Firm Heterogeneity and Comparative Advantage: Evidence on French Firm's Response to the Entry of Turkey in the European Customs Union*

JOB MARKET PAPER

Ines Buono[+]
Universitat Pompeu Fabra

Fist version: October 2006; this version: November 2007

Abstract

In this paper I analyze the effects of a reduction in tariffs by a trading partner on the exports of firms. More precisely, I focus on how cross-industry differences in factor intensities and within-industry differences in firm productivity shape the response of the extensive (the decision to export) and the intensive (the exported volumes) margin of firm's export. I examine the reaction of French firms to the reduction of Turkish import tariffs that followed the entry of Turkey in the European Customs Union (CU) in 1996. As expected a reduction in variable export costs increases the probability to export. Somewhat surprisingly, the effect is stronger in sectors without comparative advantage. At first sight this finding seem at odds with the intuition that trade liberalization leads to specialization in comparative advantage sectors, like in standard neoclassical models. However, I illustrate a possible explanation through a partial equilibrium model which includes firm level heterogeneity and sector level comparative advantage in a standard way. In this model only firms with productivity above a threshold enter the export market, this threshold being lower for sectors with comparative advantage. As trade partner tariffs fall, the productivity threshold to export decreases by more in sectors without comparative advantage. This is the case because, even if the cut-off productivity to enter the export market falls in the same proportion as tariffs in all sectors, its level was initially higher in sectors that do not have comparative advantage.

*Acknowledgments: I am grateful to Jaume Ventura, Paula Bustos and Gino Gancia for their guidance and support. I am grateful to the *Institut National de la Statistique et des Études Économiques*- INSEE which allowed me to use French data. I would especially like to thank Sebastien Roux, Pauline Givord, Francis Kramarz, Xavier Boutin, Simon Quantin and Jean-Jacques Kasparian. Finally I would also like to thank Romain Ranciere, Diego Puga and all participants at UPF-CREI International Breakfast, UPF Applied Lunch, the ASSET 2006, the GEP 2007 and the ETSG 2007 Conferences for valuable comments.

[+] Correspondence: Department of Economics and Business, Universitat Pompeu Fabra, Ramon Trias Fargas 25-27, 08005 Barcelona, Spain. E-Mail: ines.buono@upf.edu

Introduction

How do firms react to a decrease in export tariffs? Intuitively, we expect that firms expand their exports. But how does this come about? Which firms expand by more? Along which margin do they expand? Is it that more non exporters begin to export or that firms that were already exporting increase their shipped sales? What is the quantification of these two margins? Do these margins move in the same way across sectors?

The goal of this paper is to provide a description of firm's response to a marginal change in export tariffs. In doing this I consider the main forces that recent heterogeneous firm literature and standard neoclassical theory point out to explain trade: firm level productivity and sector-level comparative advantage. The firm-heterogeneity literature, started with Melitz(2003), shows that only the most productive firms export, and, as tariffs decrease, the more productive non-exporters begin to export. However neoclassical literature extensively uses sector characteristics, and the key concept of comparative advantage, to explain and study trade. Extending the firm heterogeneity model allowing for differences in sector characteristics, or, from the other perspective, relaxing the hypothesis of homogeneous-firms in models that explain trade through sector differences seems the natural direction of trade literature. Very few papers begin to address this issue. None of them provide an empirical analysis of the interaction between sector comparative advantage and firm-heterogeneity. This is the main contribution of this paper.

I provide answers to the questions outlined above by analyzing the response of French firms to the reduction in Turkish tariffs which followed the entry of Turkey in the European Customs Union in 1996. I study France among European countries for two reasons. The first is that France is provided with detailed firm-level data. The datasets I use, collected at INSEE, report information on French firms' balance-sheet characteristics and on their export sales to each foreign country. I can thus observe the characteristics of those firms, among 60.000 firms within 60 manufacturing sectors, who export precisely to Turkey in the years around the Customs Union formation. The second is that France is Turkey's third trading-partner among European countries. If Turkey's entry into European Customs Union affected European countries, then I could capture a big part of the effect by observing French economy.

I find that:

1. The Customs Union formation had a huge impact on French aggregate export to Turkey, which increased by 40% between 1995 and 1996 and by 80% between 1995 and 1999. The 60% of this increase was explained by the average shipped volumes

(intensive margin) and the remaining 40% by the number of French exporters (extensive margin) to Turkey.

