Trade Liberalization and Differentiation: Third-Country Effects [1]

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Abstract

This study develops a new theoretical framework for understanding the effects of trade liberalization on a third country. The model predicts that a higher proportion of firms differentiate their products in response to their trading partner reducing trade barriers with another country that exports a similar good. In specific, the model predicts that the firms that switch to producing a differentiated product are the mid-productive ones. These predictions are tested in the context of an exogenous shock, the Agreement on Textiles and Clothing (ATC), the removal of a quota system governing trade in textiles and clothing until the end of 2004. The study focuses on Turkey, which was not subject to quotas in the EU and thus faced an increase in competition after the quotas on China had been removed. The results suggest that in the post-ATC period Turkish firms exporting a quota-bound product increased their markups by 3.65 percentage points relative to the control group following the lift in trade barriers in 2005. Additionally, by exploiting information on productivity, the findings suggest that mid-productive firms that exported products with binding quotas observed a 30.8 percentage point larger increase in markups following the trade liberalization relative to the control group. (JEL: F1, F13, F15)

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1 Introduction

How do firms respond to a reduction in trade barriers? This question has attracted much interest from trade economists, as many developing countries have reduced trade barriers over the past five decades. In analyzing the effects of a bilateral trade agreement, the literature has merely focused on the two undertaking trading partners to the exclusion of third countries which are not privy to that agreement. However, trade policies, such as a reduction in trade barriers, not only affect the two undertaking trading partners, but also have "spill over" effects on third countries. For example, as a consequence of a trade liberalization between two countries, a third country may face greater competition in the export market to these two, liberalized countries. To address this gap in the literature, rather than exploring the effects of a bilateral trade on the two undertaking trading partners, this study examines the effects of that bilateral trade on a third country with pre-existing trade relations with either one of the undertaking trading partners. In particular, this study analyzes how firms located in this third country escape an increase in competition arising from a trade liberalization between the two undertaking trading partners. Among other findings, I show that in response to this trade liberalization, firms located in the third country differentiate their products to insulate themselves from increased foreign competition.

The analysis of this study is motivated with a theoretical framework in the spirit of Melitz (2003) with three countries. Each producer decides whether to produce a differentiated or a non-differentiated product. The producer can differentiate its product and thereby charge a higher markup for it by paying a fixed cost of innovation. The producer, of course, will only choose to do so if the additional profit from differentiating outweighs the fixed cost of innovating. Moreover, the additional profit from differentiating is negatively correlated with the proportion of firms that differentiate. If the proportion of differentiated good producers decrease (more firms choose to not differentiate), the market share of a non-differentiating firm falls, leading to a decrease in the profit of a non-differentiated good producer. As a consequence, the gap between the profit of differentiating versus non-differentiating will widen. In light of this, an exporting firm that is deciding whether to differentiate or not, must take into consideration not only its competitors in the country which it is exporting to (the destination country), but also its competitors located in other countries that are also exporting to the destination country. Hence, a trade liberalization that increases the number of non-differentiated exporters to the destination country will incentivize the exporting firm to differentiate.

As the main theoretical result, this study shows that lower trade barriers between two countries create more fierce competition in the exported goods market, incentivizing a higher proportion of firms in the third country to differentiate their products. Further, this study shows that the firms that will choose to differentiate in response to a trade liberalization will be the mid-productive firms. Firms with highest productivity charge lower prices, hence they have a high market share regardless of differentiation. Therefore, the gains to a high-productivity firm from differentiating its product are relatively low.

As the fixed cost of innovating exceeds the benefit of differentiating, highest productivity producers will not differentiate their products. Low productivity firms have low market share, therefore will generate low profits regardless of differentiation. Similar to high-productivity firms, the benefit from differentiating is unlikely to meet the fixed cost and so they produce non-differentiated goods. Conversely, firms in the middle of the productivity distribution tend to differentiate as it will increase their market share and thus their profits.

These theoretical predictions are tested in the context of an exogenous shock to competition associated with the Agreement on Textiles and Clothing (ATC), a system of bilateral quotas governing the global trade in textiles and clothing until the end of 2004. On January 1, 2005, quota restrictions on exports of textile and clothing products from China to developed countries were removed. As shown in Figure 1, following the elimination of quotas, China's exports to Germany grew, whereas exports from its biggest competitor, Turkey, remained constant.

Figure 1: German Imports from China and Turkey

The empirical analysis focuses on Turkish exports to the European Union (EU). Turkish exports of textiles and clothing were not subject to any quota restrictions in the EU market after Turkey formed a customs union with the EU in 1996. Thus the removal of the ATC quotas on large textile and clothing producers, China in particular, constituted a large shock to the competitive pressures faced by Turkish suppliers of these products to the EU market.

The identification strategy takes advantage of the fact that the ATC quotas were binding in some, but not the other products, which means that the shock mattered more for the former group. This study uses data on Turkish exports of ATC products to the EU, disaggregated at the level of the exporting firm, product, destination country and year. The data set covers the period 2001-2009. Various sources of unobservable heterogeneity is accounted by including firm-product-country and firm-product-year fixed effects.

The result from this difference-in-difference approach suggest that in the post-ATC period, Turkish firms who exported to the EU market escaped the rise in competition from China

by producing differentiated products that cater to EU tastes. In particular, I measure a firm's change in differentiation by the change in markups and the change in the quality of its intermediate inputs. The results from the empirical approach suggest that post trade liberalization, the markups of Turkey's exports increased for products in which the quotas were binding in 2003 in relative to products without binding quotas. After the shock, the affected products saw a 3.65 percentage point larger increase in markups relative to the products which were not subject to the shock. More specifically, grouping firms by productivity allows me to exploit information on non-linear affects. The empirical findings suggest that the increase in markups were observed specifically for mid-productive firms. Mid-productive firms that exported products with binding quotas observed a 30.8 percentage point larger increase in markups following the trade liberalization relative to the control group. These results suggest that mid-productive firms differentiate their products in response to the exogenous shock to competition. The empirical findings confirm the theoretical predictions.

Related Literature Between the 1980s and 1990s, most developing countries reduced their trade barriers, impacting and transforming their economy, specifically the manufacturing sector. As international trade became more common over time, international trade economists have conducted extensive studies on the impacts of trade liberalization on firms, consumers, and aggregate outcomes such as welfare and wage inequality. The literature so far has argued that domestic firms respond to an increase in competition due to trade liberalization in various ways. Following a trade liberalization, firms increase their innovation Bloom, Draca, and Van Reenen (2016), shift into services provision and out of goods production Breinlich, Soderbery, and Wright (2018), skew its export sales toward its best-performing products Mayer, Melitz, and Ottaviano (2014), decentralizing decisions to employees further down the managerial hierarchy Bloom, Sadun, and Van Reenen (2010), and increase the quality of their products A. Khandelwal (2010). My research focuses on how firms react to competition stemming from international trade by innovating and expanding their production quality.

The importance of product quality is noted by Linder (1961). He observes that consumers and producers in developed countries consume and produce higher quality products. Schott (2004) and A. Khandelwal (2010) have shown that high-income countries produce and sell products at higher prices. Moreover, Bernard, Jensen, and Schott (2006) and Hallak (2006) argue that countries with higher-skilled workers and relatively high levels of capital produce higher quality products with higher prices. The increased demand for higher quality products in developed countries also influences developing countries through the export channel. Verhoogen (2008) indicates that the rise in the demand for higher quality products abroad has increased wage inequality in Mexico. He notes that higher quality products are intensive in skill-intensive labor. As the demand for high-quality products increases, firms switch their production towards higher quality products. Therefore, the employment of unskilled labor has decreased, resulting in an increase in wage inequality.

