduction of new products at the HS-6 level. With a broad product definition identification of 'new to firm' products may miss variety introductions to upgrade or diversify the product portfolio in an effort to alleviate the effect of competition. A new variety is defined as a new 8-digit product within the same 6-digit product category. If a firm introduces a new 8 digit product, and the firm has produced similar products before (sharing the same first 6-digit), this is considered an introduction of a new variety. The difference in difference coefficient is positive and significant at the 5 percent level, indicating that firms affected by the 2002 quota removal experience have an about 21 percent disproportionate increase in the number of new varieties introduced after China's accession to WTO.

The threatened group are firms that have MFA quota products (phases I-II-III) in their product portfolio in 1999. So one expects that their innovation activities are negatively affected among MFA quota categories due to Schumpeterian forces. However, as argued in Bloom et al. (2011), competition with China can trigger innovative activities of firms towards goods where China's comparative advantages are lower. The two opposing forces may hide the real effect of the competition. To address this, new product introductions among non-MFA quota categories are investigated in column (c) of table 12. The coefficient of the interaction variable is found to be positive and statistically significant at the 5 percent level. It indicates that the treated firms have 22 % more new product introductions in non-quota categories than the other firms in the quota-free environment. These results are in line with Arrowian theories that propose a positive relationship between competition and innovation.[32] In columns (a) and (c), the magnitude differences in the respective coefficients indicate that competition generally discourages innovative activities within MFA categories now facing the stiff competition, also confirming the Schumpeterian insight.[33] The dependent variable in column (d) is the logarithm of the

the count data without any transformation and use a non-linear estimator such as a negative binomial model to account for the over dispersion. The results are robust to using a fixed effect negative binomial model, and the respective coefficients are provided in the tablenotes.

[32]Arrow (1962) emphasizes the importance of the market size effect in firms' incentive to innovate that for a monopolist, innovation simply replaces one profitable investment with another, and this raises the opportunity cost of innovating, something that Arrow called the replacement effect. See for example, Schmidt (1997), Aghion et al.'s (2005) escape competition, Bloom, et al. (2010), which all share the basic insight of Arrow (1962).

[33]The result for new product introductions within MFA categories shows negative and significant effect and

number of new products in non T&C fields plus 1.[34] The difference in difference coefficient estimate is positive and significant at the 1 percent level, indicating a more than 29 % disproportionate increase in the number of product introductions outside of T&C industry among treated firms. As a result of the competition Danish firms steer away from goods in which now Chinese (and more general other low-wage countries') comparative advantage higher, even towards products outside of T&C.

The analysis shows that Danish manufacturers increase new product introductions and new varieties in response to the intensified low-wage competition. However, Schumpeterian forces are also found to be active so that the manufacturers decrease their innovative activities among the affected goods in particular.

The analysis of product dropping is presented in table 13. In column (a) of table 13 the dependent variable is the logarithm of the number of 6-digit dropped products plus 1. The difference in difference coefficient is positive and significant at the 1 percent level. Note that the impact of the low-wage competition is also found to be positive on the new product introductions. As firms start introducing new products, the likelihood of product dropping is also expected to increase, since some of their introductions will probably not be successful; so the impact of competition on firms' incentive to drop existing product lines is analyzed in column (b) of table 13. The results confirm that firms drop some of their product lines in response to the Chinese competition.

Both the new product introductions and product dropping results are stronger and robust to the narrower product definition at the 8-digit classification and available upon request.

6.4.2 Product Scopes

The analysis on labor and sales shows that firms scale down or contract as a results of the competition. Concentrating on certain products as a result, depending on the nature of the cost structure may be a potential source of efficiency gain.

available upon request.

[34] T&C products are product categories that are between 50 and 64 in 2 digit HS codes.

Competition can increase the product shuffling without necessarily affecting the scope, as firms can replace the dropped products by adding products whether new or not. Analysis on the product scope presented in column (a) of Table 14 shows that there is a weakly negative effect on the overall scope of the firms. While the competition triggers significant shuffling of the products with the new product introductions and dropping, the net effect is found to be negative. The results presented in column (b) indicate that competition in the export markets is an important dimension of the Chinese competition, as the disproportionate decline in the number of exported products is found to be even bigger than the decline in the total number of products. In columns (c) and (d), we can see the impact of competition on the number of products and the number of exported products separately for different size firms. While the first three quartiles of affected firms respond to competition with a decline in their number of products, the 4th quartile respond to it by increasing the number of products.[35]

7 Robustness Checks and Additional Analysis

Difference in difference setting using long time series may cause under-estimation of standard errors due to serial correlations in the dependent variables. In order to address this potential problem, the analysis is also conducted with data which is aggregated into two periods: pre-

[35]Competition can also affect firms' portfolio concentration. Lelarge and Nefussi (2010) argue that as firms from developed countries try to escape the competition with low-wage countries, it may be beneficial for them to introduce new products rather than investing in process innovation to cut the production costs. This is because engaging in competition on the production cost dimension is not likely to be their comparative advantage. On the other hand, they may choose to engage in process innovation in response to the high-wage country competition. However, this idea does not necessarily imply an increase in the diversification in response to the low-wage competition, as firms may choose to innovate in selective sets of goods while they drop some of their existing products that are under threat. In an additional analysis on Danish T&C firms, and using the same product portfolio concentration indices used in Lelarge and Nefussi (2010) for the purpose of comparison, on average a slight decline of the firms' product diversification is found. When the treatment group is categorized in terms of different size quartiles, the results indicate that firms with a smaller number of products decrease their diversification quite significantly while the degree of diversification of those firms located at the top quartile does not seem to be affected by the competition. These results indicate that low-wage competition leads to a decline in firms' product diversification strategies especially among smaller firms. They are available upon request.

and post-WTO. This approach, as argued by Bertrand, et al. (2004), works well in taking care of the serial correlation problem. If the results with aggregate data do not support the main results then this would be a good indication of under-estimated standard errors.

Tables from A-1 to A-4 in the appendix present the results with two period data and they are robust. In table A-1 results indicate that after 2002 firm value added and full-time equivalent labor decrease by about 6.5 % and 8 % respectively in T&C industry in general. But the impact on treated firms are disproportionately higher by about 20 % and 22.5 % respectively. The differences in coefficient estimates of the time dummy between full-time equivalent labor and head count analysis indicate that employment adjustment at the extensive margin (hiring/firing) rather than at the hours margin is more important in the Danish industry in general as probably part-time employees are laid off first. The results on employees with different educational backgrounds and occupations in table A-2 also confirm that Danish T&C industry experiences a structural change as those, who are laid off, are less educated people in general, more so for firms that are most receptive to the increased competition.

The first two phases of MFA quota abolishment were in 1995 and 1998. Although China was not able to benefit from these phases, it is important to see whether previous MFA quota removal had any significant impact on the industry. This is also important in validating the empirical approach followed. Table A-5 present year by year changes since 1995 in employment also by occupation categories for those firms that are found to have produced MFA quota protected goods in 1995. Results confirm that the significant impact started in 2002.