Previous results were specific to Turkey: French exports to the rest of the world in that same period increased by 16% only.

As expected the response of French economy was substantial. I thus turn to study the firm-level export-market participation. The empirical identification of the impact of a reduction in variable trade costs on French firms' export behaviour is based on a generalized difference in difference methodology where the source of variation is the change in Turkish tariffs across time and industries. On this margin I find that:

2. A 1 percentage-points decrease of Turkish import tariffs increased the probability of a French firm to export to Turkey by 0.042 percentage-points;
3. The result above changes if we take into account capital (skill) intensity of French sectors. In fact, the probability of exporting to Turkey for French firm increases by 0.135 percentage points in the top 1st percentile of labour-intensive sectors and by 0.012 percentage points in the bottom 75th percentile of labour-intensive ones. Thus, the extensive margin is more reactive for sectors without comparative advantage as tariffs decrease.

I control for potential biases of my results. First, time fixed effects take account of differences in export-market participation over time. Second, the main concern on tariffs coefficient could be that tariffs are correlated with industry characteristics. By introducing time-invariant industry fixed effects at the same level of tariffs I control for this potential bias. Third, tariffs coefficient may be biased if tariffs and firm characteristics are correlated: if French sectors which export big volumes to Turkey, are very concentrated, then Turkey could have set industry tariffs considering French firms' specific characteristics. I address this issue by introducing firms' unobserved fixed effects. Finally the generalized difference in difference approach could not take account of time-varying industry trends which, in turn, may be correlated with tariffs. To address this issue I perform a set of control-experiments that consist in using as dependent variable the probability of French firms to export to other destinations or blocks of destinations, like Morocco, China, Italy, Romania, Russia, Hungary, Algeria, the entire world and the entire world except Turkey. If my results on Turkey come from time-varying industry trends which are spuriously correlated with import Turkish tariffs change, then those control experiments should deliver the same results I found for Turkey. This is not the case, thus confirming the robustness of my results. This finding is puzzling if we have in mind a neoclassical model of comparative advantage, that predict that each country specializes and thus exports mostly in sectors with comparative advantage.

Finally on the intensive margin my results are the followings:

4. A decrease of Turkish tariffs by 1 percentage-point increases the shipped flows to Turkey at existing French exporters by 3% on average and by more in high labour-intensive sectors.

Albeit results on the intensive margin are big in magnitude, they are not robust to the inclusion of time trends. This may be the case if exporters were sensitive to the entry of Turkey in European Customs Union but not specifically to the reduction in tariffs. In fact, since I include the exported flows by each firm to other destinations, Turkish tariffs capture the remaining effect of time-trends on Turkey flows. Thus my tentative conclusion is that the intensive margin reacted to Customs Union but through channels different from tariffs. Also in this case, the effect was surprisingly bigger for labour-intensive sectors.

A trade model that could explain these results should combine the following ingredients: firm level heterogeneity within each industry (only some firms manage to export), comparative advantage at the industry level, a variable trade cost to export which captures the movement of tariffs. I thus build a simplified partial equilibrium model in which France and Turkey trade in a continuum of sectors, each sector uses two production factors with different intensities, firms are heterogeneous within each sector and there are fixed and variable costs to trade. As in the standard Hecksher-Olihn model, capital-intensive sectors enjoy a cost advantage when located in France, since its capital/labour ratio is higher than in Turkey. As in the Melitz (2003) model, only firms with productivity above a threshold enter the export market since they are productive enough to cover costs to export. The export threshold is lower for comparative advantage sectors, since firms in these sectors enjoy a cost advantage given by the relative lower cost of production's factors used intensively. Thus, even with high tariffs firms in comparative advantage sectors have a higher probability of exporting than firms with the same productivity level in sectors with no comparative advantage.

As trade partner tariffs fall, the productivity threshold to export decreases by more in less comparative advantage industries and, as a result, the probability to enter the market increases by more for firms in these industries. This is the case because, even if the cut-off productivity to enter the export market falls in the same proportion as tariffs in all sectors, its level was initially higher in less comparative advantage sectors. This is consistent with my empirical findings.