Following the strand of literature focusing on quality upgrading, initiated by (Linder,

1961), (A. Khandelwal, 2010), (Hallak, 2006), many researchers have analyzed how firms conducted an upgrade in the quality of their production. Kugler and Verhoogen (2012) show that larger plants charge more for their outputs and also pay more for their material inputs, indicating that there might be a relationship between quality of output and quality of inputs. Furthermore, Manova and Zhang (2012) conduct an analysis on Chinese firms between 2002-2006 and note that firms produce a variety of qualities by using different quality levels of intermediate inputs. They also show a shift in production to higher quality products as these generate higher prices and higher sales. Fieler, Eslava, and Xu (2018), Demir, Fieler, Xu, and Yang (2021) show that higher quality outputs are intensive in higher-quality inputs, such as labor and intermediates. Therefore, the literature maps the quality output to the quality of inputs.

In addition to firms adjusting the quality of their production to escape foreign competition, the literature so far has noted that firms may also choose to increase innovation. Fieler and Harrison (2018) illustrate two examples from China where firms escape foreign competition by innovating their products: Xiaomi and Chery Automobiles. In China, a cell phone company escaped massive foreign competition arising from Apple by superior integration of its software with local applications. By innovating their cell phones to attract domestic customers in a way that Apple could not, they were able to keep their market power domestically. Similarly, Chinese consumers preferred buying from Chery Automobiles as they created small and fuel-efficient cars that would particularly appeal to domestic consumers.

Goldberg, Khandelwal, Pavcnik, and Topalova (2010) explore the relationship between trade shocks and the introduction of new goods. They analyze firm-level data from India and note that a reduction in tariff barriers accounts for 31% of the new products that domestic firms produce. They attribute all of this effect to firms having access to new intermediate input varieties which were previously unavailable to domestic producers. Although this study introduces an increase in variety due to trade liberalization, it only focuses on the idea that new intermediate inputs are used. In contrast, I aim to focus on the competition effect.

Papers such as Aghion, Bloom, Blundell, Griffith, and Howitt (2005) give evidence that there is an inverted-U relationship between product market competition and innovation. They develop a model where lower productive firms are discouraged from innovating, whereas "neck-and-neck" firms are incentivized to innovate. Similarly, Aghion et al. (2015) and Akcigit, Ates, and Impullitti (2018) show that import competition causes more firms to innovated as not innovating yields lower profits. Moreover, Fieler and Harrison (2018) develops an extension of Atkeson and Burstein (2008), where all producers produce a different variety of a good, in contrast to previous studies where there is a homogeneous good, and only the most productive firm produces. Despite the difference in the model structure, similar to Aghion et al. (2005) their model predicts an inverted-U relationship between productivity and innovating to a differentiated variety.

My research departs from the literature of quality upgrading and innovation due to trade

liberalization in two aspects. First, I will be analyzing trade liberalization in a third country. Specifically, I will show that producers switch to producing higher quality products by increasing their quality of intermediate inputs even though the country they are producing in has not been directly affected by any change in trade barriers. Second, I assume a switch in quality maps to a switch to a sector with lower demand elasticity. For the firms to switch to a higher quality sector, they must pay a fixed cost which is the difference in the total cost of intermediate inputs utilized to produce the higher quality product and the lower quality product.

I structure the rest of the paper as follows. Section 2 presents my model, which is a short extension of Melitz (2003). Section 3 demonstrates the quantification and the takeaways of the model. Section 4 introduces the overview of the trade liberalization between China and developed countries in the Textile and Clothing industry. Section 5 & 6 identifies the empirical strategy and provides the empirical results. Lastly, Section 7 offers some concluding remarks.

2 Model

The model I build is an extension of Melitz (2003). The economy consists of three countries: Home, Foreign, and Competitor. I assume a static economy where labor is supplied inelastically by the household. The labor is assumed to be immobile. For convenience, I will focus on characterizing the Home country. I will express the Foreign country with an asterisk and the Competitor country with a hat. I will express the representative consumer located in the Foreign country with an asterisk and the Competitor country with a o. The abbreviation for producers located in Home, Foreign, and Competitor are H, F, and C.

2.1 Household

The household supplies labor inelastically and maximize its utility subject to its budget constraint. The consumer derives utility from consuming goods from the differentiated sector d and the non-differentiated sector n. Each sector consists of individual firms i. To simplify the question, I assume that firms located in Competitor only produce in the non-differentiated sector.

The utility of the representative consumer in Home is

$$U = \left(y_d^{\frac{\theta-1}{\theta}} + y_n^{\frac{\theta-1}{\theta}} \right)^{\frac{\theta}{\theta-1}} \tag{1}$$

where

$$y_d = \left(\int y_{di}^{H\,\frac{\gamma-1}{\gamma}} di + \int y_{di}^{F\,\frac{\gamma-1}{\gamma}} di + \int y_{di}^{C\,\frac{\gamma-1}{\gamma}} di \right)^{\frac{\gamma}{\gamma-1}} \tag{2}$$

and

$$y_n = \left(\int y_{ni}^{H\,\frac{\sigma-1}{\sigma}} di + \int y_{ni}^{F\,\frac{\sigma-1}{\sigma}} di + \int y_{ni}^{C\,\frac{\sigma-1}{\sigma}} di \right)^{\frac{\sigma}{\sigma-1}} \tag{3}$$

The elasticity of substitution across sectors is θ, the elasticity of substitution across goods within the differentiated sector is is γ, and the elasticity of substitution across goods within the non-differentiated sector is σ.

Assumption 1. $1 < \sigma < \infty$ *and* $1 < \gamma < \infty$, *meaning that, goods are imperfect substitutes.*

Assumption 2. $1 < \theta < \gamma < \sigma$, *meaning that, goods within a sector are more substitutable than goods across sectors. Goods within the non-differentiated sector are more substitutable than goods within the differentiated sector.*

The first order conditions from the utility maximization are:

$$\begin{aligned}
y_{di}^H &= p_{di}^{H\,-\gamma} P_d^{\gamma-\theta} P^{\theta-1} Y \\
y_{ni}^H &= p_{ni}^{H\,-\sigma} P_n^{\sigma-\theta} P^{\theta-1} Y \\
y_{di}^F &= ((1+\tau^F) p_{di}^F)^{-\gamma} P_d^{\gamma-\theta} P^{\theta-1} Y \\
y_{ni}^F &= ((1+\tau^F) p_{ni}^F)^{-\sigma} P_n^{\sigma-\theta} P^{\theta-1} Y \\
y_{ni}^C &= ((1+\tau^C) p_{ni}^C)^{-\sigma} P_n^{\sigma-\theta} P^{\theta-1} Y
\end{aligned} \tag{4}$$

where

$$\begin{aligned}
P_d &= \left(\int_{\Delta^H} p_{di}^{H\,1-\gamma} di + \int_{\Delta^F} ((1+\tau^F) p_{di}^F)^{1-\gamma} di \right)^{\frac{1}{1-\gamma}} \\
P_n &= \left(\int p_{ni}^{H\,1-\sigma} di + \int ((1+\tau^F) p_{ni}^F)^{1-\sigma} di + \int ((1+\tau^C) p_{ni}^C)^{1-\sigma} di \right)^{\frac{1}{1-\sigma}} \\
P &= \left(P_d^{1-\theta} + P_n^{1-\theta} \right)^{\frac{1}{1-\theta}}
\end{aligned} \tag{5}$$

The price of good produced in Home, Foreign, and Competitor sold to Home by firm i and sector j is respectively denoted by p_{ji}^H, p_{ji}^F, p_{ji}^C. The tariff rate from Foreign to Hom, and from Competitor to Home is denoted by τ_F and τ_C respectively. Finally, P_d, P_n, and P are the aggregate price indices.