7.1 The Role of Import

Some of the firms that produce products that were protected by MFA quotas may have already outsourced part of the production, or simply use some part of the goods that were protected by MFA quotas as inputs. For those firms removing quotas may have been a mixed blessing, as they can benefit from cheaper outsourcing opportunities as well. To disentangle the potential import effect on firms that are threatened by Chinese competition, a triple difference-in difference analysis is used.

$$X_{it} = \alpha_0 + \alpha_1 * MFAQProd99_i * Dum02_t + \alpha_2 * MFAQImported99_i * Dum02_t +$$
$$\alpha_3 * MFAQImported99_i * MFAQProd99_i * Dum02_t + \sum_i \delta_f^F Firm_i + \sum_t \delta_t^Y Year_t + \epsilon_{it} \quad (5)$$

$MFAQImported99_i$ is the indicator variable that shows if a firm imports any MFA quota goods in 1999. In equation 5 the coefficient of interest is α_3 as it measures the variation in the dependent variable specific to MFAQ producers (relative to non-MFAQ producers) among MFAQ importers (relative to non MFAQ importers) in the years after the WTO accession of China.

The difference-in-difference-in-difference results on employment are presented in table A-6. All of the triple difference coefficients are found to be positive and they are significant at the 10 percent level for the full-time equivalent number of employees, the number of employees and the number of employees in professional level jobs. They indicate that firms that were producing MFA protected goods are less (negatively) affected by the competition if they were also importing MFA protected goods. As the results on education levels in table A-7 reveal, the skill upgrading and compositional changes within producer-importers also occur more in the direction of increasing the number of college educated employees, people in the technical design jobs or other professional jobs, rather than by downsizing associated increase in intensity of skilled employees.

7.2 The Impact on T&C Export

As in other small open advanced economies, exporting is a very important and relatively common activity for Danish producers. On average every year more than half of all of the Danish Textile and Clothing firms export (52 %).[36] To quantify any significant change in the prices and volumes of Danish textile and clothing exporters observed as a result of the MFA

[36]Many establishment level studies are based on data-sets that contain establishments with 10 or more employees. For the purpose of comparison, if I look at only those firms that have 10 or more employees then on average 82 % of Danish T&C firms exports (directly).

quota removal experience of China, the transaction-level export data-set between 1995-2007 is aggregated into firm (i), HS6 product (j), and year (t) level and equations 6 and 7 are estimated. In these regressions, instead of deflating unit prices, changes in the price levels specific to textile or clothing industries are controlled for using industry by year fixed effects. Product by firm fixed effects are also included due to the focus on within firm-product change in export prices and amounts.

$$lnX_{ijt} = \alpha_0 + \alpha_1 Dum02_t * MFAQExported99_i + \sum_{ij} \delta_{fp}^{FP} Firm_i * Product_j + \sum_{t} \delta_{tn}^{YI} Year_t * Industry_n + \epsilon_{ijt} \quad (6)$$

$$lnX_{ijt} = \alpha_0 + \alpha_1 Dum02_t * MFAQExportShare99_i + \sum_{ij} \delta_{fp}^{FP} Firm_i * Product_j + \sum_{t} \delta_{tn}^{YI} Year_t * Industry + \epsilon_{ijt} \quad (7)$$

The dependent variable X_{ijt} denotes the variables of interest which are the price and quantity of firm i's product j at period t. In equation 6 the treatment group is $MFAQExported99$ consisting of firms that produced one or more of MFAQ products in 1999. In equation 7 the treatment group is $MFAQExportShare99$ which is the export share of MFA quota protected goods over their total exports in 1999.

The results are presented in A-8. The price effect is found to be significant, indicating 6.3 % disproportionate decline after 2001 in prices of firms that exported quota products in 1999. The second column presents the results when the dependent variable is the logarithm of the firms' export quantity. Export quantity is also found to be negatively affected as the coefficient is found to be negative and significant at the 10 percent level. The columns c and d present the estimation result of equation 7. Analysis using the share variable reveals that the average price decline is not linearly related to the extent of MFA export share but the decline in export volume is. This is probably because firms do adjust their product portfolios in response to competition with new introductions (as revealed in the main analysis) but it takes time to be good at in exporting these new products with significant quantities.

8 Concluding Remarks

I construct a new data-set that provides detailed information on within firm adjustments in employment and product strategies for Danish Textile and Clothing industry. The sample period allows one to exploit the MFA quota removals after the WTO accession of China and the resulting intensification of Chinese (or "low wage country") competition.

First, firms with product portfolios containing products that were subject to MFA quotas before the WTO accession of China are identified. Then, using the difference in differences approach, any disproportionate changes are measured in such firms in response to the quota removal experience, after controlling for firm-fixed effects and aggregate shocks.

The results show substantial negative impact of Chinese competition on firm sales, value-added, profit, and employment. Competition is also shown to induce significant compositional changes within firms. Particularly, only the jobs that require basic skills or no specific skills are found to be negatively affected, while jobs that require professional and technical skills are not found to be affected by the competition with China. Similarly, employees with lower level of education (high school or less) and production floor workers are found to have the highest likelihood of being laid off due to competition. Thus the results show a significant increase in skill intensity of firms, more specifically the proportion of employees with college education as well as the proportion of employees that have professional or technical jobs increases significantly due to the competition. When education levels of employees are analyzed within job categories, it is found that the basic skill category of jobs experiences a disproportionate increase in skill intensity as measured by education levels. An associated significant increase in average wages of the basic skill category jobs is also documented. These findings may imply a certain flattening of the firms' organizations in accordance with lean production principles.

Competition is also found to trigger substantial shuffling of products within firms. First, firms' intangible assets are found be negatively affected by competition. Second, firms' incentive to introduce new products significantly increases with the heightened competition, and firms are found to channel their innovative efforts away from the products where China's competitive advantage is now higher. Third, as firms directly affected by competition are also found to

drop their existing products disproportionately, a weakly significant negative effect is found on product scopes.

These results may indicate that competition induced innovation may not compensate for the loss in intangible assets inflicted by competition, and they provide a cautionary note to the literature that emphasizes the positive link between Chinese competition and innovation. The results also provide empirical support for the notion of 'defensive skilled biased innovation'. The results altogether show an important role of the distributional impact of low-wage competition within firms in restructuring the industry.

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9 Tables and Figures

Table 3: Sales

Panel A				
Sample	Textile and Apparel Manufacturers (1995-2007)			
	(a)	(b)	(c)	(d)
Variable	Log Turnover	Log Value Added	Log Profit	Fragmentation Measure
$MFAQProd99_i * Dum02_t$	-0.116^{*}	-0.147^{*}	-0.074	-0.098^{*}
	(0.056)	(0.058)	(0.109)	(0.043)
Year Fixed Effects	yes	yes	yes	yes
Firm Fixed Effects	yes	yes	yes	yes
N	7270	7248	5839	7243
Number of Firms	1090	1090	1032	1090
F	3.107	6.689	3.187	20.333
Panel B				
Sample	Textile and Apparel Manufacturers (1995-2007)			
	(a)	(b)	(c)	
Variable	Log Turnover	Log Value Added	Log Profit	Fragmentation Measure
$MFAQShare99_i * Dum02_t$	-0.248^{**}	-0.296^{***}	-0.336^{*}	-0.197^{**}
	(0.087)	(0.085)	(0.150)	(0.063)
Year Fixed Effects	yes	yes	yes	yes
Firm Fixed Effects	yes	yes	yes	yes
N	7270	7248	5839	7243
Number of Firms	1090	1090	1032	1090
F	3.488	7.191	3.551	21.090

Robust standard errors are reported in parentheses. They are clustered for firms. The constant is included but not reported. The dependent variable in column a is the natural logarithm of the firm turnover (revenue). The dependent variable in column b is the natural logarithm of the value-added. The dependent variable in column c is the natural logarithm of the profit before taxes. The dependent variable in column d is the logit transformation of the ratio of value added over value of production. Data source: Regnskabsdata, Statistics Denmark.