On the intensive margin the result is opposite. The effect of partner's tariffs reduction on revenue is bigger for firms that initially exported more, the ones in comparative advantage industries. This is the case because, as in the standard one-sector model, firm's revenues elasticity to tariffs is greater than one. This result comes from the monopolistic competition

assumption and from the love of variety utility. My empirical results on this margin are not completely consistent with the ones in this model.

The model I propose is related to Bernard, Redding and Schott (2007) one. They study a general equilibrium economy with two countries that differ in factor abundance, two sectors which differ in factor intensities and heterogeneous firms within each sector. Their model is built in a general equilibrium framework and does not clearly assess the mechanism I am interested in since many results are simulated. My contribution in this sense has been to reconcile the theory to my specific case-study and pin down a clear mechanism through which theory can account for my puzzling results on the extensive margin.

The findings in this paper are related to empirical studies on firms and trade liberalization, firm-level intensive and extensive margin, trade and comparative advantage, and to few other papers on different issues.

First, there are many papers that use firm level data to analyze firms that trade. Many of them analyze the characteristics of firms that export without considering a trade liberalization episode (Bernard and Jensen (1997a), Aw and Hwang (1995) among others). Others study how trade liberalization induces a change within each firm (Bustos 2005, Bustos 2007 for technology adoption, Pavnick (2002), Schor (2004) among others for productivity upgrading, Trefler (2004) analyzes different outcomes for Canadian sectors). Finally few papers analyze the choice of firms to export after a reduction in trade costs, albeit using a change in *import tariffs* to identify their empirical strategy, like Bernard, Jensen and Schott (2006) for US between 1987 and 1997. Differently from previous paper I use a change in *export tariffs* to estimate firms export choices. Bustos (2007) uses a similar policy change and estimates the effect the entry into export market for Argentinean firms after the reduction of Brazilian tariffs induced by the formation of Mercosur. She finds that a 1 percentage-point reduction of Brazilian import tariffs increases the probability to export for Argentinean firms of 0.42 percentage-points. Her result is much higher in magnitude than mine. The difference could arise from an over-representation of bigger firms in Argentinean dataset or from differences in macro-characteristics (like industrialization level) between Argentina and France.

Second, the intensive and extensive margin of trade at firm level has been analyzed by Eaton, Kortum and Kramarz (2004) in French firm dataset for 1986. They estimate how the number of exporters and the average exports by firm explain the cross-country variation of French exports in one year. They find that the number of firms capture a bigger part of that variation. Differently from them, I use a dynamic framework and I calculate how the two trade margins account for the change in French export after a policy episode which features a decrease in trade barriers.

Third, on the comparative advantage side, the empirical literature has mainly analyzed the neoclassical theories by testing predictions on the content of trade that these models feature, but without considering the specific effect of a change in tariffs on sector marginal reaction, which models like standard Hecksher-Olhin could not predict. An improvement of neoclassical models in this direction has been made by Romalis (2004) who analyzes a trade model which features endowment comparative advantage in a monopolistic competition framework. The prediction he gets is that countries capture larger shares of world trade in sectors that use their abundant factor more intensively. However, even if the model features the existence of variable trade costs to export, there are no clear predictions when tariffs decrease. Moreover in his model firms are homogeneous, so there can't be predictions on the extensive and intensive trade margins. From a theoretical perspective the key of my contribution in this direction lies on the fact that I consider a marginal effect of trade on the response of sectors with different comparative advantage more than an average effect, like all other papers do. The main concerns of this literature is to analyze what happens when a closed economy becomes open, my point of view relies in observing what happens when an open economy becomes more open. Moreover, my empirical contribution is unique in this direction.

Fourth, there are some other papers linked with mine in different perspectives. The first one is Chaney (2006) which argues that in sectors with a low elasticity of substitution the extensive margin is highly sensitive to trade barriers while the intensive margin is not. The similarity in our works is to analyze both industry and firm-level heterogeneity in a unified framework.

Finally my paper is somehow linked with a very recent paper by Helpman, Melitz and Rubinstein (September 2007) that derives a gravity equation from a firm heterogeneous trade model. Their gravity equation has a new term, the fraction of exporters. They argue and show that by omitting this term among the regressors of a gravity equation, previous works confound the effect of trade barriers on firm-level trade with the effect of those barriers on the proportion of exporters. In a sense I use the same framework by considering the probability of exporting of each firm in each sector instead of the proportion of exporters as the dependent variables of my regressions.