2.2 Firms

As in Melitz (2003), labor supply is inelastic with the hourly wage normalized to one. In addition, there are two sectors that supply intermediate-inputs - differentiated and non-differentiated. Producing a final good in the differentiated sector requires inputs

from the differentiated intermediate good sector. Likewise, producing a final good in the non-differentiated sector required inputs from the non-differentiated intermediate good sector.

The production function for the intermediate good sector is simply:

$$F_I(l, j) = \frac{l}{f_j} \tag{6}$$

where $j \in d, n$ denotes if the intermediate sector is differentiated or non-differentiated. l is the number of labor hours used and:

$$f_j = \begin{cases} 1, & \text{if } j = n \\ 2, & \text{if } j = d \end{cases} \tag{7}$$

Therefore, producing one unit of an intermediate input in the differentiated sector required 2 labor hours, and producing one unit of an intermediate inputs in the non-differentiated sector requires 1 labor hours. Let $p_I(j)$ be the price of an intermediate input in sector j. Final-good producers are assumed to be price-takers in the intermediate-input markets, and all face the same input-price. In equilibrium, prices of the intermediate goods will be as follows:

$$p_I(j) = \begin{cases} 1, & \text{if } j = n \\ 2, & \text{if } j = d \end{cases} \tag{8}$$

The production function of the final good producer for the differentiated and the non-differentiated sector are respectively:

$$\begin{aligned} q_d(x_d) &= a \cdot x_d \\ q_n(x_n) &= a \cdot x_n \end{aligned} \tag{9}$$

where x_j is the number of units of inputs used in sector j and a is the parameter reflecting the extent to which capability lowers unit costs, with $a > 0$. I will refer to a as the firm-level productivity. I assume that firm-level productivity is drawn from a Pareto distribution. Each firm faces demand from the representative consumer in its own country and representative consumers from its trading partners. Therefore, the total demand a differentiated and a non-differentiated firm in Home faces is respectively, $y_{di} = y_{di}^H + y_{di}^{*H} + y_{di}^{oH}$ and $y_{ni} = y_{ni}^H + y_{ni}^{*H} + y_{ni}^{oH}$.

A firm produces a single good in a single sector. Each firm faces an entry decision. If the firm decides to enter the market, it can choose to produce a differentiated (higher quality) good or produce a non-differentiated (low quality) good. There is a fixed cost associated with producing a differentiated good. The fixed cost could be thought of the cost of searching for differentiated intermediate good producer. Once the firm pays the fixed cost of differentiating, it produces in a market where the elasticity of substitution is γ. If the firm decides not to pay the fixed cost, the elasticity of substitution it faces is σ.

2.2.1 Domestic Market

Since I have constant returns to scale, the firm's problem could be separated into the domestic market and the exported market. Below, I characterize the profit of firm i in Home exporting to Foreign. Furthermore, each firm will optimize their decision (i.e. export vs non-export, differentiated vs non-differentiate) for each exporting country. Hence, there will be three optimization problems for a Home firm- maximizing its profit in (i) the domestic market, (ii) Foreign market, (iii) Competitor market.

Taking wage, w, as one, the profit of a Home firm in its domestic market in the differentiated sector is

$$\pi_{di}^{H} := \max_{p_{di}^{H}} \left[\left(p_{di}^{H} - \frac{2}{a_i} \right) p_{di}^{H\,-\gamma} P_d^{\gamma-\theta} P^{\theta-1} Y - f_d \right] \tag{10}$$

where the price index is[2]:

$$P_d = \left(\int_{\Delta^H} p_{di}^{H\,1-\gamma} di \right)^{\frac{1}{1-\gamma}}$$

For the non-differentiated sector, the profit is given by:

$$\pi_{ni}^{H} := \max_{p_{ni}^{H}} \left[\left(p_{ni}^{H} - \frac{1}{a_i} \right) p_{ni}^{H\,-\sigma} P_n^{\sigma-\theta} P^{\theta-1} Y \right] \tag{11}$$

where the price index is:

$$P_n = \left(\int_{\Psi^H/\Delta^H} p_{ni}^{H\,1-\sigma} di \right)^{\frac{1}{1-\sigma}} \tag{12}$$

Taking the first-order conditions, it is noted that the solution to the problem is expressed by a markup over marginal cost.

$$p_{di}^{H} = \frac{\gamma}{\gamma - 1} \left(\frac{2}{a_i} \right) \tag{13}$$

$$p_{ni}^{H} = \frac{\sigma}{\sigma - 1} \left(\frac{1}{a_i} \right) \tag{14}$$

Given the maximized profits for the two sectors, the firms chooses between exiting, producing in the differentiated sector, and producing in the non-differentiated sector.

$$\pi_{i}^{H} := \max \left\{ 0, \pi_{di}^{H}, \pi_{ni}^{H} \right\} \tag{15}$$

[2]The set of firms in Home, the set of firms that differentiate, the set of firms that non-differentiate, and the set of firms that enter are denoted respectively as: Ω^H, Δ^H, ^{H}, and Ψ^H

2.3 Open Market

In this section, I build a model for the analysis of quality upgrading due to a third country trade liberalization. First, firms maximize profits in each sector by choosing the optimal price. Given the operating profits in the differentiated and non-differentiated sector in all markets (i.e. Home, Foreign and Competitor), the firm decides either to (i) exit, (ii) to produce a non-differentiated variety, or (iii) produce a differentiated variety. The firm decides between (i)-(iii) for each of its market. There is a fixed cost of producing a differentiated variety, denoted by f_d, where $f_d > 0$. Additionally, there is a fixed cost of exporting, denoted by f_x.

For a more concise description of the maximization problem, the elasticity of substitution for each sector (differentiated, non-differentiated), $j \in \{n, d\}$, is denoted by ϵ_j. The optimization problem of a Home firm in an open economy exporting to Foreign is:

$$\pi_i^{*H} := \max\left\{0, \max_j \max_{p_{ji}^{*H}}\left[\left(p_{ji}^{*H} - \frac{f_j}{a_i}\right)(1+\tau^{*H}) p_{ji}^{*H-\epsilon_j} P_d^{*\epsilon_j-\theta} P^{*\theta-1} Y^* - f_d - f_x\right]\right\} \tag{16}$$

The profit maximizing prices are given by a markup over marginal cost

$$p_{ji}^{*H} = \frac{\epsilon_{ji}}{\epsilon_{ji}-1}\left(\frac{f_j}{a_i}\right) \tag{17}$$

Note that, a firm might find it more profitable to export a differentiated good to one country and more profitable to export a non-differentiated good to another. There are no restrictions on firms to produce in only one sector.