Table 4: The Impact of Competition on Employment

Sample	Textile and Apparel Manufacturer Firms (1995-2007)	
	(a)	(b)
Variable	Log FTE	Log Labor
$MFAQProd99_i * Dum02_t$	-0.210^{***}	-0.197^{***}
	(0.055)	(0.054)
Year Fixed Effects	yes	yes
Firm Fixed Effects	yes	yes
N	7209	7170
Number of Firms	1090	1080
F	10.872	11.045
$MFAQShare99_i * Dum02_t$	-0.324^{***}	-0.298^{***}
	(0.087)	(0.089)
Year Fixed Effects	yes	yes
Firm Fixed Effects	yes	yes
N	7209	7170
Number of Firms	1090	1080
F	10.923	10.777

Robust standard errors are reported in parentheses. They are clustered for firms. The constant is included but not reported. In column a, the dependent variable is the logarithm of the full-time equivalent number of employees. In column b, the dependent variable is the logarithm of the number of employee head-count. FTE information is from Regnskabsdata and head-count information is from IDA, Statistics Denmark.

Table 5: The Impact of Competition on Employment By Major Occupation Groups

Sample	Textile and Apparel Manufacturer Firms (1996-2007)		
	(a)	(b)	(c)
Variable	Log No of Employees with No or Basic Skill Required Jobs	Log No of Employees with Basic Skill Required Jobs	Log No of Employees with Professional Skill Required Jobs
$MFAQProd99_i * Dum02_t$	-0.260^{***}	-0.312^{***}	-0.046
	(0.073)	(0.075)	(0.061)
Year Fixed Effects	yes	yes	yes
Firm Fixed Effects	yes	yes	yes
N	5390	5259	3585
Number of Firms	971	965	733
F	22.776	21.745	3.510
$MFAQShare99_i * Dum02_t$	-0.404^{***}	-0.455^{**}	0.100
	(0.115)	(0.114)	(0.108)
Year Fixed Effects	yes	yes	yes
Firm Fixed Effects	yes	yes	yes
N	5390	5259	3585
Number of Firms	971	965	733
F	23.206	22.266	3.675

Robust standard errors are reported in parentheses. They are clustered for firms. The constant is included but not reported. The dependent variable in column (a) is the logarithm of the number of employees that are classified as doing basic skill required jobs (e.g. stationary machinery operators) or no specific skill required jobs employees (e.g. cleaning people, guards). The dependent variable in column (b) is the logarithm of the number of employees that are classified as doing basic skill required jobs. The dependent variable in column (c) is the logarithm of the number of employees that are classified as executives, top-level employees (e.g. engineers) and intermediate-level employees, (e.g. laboratory technician, computer programmer). Since the occupation classifications have changed in 1996, there is a structural break in occupation variables between 1995 and 1996. So the 1995 data are not used in this analysis. The source of the data is persondata (IDA), Statistics Denmark.

Table 7: Skill Intensity

Sample	Textile and Apparel Manufacturers (1995-2006)	
	(a)	(b)
Variable	Log College Educated Share	Log College Educated Wage Share
$MFAQProd99_i * Dum02_t$	0.232***	0.135*
	(0.061)	(0.067)
Year Fixed Effects	yes	yes
Firm Fixed Effects	yes	yes
N	3310	3218
Number of Firms	662	656
F	14.631	12.537
$MFAQShare99_i * Dum02_t$	0.313**	0.271*
	(0.104)	(0.111)
Year Fixed Effects	yes	yes
Firm Fixed Effects	yes	yes
N	3310	3289
Number of Firms	662	656
F	14.465	12.302

Robust standard errors are reported in parentheses. They are clustered for firms. The dependent variable in column a is logarithm of the share of employees with at least some college level education. The dependent variable in column b is logarithm of the share of the total wages to the college educated over total wages. The data sample is between 1995 and 2006. 2007 is not used because 8 digit education variable where the education characteristics variables derived from is not available that year. The source of the data is persondata (IDA), Statistics Denmark.

Table 6: The Impact of Competition on Employment By Education

Sample	Textile and Apparel Manufacturers (1995-2006)			
	(a)	(b)	(c)	(d)
Variable	Log No of Employees with College Education	Log No of Employees with High School Education	Log No of Employees with T&C Production Education	Log No of Employees with T&C Technical Design Education
$MFAQProd99_i * Dum02_t$	0.052	-0.288^{***}	-0.165^{***}	0.105^{**}
	(0.042)	(0.049)	(0.040)	(0.035)
Year Fixed Effects	yes	yes	yes	yes
Firm Fixed Effects	yes	yes	yes	yes
N	6788	6788	6788	6788
Number of Firms	1077	1077	1077	1077
F	2.426	18.368	3.719	3.199
$MFAQShare99_i * Dum02_t$	-0.016	-0.303^{***}	-0.186^{**}	0.015
	(0.059)	(0.081)	(0.063)	(0.039)
Year Fixed Effects	yes	yes	yes	yes
Firm Fixed Effects	yes	yes	yes	yes
N	6788	6788	6788	6788
Number of Firms	1077	1077	1077	1077
F	2.456	16.457	3.441	3.132

Robust standard errors are reported in parentheses. They are clustered for firms. The dependent variable in column a is logarithm of the number of employees with at least some college level education plus 1. The dependent variable in column b is the logarithm of the number of employees with at most high school diploma plus 1. The dependent variable in column c is the logarithm of the number of employees with textile and clothing production training such as textile machine operator plus 1. The dependent variable in column d is the logarithm of the number of employees with textile and clothing related technical design education plus 1. The data sample is between 1995 and 2006. 2007 is not used because 8 digit education variable where the education characteristics variables derived from is not available that year. The source of the data is persondata (IDA), Statistics Denmark.