The remainder of the paper is organized as follows. Section 1 describes the timing of Turkey's entry in European Customs Union and provides a descriptive analysis of French reaction along the intensive and the extensive margins. In Section 2 I illustrate a model that accounts for firm heterogeneity and sector comparative advantage. In section 3 I describe the data and the variables of interest. Section 4 deals with the econometric strategy and the empirical results. Section 5 concludes.

1. Preliminary Analysis of EU-Turkey Customs union.

1.1 A brief background

Turkey's first application for European Community (EC) membership dates back to July 1959, followed by the signing of the Ankara Association Agreement. This agreement specified the three stages through which Turkey would prepare for full membership of the Community: a preparatory stage aimed at helping Turkey to develop its economy, a transitional stage aimed at reaching the Customs Union and a potential third stage to eventually bring Turkey to full membership.

In the *preparatory stage*, which lasted five years, the EC gave unilateral concessions to Turkey in the form of agricultural tariff quotas and direct financial aid to help Turkey to develop its economy. At this stage Turkey didn't have to change its trade regime, which was very inward looking.

The *transition stage* was meant to last from 12 to 22 years and to culminate with the formation of a Customs Union (CU) between the two parties. According to the Additional Protocol of 1973 (which gave practical details on the way to reach the Customs Union) the EC would have to reduce tariffs and equivalent protection measures during the '70s. Turkey was assigned a longer transitional period between 12 and 22 years reduce tariffs and to harmonize its standard to EC ones. EC countries soon accomplished their requirements by abolishing tariffs and equivalent taxes and restrictions on industrial imports from Turkey, though with some strategic exceptions (machine woven carpets, cotton yarn and cotton textiles)[1] . Turkey did not manage to comply with its required tariffs reduction due to political and economic instability. After the Cyprus crises of 1974 and the military "golpe" of 1980 EU-Turkey relations was interrupted and the agreement was economically and politically broken up.

During the'80s, however, Turkey successfully managed to begin a liberalization process and to experience an economic growth. In 1987 it re-applied for EU membership. At this time EC was dealing with the completion of internal market, so negotiations began only in 1993, and finalized on the 6th March 1995 with the Association Council decision that Turkey would enter the European Customs Union, starting on January the 1st, 1996. However, according to the Maastricht Treaty, the agreement had to be ratified by the European Parliament, and that

[1] However, it continued to apply quotas and minimum import price which were within the framework of the Common Agricultural Policy and also non-tariff barriers against some goods (e.g. textiles, iron and steel, raisins, fresh fruit and vegetables) remained high.

ratification was not granted due to concerns over Turkey's human right's records. After lobbying and pressures from different institutions the Parliament ratified the agreement in December 1995 and the CU came into force in January 1996.

According to the Customs Union Decision (CUD) of the 6th March 1995 the extent of the CU was the following[2]:

- Turkey had to eliminate all tariffs, customs duties, quantitative restrictions, charges having equivalent effect to customs duties and all measures having equivalent effect to quantitative restrictions in trade of industrial goods with EU by January 1, 1996;
- Turkey had to adopt the Common Customs Tariff (CCT) against third country imports by the same date and adopt all the EU preferential agreements with third countries by 2001;
- Common agricultural policy (CAP) was not included in the CUD: articles 22-25 declared that Turkey had to let its agricultural products to circulate freely (however many issues were still under discussion);
- the "European Coal and Steel Community" (ECSC) products, basically iron and steel, was exempted from the CU. However in 1996 Turkey and EU signed a Free Trade Agreement (FTA) to let these goods circulate freely after three years;
- Turkey would have to work toward the harmonization of competition policy, intellectual and industrial property rights, customs classification rules, valuation, rules of origin, technical regulations, standards and government procurements;
- Two important issues remained out of the CUD: the supply of service and freely circulation of capital and labour.