Similarly, the optimization problem of a Home firm in an open economy exporting to Competitor is:

$$\pi_i^{oH} := \max\left\{0, \max_j \max_{p_{ji}^{oH}}\left[\left(p_{ji}^{oH} - \frac{f_j}{a_i}\right)(1+\tau^{oH}) p_{ji}^{oH-\epsilon_j} P_d^{o\epsilon_j-\theta} P^{o\theta-1} Y^o - f_d - f_x\right]\right\} \tag{18}$$

The profit maximizing price of the maximization problem is:

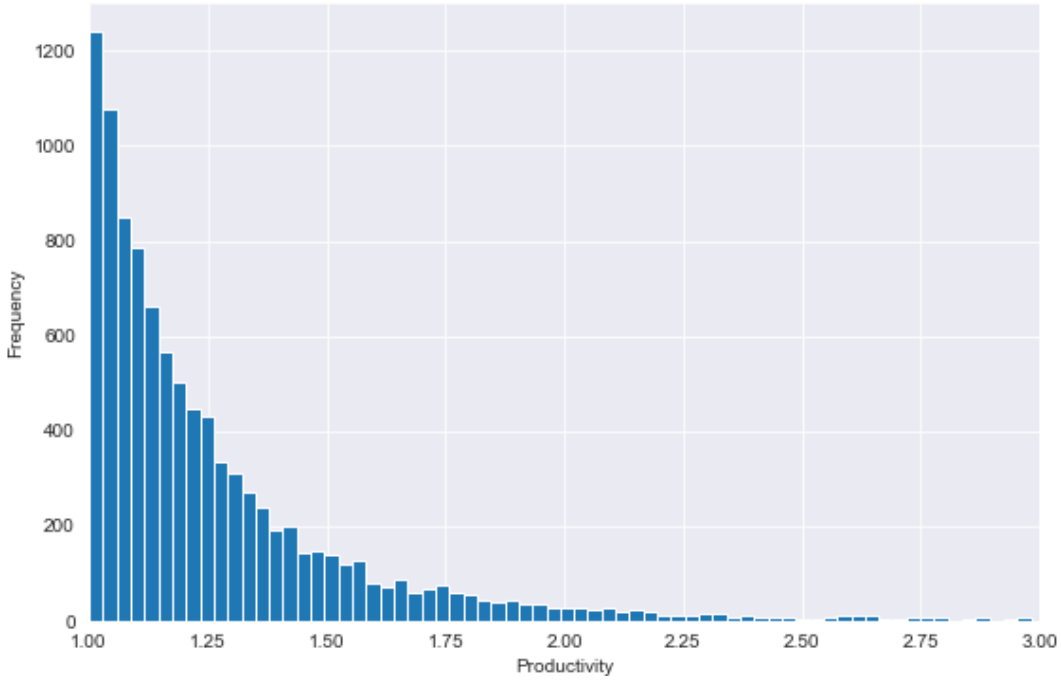
$$p_{ji}^{oH} = p_{ji}^{*H} = \frac{\epsilon_{ji}}{\epsilon_{ji}-1}\left(\frac{f_j}{a_i}\right) \tag{19}$$

3 Quantifying the Model

This section will walk you through three main findings: (i) high productivity firms produce in the differentiated sector, (ii) the firms that switch to production in the differentiated sec-

tor are the mid-productive firms, and (iii) the number of firms that differentiate increases as the tariff rate between a Competitor and Foreign decreases.

Figure 2: Distribution of Simulated Productivity



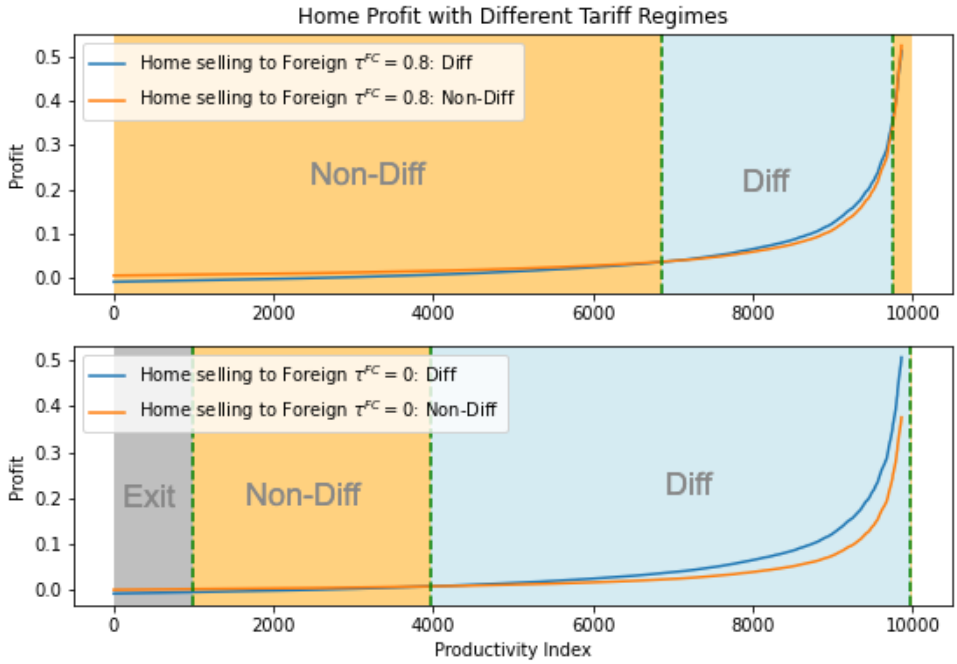
I calibrate the model with 10,000 firms in each country with a Pareto productivity distribution as shown in Figure 2. The parameters used for the calibration are borrowed from the literature and is provided in the Appendix.[3] Each firm decides among its discrete choices. For Home and Foreign firms, this is (i) exit, (ii) produce a non-differentiated variety, or (iii) produce a differentiated variety, and for Competitor firms, this is (i) exit, or (ii) produce a non-differentiated variety. Each firm decides among these options for each of the markets (i.e. Home, Foreign, Competitor).

Keeping the tariff rate between Foreign and Competitor fixed, the gain from differentiation depends on the variable and fixed cost. If both, the variable and fixed costs were zero, all firms would export a differentiated product. With positive variable and fixed costs, some firms will have higher profits exporting a non-differentiated product and some will have higher profits exporting a differentiated product. The top graph on Figure 3 depicts firm level decisions on differentiation according to their productivity. As you can see, when tariff rates between Competitor and Foreign are fixed to 80%, the bottom 60% and the top 1% of firms (according to productivity) produce a non-differentiated product, whereas the rest of the firms produce differentiated products. Firms with low productivities charge high prices both in the differentiated and the non-differentiated sector. As high prices causes low demand, the profit will be low regardless of which sector the firm is producing

[3]The elasticity of substitution across sectors and the pareto shape parameter are borrowed from Edmond, Midrigan, and Xu (2015). The value of elasticity of substitution within the textile industry is borrowed from Ahmad and Riker (2020).

in. Therefore, for low productivity firms the gain from switching to a differentiated sector does not compensate for the fixed cost of differentiating. In contrast, the highest 1% of firms observe high demand for their products due to their low prices. These firms have high market shares in both sectors, therefore their gain from switching to a differentiated sector does not compensate for the fixed cost. Lastly, the firms depicted in the blue region in Figure 3, are the firms who differentiate. These firms observe an increase in profit by differentiating.