Table 8: The Impact of Competition on Wages

Sample	Textile and Apparel Manufacturers 1996-2006			
	(a)	(b)	(c)	(d)
Variable	Log Average Hourly Wage	Log Average Hourly Basic-Level Jobs' Wage	Log Average Hourly Wage of College Educated	Log Average Hourly Wage of High School Educated
$MFAQProd99_i * Dum02_t$	0.042^{**}	0.088^{***}	-0.022	0.037
	(0.015)	(0.020)	(0.035)	(0.022)
Year Fixed Effects	yes	yes	yes	yes
Firm Fixed Effects	yes	yes	yes	yes
N	6002	4932	2848	5462
Number of Firms	1016	952	598	971
F	7.078	3.519	2.734	4.050
$MFAQShare99_i * Dum02_t$	0.020	0.053	0.071	0.034
	(0.026)	(0.035)	(0.051)	(0.029)
Year Fixed Effects	yes	yes	yes	yes
Firm Fixed Effects	yes	yes	yes	yes
N	6002	4932	2848	5462
Number of Firms	1086	952	598	971
F	5.955	2.316	3.015	3.504

Robust standard errors are reported in parentheses. They are clustered for firms. The dependent variable in column a is the logarithm of the average hourly salary. It does not include the benefits. The dependent variable in column b is logarithm of the average hourly salary of employees who do jobs that require basic-level skills. The dependent variable in column c is the logarithm of the average hourly salary of employees with at least some college schooling. The dependent variable in column d is the logarithm of the average hourly salary of employees with at most high school diploma. Year 1995 data are not used because a new occupation groupings (DISCO-88) has implemented in year 1996. Year 2007 data are not used because the 8-digit education code (hffsp) where education-related variables are derived from is not available that year. Data source: IDA, Statistics Denmark.

Table 9: The Impact of Competition on the Within Occupation Composition

Sample	Textile and Apparel Manufacturers (1996-2006)			
	(a)	(b)	(c)	(d)
	Log College Rate	Log Average Experience	Log College Rate	Log Average Experience
Variable	Among Basic Level Jobs	Among Basic Level Jobs	Among Professional Level Jobs	Among Professional Level Jobs
$MFAQProd99_i * Dum02_t$	0.324^{***}	0.121^{***}	0.043	-0.011
	(0.090)	(0.030)	(0.059)	(0.034)
Year Fixed Effects	yes	yes	yes	yes
Firm Fixed Effects	yes	yes	yes	yes
N	1546	4986	2006	3390
Number of Firms	372	958	458	721
Adj R^2	0.201	0.082	0.026	0.159
F	8.865	37.713	2.159	22.343
$MFAQShare99_i * Dum02_t$	0.301^{*}	0.157^{***}	0.021	0.069
	(0.152)	(0.038)	(0.113)	(0.054)
Year Fixed Effects	yes	yes	yes	yes
Firm Fixed Effects	yes	yes	yes	yes
N	1546	4986	2006	3390
Number of Firms	372	958	458	721
F	9.466	34.793	2.180	20.892

Robust standard errors are reported in parentheses. They are clustered for firms. The dependent variable in column a is the logarithm of the share of college level employees among basic level occupations. The dependent variable in column b is the logarithm of the average work experience (the number of years as an employee) of employees who have basic level occupations. The dependent variable in column c is the logarithm of the share of college level employees among high level occupations. The dependent variable in column d is the logarithm of the average work experience of employees who have intermediate or above ranked jobs. Data source: IDA, Statistics Denmark.

Table 10: Firms' Assets

Panel A				
Sample	Textile and Apparel Manufacturers (1995-2007)			
	(a)	(b)	(c)	(d)
Variable	Log Capital	Log Investment	Log Capital Per Labor	Log Intangible Assets
$MFAQProd99_i * Dum02_t$	-0.014	-0.236*	0.218**	-0.349**
	(0.090)	(0.094)	(0.084)	(0.134)
Year Fixed Effects	yes	yes	yes	yes
Firm Fixed Effects	yes	yes	yes	yes
N	7105	6591	7045	5843
Number of Firms	1080	1068	1080	1049
F	14.170	31.994	15.666	82.012
Panel B				
Sample	Textile and Apparel Manufacturers (1995-2007)			
	(a)	(b)	(c)	(d)
Variable	Log Capital	Log Investment	Log Capital Per Labor	Log Intangible Assets
$MFAQShare99_i * Dum02_t$	-0.115	-0.390**	0.234*	-0.279
	(0.111)	(0.125)	(0.118)	(0.197)
Year Fixed Effects	yes	yes	yes	yes
Firm Fixed Effects	yes	yes	yes	yes
N	7105	6591	7045	5843
Number of Firms	1080	1068	1080	1049
F	14.347	32.636	15.462	83.628

Robust standard errors are reported in parentheses. They are clustered for firms. The dependent variable in column a is the logarithm of the physical capital assets. The dependent variable in column b is the logarithm of the total investment in physical assets. The dependent variable in column c is the logarithm of the physical capital per full-time equivalent labor. The dependent variable in column d is the logarithm of the value of intangible assets. Data source: Regnskabsdata, Statistics Denmark.

Table 11: Intangible Assets and Firm Scale

Panel A		
Sample	Textile and Apparel Manufacturers (1995-2007)	
	(a)	(b)
Variable	Log Intangible Assets	Firm Scale
$MFAQ2Prod99_i * Dum02_t$	-0.647^{***}	-0.648^{***}
	(0.172)	(0.164)
Year Fixed Effects	yes	yes
Firm Fixed Effects	yes	yes
N	5843	5843
Number of Firms	1049	1049
F	81.141	101.474
Panel B		
Sample	Textile and Apparel Manufacturers (1995-2007)	
	(a)	(b)
Variable	Log Intangible Assets	Firm Scale
$MFAQ2Share99_i * Dum02_t$	-1.700^{**}	-1.516^{**}
	(0.600)	(0.538)
Year Fixed Effects	yes	yes
Firm Fixed Effects	yes	yes
N	5843	5843
Number of Firms	1049	1049
F	83.217	104.810

Robust standard errors are reported in parentheses. They are clustered for firms. The dependent variable in column (a) is the natural logarithm of the value of intangible assets. The dependent variable in column (b) is the logit transformation of the ratio of intangible assets over total assets. Data source: Regnskabsdata, Statistics Denmark.

Table 12: New Product Introductions in Response to 2002 Quota Removal

Panel A				
Sample	Textile and Apparel Manufacturers 1996-2005			
Variables	Log Number of New Products	Log Number of New Varieties	Log Number of New Non-MFA Products	Log Number of New Non T&C Products
$MFAQ2Prod99_i * Dum02_t$	0.130^{*}	0.189^{**}	0.199^{**}	0.259^{***}
	(0.065)	(0.060)	(0.064)	(0.063)
Size (# of products) Quintile II	0.495^{***}	0.047^{*}	0.424^{***}	0.202^{***}
	(0.033)	(0.020)	(0.033)	(0.032)
Size (# of products) Quintile III	1.026^{***}	0.121^{***}	0.941^{***}	0.469^{***}
	(0.043)	(0.024)	(0.046)	(0.042)
Size (# of products) Quintile IV	1.770^{***}	0.313^{***}	1.624^{***}	0.997^{***}
	(0.051)	(0.035)	(0.056)	(0.059)
Size (# of products) Quintile V	2.732^{***}	0.658^{***}	2.579^{***}	1.773^{***}
	(0.068)	(0.057)	(0.070)	(0.078)
Year Fixed Effects	yes	yes	yes	yes
Firm Fixed Effects	yes	yes	yes	yes
Number of Observation	3465	3465	3465	3465
Number of Firms	735	735	735	735
F	180.114	17.633	150.347	67.612

Robust standard errors are reported in parentheses. They are clustered for firms. The product definitions are at the 6-digit HS. Product classification is made using export transaction data between 1993 and 2007 combined with domestic production data between 1995-2005. The sample period is 1996-2005. A new product is defined as a product that a firm started to sell/export that current year, which is not observed to be produced by the firm in previous years. If the firm appears in the data the first time, then this variable is not defined. The estimated coefficients of $MFAQ2Prod99_i * Dum02_t$ under the the fixed effect negative binomial estimators when the dependent variable is the count number are found to be 0.271^{***} (0.063), 0.339^{**} (0.117), 0.384^{***} (0.065) and 0.539^{***} (0.093) columns a, b, and c and d specifications respectively. Data source: Domestic and Foreign Trade Data Sets, Statistics Denmark.

Table 13: Product Dropping in Response to 2002 Quota Removal

Sample	Textile and Apparel Manufacturers 1995-2004	
Variables	Log Number of Dropped Products	Log Number Dropped Existing Products
$MFAQ2Prod99_i * Dum02_t$	0.556^{***}	0.474^{***}
	(0.084)	(0.097)
Size (# of products) Quintile II	0.458^{***}	0.110^{**}
	(0.039)	(0.039)
Size (# of products) Quintile III	0.914^{***}	0.254^{***}
	(0.044)	(0.050)
Size (# of products) Quintile IV	1.543^{***}	0.489^{***}
	(0.057)	(0.067)
Size (# of products) Quintile V	2.360^{***}	0.920^{***}
	(0.071)	(0.086)
Year Fixed Effects	yes	yes
Firm Fixed Effects	yes	yes
Number of Observation	3513	3247
Number of Firms	746	678
F	124.511	38.722

Robust standard errors are reported in parentheses. They are clustered for firms. The product definitions are at the 6-digit HS. Product classification is made using export transaction data between 1993 and 2007 combined with domestic production data between 1995-2005. A dropped product is defined as a product that a firm stopped selling that current year, not observed to sold by the firm in subsequent years. For firms that appear the last time in the data-set, dropped product indicator takes missing value. The estimated coefficients and the associated standard errors of $MFAQ2Prod99_i * Dum02_t$ under the the fixed effect negative binomial estimators are found to be 0.454^{***} (0.063), and 0.265^{**} (0.101) for the columns a, and b specifications respectively. Data source: Domestic and Foreign Trade Data Sets, Statistics Denmark.

Table 14: Product Scope

Sample	Textile and Apparel Manufacturers 1995-2005			
Variables	Number of Products	Number of Exported Products	Number of Products	Number of Exported Products
$MFAQ2Prod99_i * Dum02_t$	-0.085^{*}	-0.134^{**}		
	(0.042)	(0.049)		
$MFAQ2Prod99_i * Dum02_t * Quartile1$			-1.744^{***}	-1.617^{***}
			(0.226)	(0.240)
$MFAQ2Prod99_i * Dum02_t * Quartile2$			-1.032^{***}	-0.970^{***}
			(0.119)	(0.133)
$MFAQ2Prod99_i * Dum02_t * Quartile3$			-0.547^{***}	-0.630^{***}
			(0.085)	(0.108)
$MFAQ2Prod99_i * Dum02_t * Quartile4$			0.150^{***}	0.098^{*}
			(0.040)	(0.048)
$MFAQ2Prod99_i$	0.265^{***}	0.024	0.602^{***}	0.275^{**}
	(0.079)	(0.089)	(0.082)	(0.092)
Year Fixed Effects	yes	yes	yes	yes
Firm Fixed Effects	yes	yes	yes	yes
Number of Observation	4018	3929	4018	3929
Number of Firms	683	658	683	658
χ^2	787.062	607.550	1294.184	893.856

The results are obtained from the fixed effect negative binomial estimation. The product definitions are at the 6-digit HS. The dependent variable in column a and c is the number of products that a firm produces. The dependent variable in column b and d is the number of exported products. Data source: Domestic and Foreign Trade Data Sets, Statistics Denmark.

APPENDIX

A Additional Analysis

Table A-1: Pre-Post Analysis with Aggregate Data I

Panel A Sample					
	(a)	(b)	(c)	(d)	(e)
Variable	Log Turnover	Log Value Added	Log Profit	Log FTE	Log Labor
$MFAQProd99_i * Dum02_t$	-0.178^{**}	-0.220^{**}	-0.391^{*}	-0.256^{***}	-0.270^{***}
	(0.068)	(0.067)	(0.177)	(0.063)	(0.059)
$Dum02_t$	0.027	-0.069^{*}	-0.047	-0.086^{*}	-0.138^{***}
	(0.36)	(0.035)	(0.068)	(0.039)	(0.030)
Firm Fixed Effects	yes	yes	yes	yes	yes
N	1601	1599	1239	1599	1586
F	3.709	14.661	3.844	26.619	43.399
Panel B					
	(a)	(b)	(c)	(d)	(e)
Variable	Log Turnover	Log Value Added	Log Profit	Log FTE	Log Labor
$MFAQShare99_i * Dum02_t$	-0.275^{*}	-0.337^{**}	-0.452^{*}	-0.316^{***}	-0.338^{***}
	(0.112)	(0.103)	(0.201)	(0.089)	(0.086)
$Dum02_t$	0.009	-0.092^{**}	-0.090	-0.121^{***}	-0.175^{***}
	(0.034)	(0.033)	(0.069)	(0.035)	(0.029)
Firm Fixed Effects	yes	yes	yes	yes	yes
N	1601	1599	1239	1599	1586
F	3.353	15.773	5.418	25.365	44.870

Robust standard errors are reported in parentheses. The dependent variable in column a is the natural logarithm of the firm turnover (revenue). The dependent variable in column b is the natural logarithm of the value-added. The dependent variable in column c is the natural logarithm of the profit. In column d, the dependent variable is the logarithm of the full-time equivalent number of employees. In column e, the dependent variable is the logarithm of the number of employee head-count. The logarithm transformation is applied after taking the mean values of original variables across 1995-2001 and 2002-2007 periods. Data Source: Statistics Denmark.

Table A-2: Pre-Post Analysis with Aggregate Data II

Panel A Sample				
	(a)	(b)	(c)	(d)
Variable	Log No of Employees with Basic Skill Required Jobs	Log No of Employees with Professional Skill Required Jobs	Log No of Employees with High School Education	Log No of Employees with T&C Production Education
$MFAQProd99_i * Dum02_t$	-0.162	-0.081	-0.363^{***}	-0.205^{***}
	(0.088)	(0.089)	(0.056)	(0.042)
$Dum02_t$	-0.629^{***}	-0.088	-0.163^{***}	-0.023
	(0.052)	(0.059)	(0.026)	(0.016)
Firm Fixed Effects	yes	yes	yes	yes
N	1411	998	1582	1582
F	134.227	4.374	75.055	17.703
Panel B Sample				
	(a)	(b)	(c)	(d)
Variable	Log No of Employees with Basic Skill Required Jobs	Log No of Employees with Professional Skill Required Jobs	Log No of Employees with High School Education	Log No of Employees with T&C Production Education
$MFAQShare99_i * Dum02_t$	-0.399^{**}	0.061	-0.352^{***}	-0.254^{***}
	(0.127)	(0.148)	(0.084)	(0.073)
$Dum02_t$	-0.631^{***}	-0.130^{**}	-0.222^{***}	-0.050^{***}
	(0.047)	(0.049)	(0.026)	(0.015)
Firm Fixed Effects	yes	yes	yes	yes
N	1411	998	1582	1582
F	147.215	3.857	69.005	14.240

Robust standard errors are reported in parentheses. The dependent variable in column (a) is the logarithm of the number of employees that are classified as doing basic skill required jobs. The dependent variable in column (b) is the logarithm of the number of employees that are classified as executives, top-level employees (e.g. engineers) and intermediate-level employees, (e.g. laboratory technician, computer programmer). The dependent variable in column (c) is the logarithm of the number of employees with at most high school diploma plus 1. The dependent variable in column (d) is logarithm of the number of employees with T&C production training plus 1. Data Source: Statistics Denmark.