Figure 3: Home profit in different tariff regimes

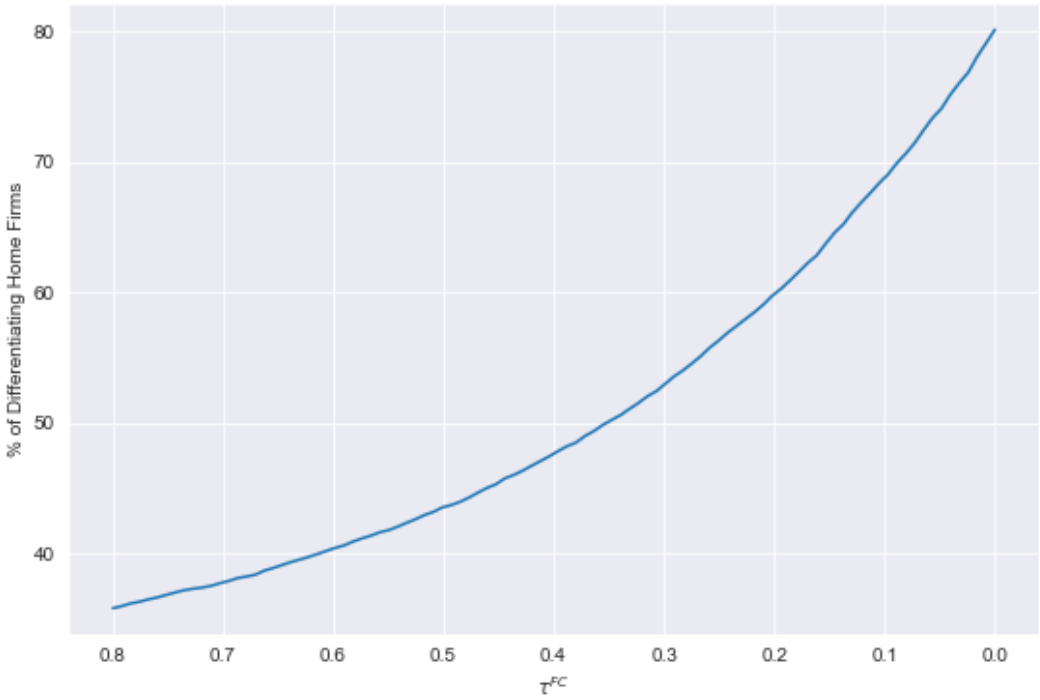


The threshold productivity of producing a non-differentiated sector depends on the tariff rates. Figure 3 depicts the profit of Home firms in the Foreign market with two different tariff regimes between Foreign and Competitor. The top graph depicts profits when the tariff rate is 80%, and the bottom graph depicts profits when the tariff rate is 0%. As shown, Home firms benefit from high Competitor tariffs to Foreign. This follows from the fact that with lower tariff rates, the Foreign consumers are able to buy Competitor products at a lower price. Therefore, the market share of Competitor producers increases as the tariff rate reduces. In addition to the lower prices that Foreign faces, in equilibrium, the number of Competitor firms that export to Foreign increases. Both factors increase competitiveness in the Foreign market, leading to Foreign's demand on Home products to drop. Lower demand from Foreign causes a downward shift in Home profits. As Competitor firms are restricted to produce only in the non-differentiated sector, there is no direct competition effect in the differentiated sector. It is straightforward that the profit in the non-differentiated sector decreases more than the profit in the differentiated sector. In turn, a larger decline in profits in the non-differentiated sector induces a larger portion

of Home firms to differentiate their production.

The extent to which the profit of the non-differentiated sector shifts downwards depends on the tariff rate between Foreign and Competitor. Figure 4 depicts the fraction of Home firms differentiating with respect to different tariff regimes between Foreign and Competitor. As explained above, as the tariff rate declines, the competitiveness of the non-differentiated sector in the Foreign market surges, leading to a higher proportion of Home firms to differentiate. As shown, a reduction of the tariff rates from 80% to 0% generates an increases the fraction of differentiating firms from around 35% to 80%.

Figure 4: Percentage of differentiated firms



More specifically, the firms that switch sectors following the trade liberalization are the mid-productive firms. These firms obtain higher profits in the differentiated sector in comparison to the non-differentiated sector post-liberalization. The drop in non-differentiated profits still do not compensate for the fixed cost for the low-productive firms, hence they will not switch sectors. Remember that as this is monopolistic competition, the switch in sectors is equivalent to a switch in markups. In addition, the model setup indicates that a switch to the differentiated sector requires higher quality intermediate inputs. Therefore, my model predicts that mid-productive firms will increase the markups following the trade liberalization, and to do so, they will increase the quality of their intermediate inputs. I will test these findings empirically in the following sections.

4 Data and Description of ATC Termination

4.1 ATC Termination: Natural Experiment Setting

There have been continuous debates surrounding trade in textiles and clothing. Policy-makers in developed countries were concerned by the increase in competition arising from exporters in developing countries. Developing countries have a comparative advantage in textiles and apparel as it is labor-intensive. Hence this can cause profits of textile producers in developed countries to fall.

The Multi-fibre Arrangement (MFA) was imposed between 1974 to 1994. This framework was a bilateral agreement that allowed unilateral restrictions such as quotas to cap imports in countries whose domestic producers were damaged due to trade liberalization in their industry. This framework was against the General Agreement on Tariffs and Trade (GATT) principle of treating all trading partners equally. Therefore, during the GATT Uruguay Round, it has been decided that the quota restrictions would be lifted by January 1, 2005. This agreement is called the Agreement on Textiles and Clothing (ATC) of the World Trade Organisation (WTO). This agreement consisted of four phases out of the quota restrictions. In each stage, a more significant percentage of products were brought under GATT. This transition aimed to let the domestic industry adapt to the increased competition arising from trade liberalization. Transitional safeguards were put into place for countries that had industries suffering during this transition. This also was against the GATT, as the safeguards allowed countries to implement quota restrictions to specific exporting countries.

Although the main subject of debate of trade liberalization in the textile and clothing industry was about the direct implications on the exporting and importing countries, there are also vast implications of trade policies on third countries. Between 2000-2006, Turkey and China were the leading exporters to the European Union market. In 2006, China accounted for 9.5% of the EU's imports of textile from the world, and Turkey accounted for 5.9%. Prior to the phasing out of the quota restrictions brought by the ATC, Turkish exporters had an advantage in exporting to the EU over Chinese exporters due to its Customs Union membership starting from 1995 and its geographical proximity. Turkey's Customs Union membership permitted its producers to export to the EU market without any trade restrictions. As the quota restrictions on Chinese exporters lifted, the advantage of the Turkish exporters reduced, which hurt the Turkish textile and clothing industry.

Although the ATC was a gradual elimination of MFA import quotas, around four-fifths remained until 2005, which is the end of the 10-year elimination period. As this lift of quotas has been anticipated, one may argue that any adjustments should already be "priced in" way before the termination of the ATC. To this end, I would like to provide one example to why I believe this is *not* the case.

In 2005 there was a "serious glitch" in managing the textiles trade, the so-called Bra Wars.

EU retailers short after the trade liberalization realized that China is producing goods at competitive prices and it is only logical to place orders from China. As not even customs officials were prepared for this sudden increase in exports from China, 77 million Chinese garments left stranded in EU ports. Therefore, although both the industry and politicians had ten years of anticipation for the international competition in textiles, no one was preparing for it.

Therefore, I believe, the sudden lift of all quotas in 2005 is a useful event for the purpose of understanding the effect of a trade liberalization on third-countries

4.2 Data

I aim to combine three data sets from Turkey: (1) international trade data from Turkey, (2) international trade data from China, (3) quota data.