Table A-3: Pre-Post Analysis with Aggregate Data III

Panel A Sample					
	(a)	(b)	(c)	(d)	(e)
Variable	Log College Rate	Log High School Rate	Log College Wage Share	Log Hourly Wage	Log Hourly Wage of Basic Skill Jobs
$MFAQProd99_i * Dum02_t$	0.188^{*}	-0.118^{***}	0.114	0.055^{*}	0.077^{**}
	(0.089)	(0.035)	(0.102)	(0.022)	(0.027)
$Dum02_t$	0.282^{***}	-0.085^{***}	0.277^{***}	0.028^{*}	-0.059^{***}
	(0.060)	(0.021)	(0.076)	(0.012)	(0.017)
Firm Fixed Effects	yes	yes	yes	yes	yes
N	922	1505	909	1581	1411
F	37.066	35.019	23.102	12.279	6.517
Panel B					
	(a)	(b)	(c)	(d)	(e)
Variable	Log College Rate	Log High School Rate	Log College Wage Share	Log Hourly Wage	Log Hourly Wage of Basic Skill Jobs
$MFAQShare99_i * Dum02_t$	0.371^{*}	-0.035	0.403^{*}	0.017	0.057
	(0.172)	(0.045)	(0.166)	(0.032)	(0.050)
$Dum02_t$	0.310^{***}	-0.114^{***}	0.272^{***}	0.041^{***}	-0.043^{**}
	(0.050)	(0.019)	(0.062)	(0.011)	(0.015)
Firm Fixed Effects	yes	yes	yes	yes	yes
N	922	1505	909	1581	1411
F	35.272	27.021	27.530	9.497	4.309

Robust standard errors are reported in parentheses. The dependent variable in column a is logarithm of the share of employees with at least some college level education over total number of employees in a given firm. The dependent variable in column c is the logarithm of the number of people with at most high school diploma over the total number of employees in a given firm. The dependent variable in column c is logarithm of the share of the total wages to the college educated over total wages. The dependent variable in column d is the logarithm of the average hourly salary. It does not include the benefits. The dependent variable in column e is logarithm of the average hourly salary of employees who do jobs that require basic-level skills. Data Source: Statistics Denmark.

Table A-4: Pre-Post Analysis with Aggregate Data IV

Panel A Sample				
	(a)	(b)	(c)	(d)
Variable	Log New Product	Log New Non-MFA Products	Log New Non T&C Products	Log Dropped Products
$MFAQ2Prod99_i * Dum02_t$	0.171*	0.269***	0.371***	0.603***
	(0.070)	(0.070)	(0.068)	(0.090)
$Dum02_t$	0.031	0.046	0.129***	0.233***
	(0.039)	(0.038)	(0.035)	(0.041)
Size (# of products) Quintile II	0.368***	0.336***	0.186***	0.315***
	(0.067)	(0.072)	(0.059)	(0.092)
Size (# of products) Quintile III	0.923***	0.849***	0.509***	0.827***
	(0.082)	(0.090)	(0.078)	(0.124)
Size (# of products) Quintile IV	1.525***	1.407***	0.886***	1.447***
	(0.107)	(0.114)	(0.099)	(0.139)
Size (# of products) Quintile V	2.161***	2.062***	1.584***	2.176***
	(0.131)	(0.133)	(0.130)	(0.161)
Firm Fixed Effects	yes	yes	yes	yes
N	1060	1060	1060	1053
F	72.436	70.426	53.988	89.599

Robust standard errors are reported in parentheses. A new product is defined as a product that a firm started to sell/export that current year, which is not observed to be produced by the firm in previous years. A dropped product is defined as a product that a firm stopped selling that current year, not observed to sold by the firm in subsequent years. Data Source: Statistics Denmark.

Table A-5: The Impact of Competition on Employment By Major Occupation Groups II

Sample	Textile and Apparel Manufacturer Firms			
	(a)	(b)	(c)	(d)
Variable	Log FTE	Log Labor	Log Basic Level Jobs	Log Professional Skill Required Jobs
$MFAQProd95_i * 1996$	-0.019	-0.038	–	–
	(0.039)	(0.039)	–	–
$MFAQProd95_i * 1997$	-0.088	0.006	0.051	0.065
	(0.050)	(0.052)	(0.050)	(0.049)
$MFAQProd95_i * 1998$	-0.031	-0.061	-0.010	0.064
	(0.061)	(0.056)	(0.058)	(0.052)
$MFAQProd95_i * 1999$	-0.029	-0.103	-0.018	0.050
	(0.066)	(0.073)	(0.069)	(0.063)
$MFAQProd95_i * 2000$	-0.074	-0.054	-0.027	0.155^{*}
	(0.070)	(0.072)	(0.078)	(0.073)
$MFAQProd95_i * 2001$	-0.117	-0.075	-0.004	0.123
	(0.076)	(0.071)	(0.083)	(0.077)
$MFAQProd95_i * 2002$	-0.241^{**}	-0.211^{**}	-0.185	0.086
	(0.089)	(0.080)	(0.094)	(0.095)
$MFAQProd95_i * 2003$	-0.170^{*}	-0.202^{*}	-0.214	0.111
	(0.084)	(0.089)	(0.118)	(0.092)
$MFAQProd95_i * 2004$	-0.277^{**}	-0.316^{**}	-0.309^{*}	0.001
	(0.088)	(0.096)	(0.128)	(0.101)
$MFAQProd95_i * 2005$	-0.317^{***}	-0.299^{**}	-0.299^{*}	0.091
	(0.095)	(0.095)	(0.132)	(0.104)
$MFAQProd95_i * 2006$	-0.282^{*}	-0.280^{**}	-0.400^{**}	0.036
	(0.110)	(0.107)	(0.143)	(0.121)
$MFAQProd95_i * 2007$	-0.380^{**}	-0.335^{**}	-0.502^{**}	0.034
	(0.122)	(0.110)	(0.158)	(0.120)
Year Fixed Effects	yes	yes	yes	yes
Firm Fixed Effects	yes	yes	yes	yes
N	7209	7170	5180	3526
Number of Firms	1092	1086	1016	881
F	6.480	6.563	11.877	2.480

Robust standard errors are reported in parentheses. They are clustered for firms. In column a, the dependent variable is the logarithm of the full-time equivalent number of employees. In column b, the dependent variable is the logarithm of the number of employee head-count. In column c, the dependent variable is the logarithm of the number of occupied jobs that are at the basic skill level. In column d, the dependent variable is the logarithm of the number of occupied jobs that are intermediate level or above. $MFAQProd95_i$ is an indicator variable that takes 1 if firm i is found to produce MFA quota goods in 1995. Data Source: Statistics Denmark.

Table A-6: Import Channel I

Variable	(a) Log FTE	(b) Log Labor	(c) Log Basic Level Jobs	(d) Log Professional Level Jobs
$MFAQProd99_i * Dum02_t$	-0.314^{**}	-0.291^{**}	-0.489^{***}	-0.262^{*}
	(0.098)	(0.106)	(0.142)	(0.112)
$MFAQImported99_i * Dum02_t$	-0.248^{**}	-0.229^{**}	-0.016	-0.074
	(0.083)	(0.084)	(0.091)	(0.087)
$MFAQImported99_i * MFAQProd99_i * Dum02_t$	0.329^{*}	0.303^{*}	0.199	0.290^{*}
	(0.133)	(0.140)	(0.179)	(0.145)
Firm Fixed Effects	yes	yes	yes	yes
N	7209	7170	5180	3526
Number of Firms	1090	1080	959	726
F	10.388	10.222	18.393	3.381

Robust standard errors are reported in parentheses. They are clustered for firms. In column a, the dependent variable is the logarithm of the full-time equivalent number of employees. In column b, the dependent variable is the logarithm of the number of employee head-count. Data Source: Statistics Denmark.

Table A-7: Import Channel II

Variable	(a) Log No of Employees with College Ed.	(b) Log No of Employees with High School Ed.	(c) Log No of Employees with T&C Production Ed.	(d) Log No of Employees with T&C Technical Design Ed.
$MFAQProd99_i * Dum02_t$	-0.168^{*}	-0.288^{**}	-0.158^{*}	-0.018
	(0.066)	(0.092)	(0.072)	(0.030)
$MFAQImported99_i * Dum02_t$	-0.018	-0.179^{**}	-0.076	-0.022
	(0.054)	(0.065)	(0.049)	(0.033)
$MFAQImported99_i * MFAQProd99_i * Dum02_t$	0.298^{**}	0.142	-0.052	0.176^{**}
	(0.096)	(0.119)	(0.096)	(0.061)
Firm Fixed Effects	yes	yes	yes	yes
N	6788	6788	6788	6788
Number of Firms	1077	1077	1077	1077
F	2.811	16.721	3.332	2.996

Robust standard errors are reported in parentheses. They are clustered for firms. The dependent variable in column (a) is the logarithm of the number of employees with at least some college schooling plus 1. The dependent variable in column (b) is the logarithm of the number of employees with at most high school diploma plus 1. The dependent variable in column (c) is logarithm of the number of employees with T&C production training plus 1. The dependent variable in column (d) is the logarithm of the number of employees with textile and clothing related technical design education plus 1. Data Source: Statistics Denmark.

Table A-8: Export Prices and Quantities

Sample	Trade Data: Textile & Clothing Export 1995-2007			
Variables	Log Price	Log Quantity	Log Price	Log Quantity
$Dum02_t * MFAQExported99_j$	-0.065^{**}	-0.163^{*}		
	(0.025)	(0.079)		
$Dum02_t * MFAQExportShare99_j$			-0.010	-0.557^{**}
			(0.047)	(0.173)
Industry By Year Fixed Effect	yes	yes	yes	yes
Product (HS6) by Firm Fixed Effect	yes	yes	yes	yes
Number of observation	243033	243033	243033	243033
F	5.785	3.918	5.783	4.356

Robust standard errors are reported in parentheses. They are clustered for each firm. Constant is included but not reported. The sample covers all reported export transactions in textile and clothing between 1995 and 2007. Data Source: Statistics Denmark.

B Constructing Matched Data Sets for the Textile and Clothing Industry

The data sets used in this study are compiled from different sources mainly within Danmark Statistik. The main data sets are international trade data-set (Udtræk Udenrigshandel), domestic trade data-set (Udtræk Varestatistik), firm accounting data-set (Udtræk Regnskabsdata) and person data-set (Udtræk Persondata / IDA). Detailed information regarding the content, coverage as well as the variable definitions of these data-sets can be found at http://www.dst.dk/da/Statistik/dokumentation/times.aspx. Quota information is reported in the SIGL (Système Intégré de Gestion de Licenses) database and is available online at http://trade.ec.europa.eu/sigl/index.html. Below I will provide a brief summary of the content and coverage of the confidential data-sets.

The International trade data-set (Udtræk Udenrigshandel): The international trade data set is compiled from the Danish Customs records. Each shipment record includes the date of the shipment, the value of shipment, the product code (The Combined Nomenclature (CN)-8 digit)[37], the name of the product, weight of the shipment, type of the weight and when relevant

[37]The CN is comprised of the Harmonized System (HS) nomenclature with further European Community subdivisions. The first 6-digit of the classification matches with the Harmonized System. The detailed description of the CN codes can be found at http://udr.dst.dk/nomenklatur/index.aspx

quantity information as well as the unique firm identifier. Statistics Denmark aggregated this data into annual shipments for each triplet of product (CN-8 digit), country and firm. As provided by the Statistics Denmark, the international transaction data-set does not have a truncation at the firm-level as it covers the universe of the Danish firms' transactions between the period of 1993-2007. However, only the product shipments of 10,000 kr (approx. 1700 USD) or more included in the data set. To calculate unit prices uniform weight/quantity measures are used per product.

Domestic trade data (Udtræk Varestatistik): The industry's sales of products are recorded in the 10-digit product classification. The first 8 digits of the classification of goods is always identical to the combined nomenclature. This data-set is available for the period 1995-2005. Only firms with employment of 10 people or more two years prior to current(statistics) date are included in this survey.

Firm Accounting data (Udtræk Regnskabsdata): Business statistics data are compiled from survey results of firms that take part in an annual financial survey as well as from the annual tax reports, vat reports, and annual reports from incorporated companies. The general business statistics include only firms that employ at least a 0.5 FTE (full-time equivalent employment) employment and/or have had an estimated earnings of a certain size. Earning sizes are estimated differently for different industries.[38]. However, some of the data for small firms may be subject to imputation. This data-set is available starting from 1995. Only manufacturing, construction and retail sectors are included until 1998. In 1998, the wholesale trade sector is included and starting from 1999 it covers almost all sectors including mining, and all business service sectors.[39]

Integrated Database for Labour Market Research (IDA): A longitudinal yearly data-set of persons (age 15-70) are merged with establishments. It contains establishment and industry codes, education-level, wages, type of jobs, work experience, age, and other person classifications. For

[38]In the wholesale trade sectors, the limit of earnings is typically over 500,000 Danish Kroner, while in the manufacturing industry, it ranges between 150,000 and 200,000 Danish Kroner.