Customs Data: The empirical analysis is based on detailed international trade data for Turkey provided by the Turkish Statistical Institute (TurkStat). This data provides product-level dis-aggregated data for all exports and imports for the universe of firms located in Turkey. Given the nature of the shock, I focus on Turkey's exports and imports of Textile and Clothing dis-aggregated by the exporting firm, 8-digit Harmonized System (HS) product code, destination country, and year. At this level of aggregation, the data set reports value and quantity measured in specified units. I combine value and quantity data to construct FOB unit values, which I later refer to as "prices".

UN Comtrade Data: The empirical analysis utilizes data on Chinese exports in Textile and Clothing that is provided by the UN Comtrade database. This data provides product-level dis-aggregated data for all exports for the 6-digit HS product code, destination country, and year. At this level of aggregation, this data reports the value and quantity of exports and imports that covers the universe of firm and product-level export records between 2001-2009.

Quota-Fill Data: Data on US, EU, and Canadian quota-fill rates are obtained from the *US Office of Textile and Apparel*, *Système Intégré de Gestion de Licenses*, and *Foreign Affairs and International Trade Canada*, respectively. Quota-fill rates are available for the HS8 product code and year.

5 Identification Strategy

This study aims to understand the impact of trade policies on third countries. I will empirically test this using the event of the removal of quota restrictions at the beginning of 2005 using product-level dis-aggregated data from Turkey and China. In alignment

with the model, the empirical methodology will consist of understanding third country effects.

Anecdotal evidence suggests that exporters located in Turkey differentiated their products following the trade liberalization to escape the increased competition from China. For example, pre-liberalization, a Turkish firm buys cotton (HS-52084230) from India to produce plain white t-shirts (HS-61091000), to export to Germany. Post-liberalization, customers in Germany prefer to buy plain white t-shirts from exporters in China instead of Turkey, as they are cheaper. In response, the Turkish firm decides to differentiate its product and export t-shirts with graphic designs (HS-61091000) that cater to German tastes. The production of a graphic t-shirt requires red organic pigment suitable for printing (HS-32041739) imported from the United Kingdom, in addition to cotton (HS-52084230) from India. Although, both the plain white t-shirt and the graphic t-shirt are classified under the same HS-8 product, they are different products with different markups.

Consistent with the anecdotal evidence, in the model, firms in Turkey are allowed to switch to produce a differentiated product by switching its purchase of intermediate inputs from the lower quality sector to the higher quality sector. My model defines higher quality as high differentiation. Therefore, a firm upgrading its quality is equivalent to an increase markups and a quality upgrade of inputs.

In specific, I test the following hypotheses on Turkey's exports of textile and clothing products to the European Union, the United States, and Canada[4]: (i) Turkish exports fell following the termination of ATC for quota-bound products, (ii) Turkish markups upwards adjusted for quota-bound products, particularly for the mid-productive firms, (iii) the quality of Turkish imports upward adjusted for quota-bound products, particularly for the mid-productive firms. The analysis will follow a difference-in-difference strategy where products with binding quotas in 2003 are the treated products and products with non-binding quotas are the control products.

First, I will empirically test quality upgrading by the change in markups, where I estimate markups using a fixed effect approach commonly used in the literature. This approach aims to remove price variation caused by the marginal cost in order to obtain variation in markups. By using firmxproductxtime fixed effects, the aim is to keep variations in the destination dimension. This will exploit information on markups.

$$\begin{aligned} p_{ikct} =& \alpha + \beta_1 \mathcal{I}(t \geq 2005)\mathcal{I}(QuotaFill_{kc} \geq 0.9) \\ &+ \gamma_{ikt} + \gamma_{ikc} + \epsilon_{ikct} \end{aligned} \tag{20}$$

where p_{ikct} is the price of firm i's export of product k to country c at time t. $\mathcal{I}(t \geq 2005)$ is the identity function that takes a value of 1 post liberalization and $\mathcal{I}(QuotaFill_{kc} \geq 0.9)$ is the measure of treatment. Following A. K. Khandelwal, Schott, and Wei (2013) I identify a

[4]The European Union will be treated as a single country as quotas are provided for the union as a whole.

product-country pair to be quota-bound if the quota-fill rate is greater than or equal to 90%.

Furthermore, I add a third interaction that captures the markup change for different productivity groups. Also, to fix for any demand-side changes by adding additional fixed effects.

$$q_{jict} = \sum_{j}^{4} \beta_{j,1} \mathcal{I}(t \geq 2005) \mathcal{I}(QuotaFill_k \geq 0.9) \mathcal{I}(a_i \in Q_j^a) + \gamma_{ikt} + \gamma_{ikc} + \gamma_{kct} + \epsilon_{ikct} \tag{21}$$

where Q_j^a is the jth quantile in productivity.

Starting with A. Khandelwal (2010), studies in the quality literature such as Kugler and Verhoogen (2012), Manova and Zhang (2012), Fieler et al. (2018) and Demir et al. (2021) have shown that firms upgrade their quality by upgrading the quality of intermediate inputs. Therefore, following this strand of literature, I aim to see that following the trade liberalization of China to the EU, a larger portion of Turkish producers started buying higher quality intermediate inputs, meaning that they have increased their output quality[5]. Using the findings of Linder (1961), I assume that intermediate inputs supplied in developed countries are of greater quality. Hence, I will empirically test quality upgrading by the average price of intermediate goods supplied from developed countries.

Moreover, Bøler, Moxnes, and Ulltveit-Moe (2015) show that innovating to produce a differentiated product and international sourcing are complementary activities. They present a high correlation between innovation and the variety of inputs utilized. Relying on their findings, I am proxying firms expenditure on innovation investment (the fixed cost to produce a differentiated/high quality good) with a variety of inputs utilized. As presented in the model, the decision of the firm to produce a differentiated product depends on the extent of the third-country shock. Firms that were exporting to EU members prior to 2005 were more exposed to the China competition shock than firms that only sold domestically. Therefore, the regression I run with the Customs data in Turkey is

$$q_{it} = \alpha + \beta_1 \mathcal{I}(t \geq 2005) Exposure_i + \gamma_i + \gamma_t + \epsilon_{it} \tag{22}$$

where q_{it} is firm i's the average price of inputs, average price of intermediate inputs, extensive margin of imported intermediate inputs, and extensive margin of imported intermediate inputs from developed countries at time t. γ denotes the fixed effects such as

[5] I use the the classification by Broad Economic Categories published by the United Nations to identify intermediate inputs

the firm and time fixed effects. $Exposure_i$ is firm i's rate of exposure to the China shock. This measure is constructed by a weighted average of the quota-fill rate.

$$Exposure_i = \sum_k \mathcal{I}(QuotaFill_{kc} \geq 0.9) \frac{\sum_c val_{ikc03}}{\sum_k \sum_c val_{ikc03}}$$

where val_{ikc03} is the value of firm i's export of product k to country c in 2003.

Moreover, I add a triple interaction to observe product differentiation that is non-linear in productivity.

$$\begin{aligned} q_{it} = &\sum_j^4 \beta_{j,1} \mathcal{I}(t \geq 2005) Exposure_i \mathcal{I}(a_i \in Q_j^a) \\ &+ \gamma_i + \gamma_t + \epsilon_{it} \end{aligned} \tag{23}$$

where Q_j^a is the jth quantile in productivity.