[39]Starting from 1999, the data-set includes hospitality, transportation, telecommunication, real estate, rental services, information technology services, research and development services, and other consultancy and business services. It does not include agriculture, financial sector, public, education and medical service sectors.

a complete description see the Danmarks Statistik document at http://www.dst.dk/da/Statistik/dokumentation/T databasen.aspx.

All of the data-sets are accessed through the LMDG (Labor Market Development and Growth) project sponsored servers, and the routine cleaning procedures have been executed both by the Danish Statistics employees but also by the LMDG. For the details of the cleaning procedures conducted by the LMDG project, see Bunzel (2009).

B.1 Firm-Level Values

Raw materials, intermediate goods, capital goods, electric, gas, water, and output deflators provided by the Danish Statistik are used to deflate the nominal variables. Wages are deflated using cpi. Sales and output values are deflated separately for the textile and apparel producers using the output deflators. Value-added information is derived by the author using the following formula: [turnover+work performed for own purposes and capitalized+(end of year inventory-beginning inventory)-[purchase of raw materials + energy + subcontracting expenses]. Values are expressed in thousand year 2000 constant Danish Kroner except the hourly wages. Hourly wages are expressed in constant 2000 Danish kroner. Physical capital assets include plant, machinery, technical installations, land, buildings, and other equipments such as computers, and office furniture. Table B-1 and B-2 present summary statistics for firm-level variables from Regnskabsdata and IDA data-sets.

Table B-1: Summary Statistics I

Source	Regnskabsdata				
Variables	N	Median	Mean	Standard Deviation	Sample
Turnover	7271	5115	21569	54854	1995-2007
Value Added	7271	2692	9774	24035	1995-2007
Profit	7271	242.6	1254	7049	1995-2007
Total Assets	7271	3577	17978	68464	1995-2007
Capital	7271	934	5275	21623	1995-2007
Investment	7271	132.2	1053	6647	1995-2007
Full-time Equivalent Labor	7271	5.96	17.98	39.38	1995-2007
Average Full Wage (Per Person)	7209	261.7	275.4	108.2	1995-2007

Values are expressed in constant 2000 prices in thousand Danish kroner.

Table B-2: Summary Statistics II

Source	IDA				
Variables	N	Median	Mean	Standard Deviation	Sample
Head-Count Labor	7170	7	20	41.18	1995-2007
Total Hours	7170	8321	25827	57044	1995-2007
Professional and Technical Labor	6482	1	3.442	8.273	1996-2007
Basic or Non-Skilled Labor	6482	3	12.55	30.88	1996-2007
Unclassified Labor	6482	2	3.059	6.792	1996-2007
Average Hourly Wages	7056	138.1	142.6	52.58	1995-2007
Average Hourly Wages of Professional Employees	3524	190.5	198.4	84.77	1996-2007
Average Hourly Wages of Basic Skilled Employees	5179	132	136.2	45.89	1996-2007

Values are expressed in constant 2000 prices in Danish kroner.

B.2 Employee Characteristics (IDA)

Every person is attached a code regarding its status in the firm, such as the 'employer', 'director', 'top-level employee', 'mid-level employee' etc..The structure of this occupation code changed in 1996 in order to comply with the major groupings of the the International Standard Classification of Occupations Codes (ISCO-88). I drop inactive people such as retirees, employees on leave as well as owners' spouses before calculating the employment characteristics for each firm.

The classification of occupations are derived from the variable 'pstill2'. The professional and technical employees in the analysis corresponds to the 'pstill2' codes 31, 32, and 34 which are executives, top-level professional employees and intermediate level professional and technical employees, respectively. The classification of employees with basic skill requirement corresponds to the pstill2 value 35, which includes work that requires basic level skills, such as, office work, or operating different types of stationary machinery. The classification of employees with no skill requirement refers to the pstill2 value 36, which includes works such as cleaning services, delivery services, guard work, and transport work. The last grouping, which corresponds to the pstill2 value 37, contains unclassified jobs.

In order to extract information about the educational backgrounds of people, I use the 8-digit education code, 'hffsp', that shows the person's maximum completed education level combined with professional training. The first two digit of the code indicates the main education groups.

The group of people with at most high school diploma refers to the hffsp value equal or smaller than 25 in the first two digits. The group of people with at least some college schooling refers to the hffsp value equal or bigger than 40 in the first two digits. Those people with professional training (college level) in technical design in textile and clothing industry corresponds to hffsp value 405985, it includes industrial designer, model engineering, product developer, textile and garment engineering training. Those people with production training in textile and clothing industry corresponds to hffsp values 355880 and 355890, it includes clothing operator, fashion craft, hand stitchers, cutter, tailor, knitting operator, textile operator, textile worker etc..Since 8-digit education code is not reported in 2007, the relevant variables are not constructed for that year.

In the labor (IDA) data-set, for each employed person there is a unique firm identifier provided for the employer. Using this firm identifier, extracted information from IDA is merged with the Firm Accounting Data Set for each year. Only a couple of observations in firm accounting data have left unmatched from this matching.

B.3 Product Characteristics

Export data between 1993 and 2007 and domestic trade between 1995 and 2005 are merged to construct product classifications. The first 8 digit of the product categories in the domestic trade data are the same as the combined nomenclature (CN) as reported in the international trade data. Product classifications are made according to both 8-digits and 6-digit classifications. Products are defined in HS-6 digit in the analysis if not otherwise stated. Analysis with 8-digit product classification is also available upon request. Table B-3 presents summary statistics. The median number of products (HS-6) produced among the Textile and Apparel firms is 6. About 43 % of the firms are found to produce between 1 to 5 HS-6 digit products as shown in the table B-4. Table B-5 also shows the transition probabilities for firms between the number of products they produce. For those firms produce 1 to 5 products, the probability of producing 1 to 5 products next period is about 84 percent.

Table B-3: Summary Statistics III

Source	Custom and Domestic Sales Data Sets				
Variables	N	Median	Mean	Standard Deviation	Sample
Number of (6-digit) Products	4211	6	15.562	25.219	1995-2005
Number of New Products	3466	2	5.715	11.338	1996-2005
Number of New Non-MFAQ Products	3466	2	4.847	9.976	1996-2005
Number of New Non-T&C Products	3466	0	2.220	6.767	1996-2005
Number of New Modifications	3466	0	0.793	1.849	1996-2005
Number of Dropped Products	3514	2	4.795	10.601	1995-2004

Table B-4: Distribution of Firms Over the Number of Products

Sample	Textile and Apparel Manufacturers 1995-2005					
# of products (hs6)	**1-5**	**6-10**	**11-15**	**16-20**	**21-25**	**25+**
Percentages	43.45	16.39	9.60	7.05	4.89	18.61

Table B-5: **Transition Matrix between the Number of Products**

	Number of Products at $t+1$					
# of products (hs6) at t	**1-5**	**6-10**	**11-15**	**16-20**	**21-25**	**25+**
1-5	84.35	10.79	2.46	1.00	0.33	1.07
6-10	24.44	48.38	17.78	5.30	1.20	2.91
11-15	7.07	27.01	33.44	17.36	7.40	7.72
16-20	6.61	4.96	22.73	36.78	15.29	13.64
21-25	5.19	3.25	7.14	18.83	32.47	33.12
25+	1.72	1.21	2.24	3.45	7.41	83.97