6 Results

The results obtained from testing the first hypothesis support the first theoretical prediction. Table 1 presents specifications with two fixed effects (i.e., product and year fixed effects). I note that products with binding quota rates in Turkey experienced a disproportionate decrease in the quantity of sales in the post-shock period relative to the control products. The coefficient of interest is positive and statistically significant in all specifications. Its magnitude changes relatively little between the specifications including different sets of fixed effects, thus suggesting that various sources of identifying variation gives us the same answer. The estimates in the third and fourth column suggest that Chinese exports with binding quotas increased the quantity of sales post trade liberalization around 50 percentage points more than exports without binding quotas. This finding also holds with different fixed effects. In sum, the evidence suggests that the lift of the quota restrictions increased Chinese exports and decreased Turkish exports for products with binding quotas.

Table 1: Export Quantity Post-Liberalization

	(1) $log(q_{kt})^{TR}$	(2) $log(q_{kt})^{TR}$	(3) $log(q_{kt})^{CHN}$	(4) $log(q_{kt})^{CHN}$
$\mathcal{I}(QuotaFill_k \geq 0.9)\mathcal{I}(t \geq 2005)$	-0.23**	-0.23**	0.51**	0.54**
	(0.10)	(0.10)	(0.25)	(0.25)
Year		✓		✓
Product	✓	✓	✓	✓
Observations	2401	2401	2297	2297

Standard errors in parentheses
* $p < .10$, ** $p < .05$, *** $p < .01$
Note: The dependent variable is the logarithm of quantity of exports from Turkey for Column (1) & (2) and from China for Column (3) & (4). The exports are given in the HS8 product k at time t, where t is between 2002 – 2009.

Moving on to the second hypothesis, I also find support for the prediction that Turkish exporters responded to increases in competitive pressures by increasing their quality, measured by markups. This is evident from Table 2 where coefficient on the variable of interest is (as expected) positive and statistically significant in all specifications. As in the case of the decline in quantity of exports, specifications with different sets of fixed effects and alternative definitions of treatment lead to the same conclusions. I find that on average the quota-bound products saw a 2.5-3.5% larger increase in markups relative to the control products. Put differently, moving to a 90% quota fill rates as of 2003, is associated with a 2.5-3.5% increase in markups after the end of ATC.

Table 2: Turkey Export Markups Post-Liberalization

	(1) $log(p_{ikct})$	(2) $log(p_{ikct})$	(3) $log(p_{ikct})$
I(t≥ 2005)$\mathcal{I}(QuotaFill_{kc} \geq 0.9)$	0.148***	0.0281**	0.0365*
	(0.00680)	(0.0137)	(0.0204)
FirmxCountxProd FE	✓		✓
FirmxYearxProd FE		✓	✓
Observations	53430	53430	53430

Standard errors in parentheses
* $p < .10$, ** $p < .05$, *** $p < .01$
Note: The dependent variable is the logarithm of of unit values (value divided by reported quantities) of HS8 product k exported by firm i to country c at time t.

Moreover, the empirical findings support the theoretical findings that mid-productive firms upgrade their markups. As seen in Table 3, the increase in markups is significant and positive for the mid-productive group with various fixed effects, including fixed effects that control for demand. The estimation suggests that following the end of ATC, firms

in the third quartile exporting quota-bound products observe a 17-30% larger increase in markups relative to firms with productivities that lie in first quartile and that export control products.

Table 3: Turkey Export Markups Post-Liberalization by Productivity

	(1) $log(p_{ikct})$	(2) $log(p_{ikct})$
$\mathcal{I}(QuotaFill_{kc} \geq 0.9)\mathcal{I}(t \geq 2005)\mathcal{I}(a_i \in Q_a^2)$	-0.0798	-0.00779
	(0.128)	(0.166)
$\mathcal{I}(QuotaFill_{kc} \geq 0.9)\mathcal{I}(t \geq 2005)\mathcal{I}(a_i \in Q_a^3)$	0.172*	0.308**
	(0.0913)	(0.120)
$\mathcal{I}(QuotaFill_{kc} \geq 0.9)\mathcal{I}(t \geq 2005)\mathcal{I}(a_i \in Q_a^4)$	0.0548	0.201
	(0.0874)	(0.123)
FirmxCountxProd FE	✓	✓
FirmxYearxProd FE	✓	✓
ProdxCountxYear FE		✓
Observations	53430	53430

Standard errors in parentheses
* $p < .10$, ** $p < .05$, *** $p < .01$
Note: The dependent variable is the logarithm of of unit values (value divided by reported quantities) of HS8 product k exported by firm i to country c at time t. There is an added third interaction on the dependent variable. The third interaction, $\mathcal{I}(a_i \in Q_a^j)$ groups firms by their productivity, where Q_a^j indicates that set of firms that have productivities in the jth quantile. The first quantile indicates the lowest productivity group, whereas the fourth quantile indicates the highest productivity group.
*The sample included for this regression only captures firms which labor and sales data is available for. These firms are the firms greater than 20 employees.

Finally, I test the third hypothesis. Specifically, I examine whether firms that are more exposed to the competition shock increased the price of imported inputs following the trade liberalization. Table 4 shows the change in average price of inputs and Table 5 shows the extensive margin of the number of imported intermediate inputs. The first two columns in Table 4 provides evidence that Turkish exporters responded to increases in competitive pressures by importing higher priced inputs. The coefficient is positive and statistically significant even with different fixed effects. The coefficient suggests that following the trade liberalization, more exposed firms started importing inputs at a 16% higher price in comparison to pre-liberalization. Column (3) and column (4), represent the average price of the imported intermediate inputs. Similarly, the coefficient of interest is positive and statistically significant. The result remains with different sets of fixed effects. Evidence suggests that average prices on imported *intermediate* inputs have increased around 14% for more exposed firms post-liberalization. The increase in import prices

are evidence that there is a quality upgrading in inputs in addition quality upgrading in output.

Table 4: Average Input Prices Post-Liberalization

	(1) $log(p_{it})$	(2) $log(p_{it})$	(3) $log(p_{it})^{int}$	(4) $log(p_{it})^{int}$
$\mathcal{I}(t \geq 2005)Exposure_i$	0.163**	0.166***	0.135*	0.141**
	(0.0763)	(0.0592)	(0.0764)	(0.0590)
Firm FE		✓		✓
Year FE	✓	✓	✓	✓
Observations	10053	9909	10046	9900

Standard errors in parentheses
* $p < .10$, ** $p < .05$, *** $p < .01$
Note: The dependent variable is the logarithm of average unit value of imports for Column (1) & (2) and the average unit value of intermediate imports for Column (3) & (4). The unit prices of imports are averaged for each firm i at time t, where t is between 2002 – 2009.

Column (1) and (2) of Table 5 suggest that a 10% increase in the exposure rate increases the extensive margin of the number of imported intermediate inputs by 1.35% post liberalization. Similarly, the coefficients of column (3) and (4) confirm the hypothesis that the extensive margin of imported intermediate inputs from developed countries increase. In specific, the coefficient of interest is positive and statistically significant and implies that a 10% increase in the exposure rate of firm j increases the extensive margin of imported intermediate inputs from developed countries by 1.55%. Following (Bøler et al., 2015), the positive coefficients indicate a quality upgrade in imported inputs.

Table 5: Variety of Imported Intermediate Inputs

	(1) $log(\#imp)^{int}$	(2) $log(\#imp)^{int}$	(3) $log(\#imp)^{int,dev}$	(4) $log(\#imp)^{int,dev}$
$\mathcal{I}(t \geq 2005)Exposure_i$	0.135***	0.136***	0.160***	0.156***
	(0.0489)	(0.0487)	(0.0506)	(0.0505)
Firm FE	✓	✓	✓	✓
Year FE		✓		✓
Observations	9909	9909	9180	9180

Standard errors in parentheses
* $p < .10$, ** $p < .05$, *** $p < .01$
Note: The dependent variable is the logarithm of the variety (by product and country) of intermeidate imports for Column (1) & (2) and the logarithm of the variety (by product and country) of intermediate imports from developed countries in Column (3) & (4). The variety is provided for each firm i at time t, where t is between 2002 – 2009.

Moreover, the increase in the variety of inputs is positive and significant for the mid-

productive firms. Table 6 indicates that more exposed firms with productivities in the third quartiles observe an increase in the variety of inputs and the price of the intermediate inputs post liberalization relative to the control group. These results imply a quality upgrading in imported inputs for mid-productive firms post-liberalization.

Table 6: Inputs by Productivity

	(1) $log(\#imp)^{int}_{dev}$	(2) $log(\#imp)^{int}$	(3) $log(p_{it})^{int}$
$\mathcal{I}(t \geq 2005)Exposure_i\mathcal{I}(a_i \in Q_a^2)$	0.392	0.410**	-0.0904
	(0.350)	(0.208)	(0.173)
$\mathcal{I}(t \geq 2005)Exposure_i\mathcal{I}(a_i \in Q_a^3)$	0.617*	0.691**	0.400
	(0.339)	(0.292)	(0.372)
$\mathcal{I}(t \geq 2005)Exposure_i\mathcal{I}(a_i \in Q_a^4)$	0.333	0.456*	-0.260
	(0.420)	(0.246)	(0.202)
Firm FE	✓	✓	✓
Year FE	✓	✓	✓
Observations	4718	4718	4718

Standard errors in parentheses
* $p < .10$, ** $p < .05$, *** $p < .01$
Note: The dependent variable is the logarithm of the variety (by product and country) of intermediate imports from developed countries for Column (1), the logarithm of the variety of all intermediate imports for Column (2), and the average unit value of intermediate imports for Column (3). There is an added third interaction on the dependent variable. The third interaction, $\mathcal{I}(a_i \in Q_a^j)$ groups firms by their productivity, where Q_a^j indicates that set of firms that have productivities in the jth quantile. The first quantile indicates the lowest productivity group, whereas the fourth quantile indicates the highest productivity group.
*The sample included for this regression only captures firms which labor and sales data is available for. These firms are the firms greater than 20 employees.

6.1 Robustness Checks

To provide further support for my identification strategy, I extend the analysis to exports to all HS8 classified products instead of restricting it to only products that have quota restrictions. As seen in table 7, the results suggest that the markups increased by 2% relative to the control product groups following the termination of the ATC. These findings are consistent with my theoretical model and main empirical results.

Table 7: Turkey Export Markups Post Liberalization

	(1) $log(p_{ikct})$	(2) $log(p_{ikct})$	(3) $log(p_{ikct})$
$\mathcal{I}(QuotaFill_{kc} \geq 0.9)\mathcal{I}(t \geq 2005)$	0.0649***	0.0227**	0.0203
	(0.00460)	(0.0109)	(0.0164)
FirmxCountxProd FE	✓		✓
FirmxYearxProd FE		✓	✓
Observations	752811	707675	447123

Standard errors in parentheses
* $p < .10$, ** $p < .05$, *** $p < .01$
Note: The dependent variable is the logarithm of of unit values (value divided by reported quantities) of HS8 product k exported by firm i to country c at time t. The sample included in this regression includes all products in the textile and clothing industry (including products where quota restrictions were not present).

The increase in markups by productivity groups are also consistent with the main findings even with an increased sample. The findings suggest that firms with productivities in the third quartile has observed an increase in markups by 26% relative to the control group. Therefore, I find that expanding the sample to all HS 8 exports has little impact on the estimates of interest.

Table 8: Turkey Export Markups Post-Liberalization by Productivity

	(1) $log(p_{ikct})$	(2) $log(p_{ikct})$
$\mathcal{I}(QuotaFill_{kc} \geq 0.9)\mathcal{I}(t \geq 2005)\mathcal{I}(a_i \in Q_a^2)$	0.0359	0.107
	(0.108)	(0.140)
$\mathcal{I}(QuotaFill_{kc} \geq 0.9)\mathcal{I}(t \geq 2005)\mathcal{I}(a_i \in Q_a^3)$	0.119	0.269**
	(0.102)	(0.114)
$\mathcal{I}(QuotaFill_{kc} \geq 0.9)\mathcal{I}(t \geq 2005)\mathcal{I}(a_i \in Q_a^4)$	0.0835	0.189
	(0.101)	(0.137)
FirmxCountxProd FE	✓	✓
FirmxYearxProd FE	✓	✓
ProdxCountxYear		✓
Observations	270684	151917

Standard errors in parentheses
* $p < .10$, ** $p < .05$, *** $p < .01$
Note: The dependent variable is the logarithm of of unit values (value divided by reported quantities) of HS8 product k exported by firm i to country c at time t. There is an added third interaction on the dependent variable. The third interaction, $\mathcal{I}(a_i \in Q_a^j)$ groups firms by their productivity, where Q_a^j indicates that set of firms that have productivities in the jth quantile. The first quantile indicates the lowest productivity group, whereas the fourth quantile indicates the highest productivity group. The sample included in this regression includes all products in the textile and clothing industry (including products where quota restrictions were not present).
*The sample included for this regression only captures firms which labor and sales data is available for. These firms are the firms greater than 20 employees.

7 Conclusion

I study the third-country effects of trade liberalization through a model with monopolistic competition and two sectors. The model predicts that following a trade liberalization between two countries, firms located in a country that is not directly linked to the policy change are still affected by it through the competition channel. Moreover, the model estimates that lower tariff rates induce quality upgrading in the third country.

I empirically test the results from the model using firm-level Customs data from Turkey. The policy shock that I examine is the termination of the quota system under the Agreement on Textiles and Clothing (ATC) in 2005. Turkey and China were the leading textile exporters to the EU. As the binding import quotas against Chinese producers were lifted in 2005, Turkish textile producers experienced a sudden competition shock. I rely on

a difference and difference methodology where I take into account the extent to which the producer in Turkey is exposed to the China shock. My findings support the model predictions by showing that there was an overall increase in markups by 3.65% following the termination of ATC for quota-bound products. More specifically, by grouping firms into productivity quartiles, I observe that the increase in markups were observed only for mid-productive firms and the increase is by 30.8%.

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Appendix

Table 9: Model Estimates

	Parameters	Estimates
Tariff from Competitor to Foreign	τ_{fc}	[0,0.80]
Tariff from Home to Foreign	τ_{fh}	0
Elasticity of Substitution between products (diff)	γ	3.7
Elasticity of Substitution between products (non-diff)	σ	4.41
Elasticity of Substitution across sectors	θ	1.24
Fixed cost of Differentiating	f_{diff}	0.000033
Fixed cost of Non-Diff	f_l	0
Fixed cost of Exporting	f_x	0.0000033
Pareto Distribution Parameter	ϕ	4.58