1.2 Elimination of the trade barriers

What has been the real extent on the trade barriers elimination provided by EU-Turkey CU? Even if it is hard to quantify the effect of the CU on non-tariffs barriers and policy harmonization, we can use the reduction in Turkish effectively applied tariffs toward EU, available in TRAINS-WTO dataset, to proxy for all the other changes. According to this source Turkish import tariffs decrease consistently after the CU even if they were not set to "0". The variation of effectively applied tariffs is shown in Figure 1b for all sectors and in Figure 1a for all sectors excluding "Food, Beverages and Tobacco". If we exclude this sector, Turkey import tariffs against EU decreased from an average of 7.88 in 1995 to 4.65 in 1999. Moreover the

[2] This section borrows from Erdogan (2002) Togan (1995), Togan (1997).

variation of tariffs among sectors remained quite high. The standard deviation in 1999 was around 4.60. Including the "Food, Beverages and Tobacco" sector the average variation of tariffs went from 9.80 in 1995 to 7.80 in 1999.

In this paper I use this reduction of Turkish tariffs to explore the response of French firms. I have chosen France, among European countries, for two reasons. The first is that French Statistical Agency-INSEE collects very detailed data on French firm balance sheet (BRN dataset), and, more importantly, on French firm export sales to different destinations (DOUANE dataset).This helps me in dissecting the effect of tariffs reduction on firm export choice by considering exactly those firms that export to Turkey (and not to any destination), in the years around the CU[3]. The second reason is that France is Turkey's third trading-partner among European countries[4]. If Turkey's entry into EU-Customs Union affected European countries, I capture a big part of it by analyzing French economy.

In the rest of this section I report preliminary findings on the substantial change of French exports to Turkey, before and after the CU. I then show how the aggregate increase in French export to Turkey can be explained by an increase in the number of exporters: the extensive margin and flows by exporter: the intensive margin of trade. I then propose the same decomposition at sector level, obtaining puzzling results with respect to sector capital intensity margin. The aim of this analysis is to describe in a detailed way the effect of CU on French exports and to indicate a few effects which I further analyze in the rest of the paper.

The entry of Turkey in the European Customs Union affected French exports quite strongly. Between 1995 and 1996 (the year of entry) France increased its exports to Turkey by 40% and by 80% between 1995 and 1999, as shown in Table 1. Compared with the growth in exports to Turkey in the years before CU (2%) or with the growth in exports to the rest of the world in the same period (-1% in 1996 and 16% between 1995 and 1999), the huge effect seems to come from the formation of the CU.

The aggregate French export growth to Turkey may be decomposed in the following way:

$$\ln\left(\frac{Q_t}{Q_{t-1}}\right) = \ln\left(\frac{\overline{Q_t}}{\overline{Q_{t-1}}}\right) + \ln\left(\frac{N_t}{N_{t-1}}\right) \qquad \text{(Decomposition 1)}$$

where the first part refers to the intensive margin (the change in average flows) and the second to the extensive margin (the change in number of exporters). The interest of the literature in this

[3] The years I look at go from 1995 to 1999, for which all the datasets I combine have information.
[4] The first is Germany and the second Italy.

decomposition is not only descriptive, but also normative since the extensive margin is a proxy for product varieties[5] and a large fraction of trade models[6] predict that the number of varieties increases welfare.

Both margins explain trade between countries, but the literature still lacks a quantification of the movements of these margins following a liberalization episode. Eaton, Kortum and Kramarz (2004) estimate those extensive and intensive margins for French exports towards the rest of the world in 1986. They find that the extensive margin explains a bigger fraction of the aggregate exports. By applying Decomposition 1 I find that almost the 40% of the total growth in exports to Turkey is explained by the increase in the number of exporters while a 60% is explained by the increase in average flows. The same decomposition for exports to other destinations in the same years, reported in Table 1, reveals that, in those cases, the extensive margin explains a smaller part of the growth in total exports.

Even if many French firms entered Turkey after the CU, they exported very small quantities. We can decompose the aggregate French growth rate to Turkey according to a different perspective: considering the change in export flows for continuing exporters (which I indicate with STAY) and the change in export flows given by the entry-exit dynamic (indicated as NET_ENTRY)[7] :

$$\frac{\Delta Q_t^{STAY}}{\Delta Q_t^{TOTAL}} + \frac{\Delta Q_t^{NET\_ENTRY}}{\Delta Q_t^{TOTAL}} = 1 \qquad \text{(Decomposition 2)}$$

Table 2 reports results for Decomposition 2 for different years as well as the level change in exported flows to Turkey in levels (in column 1). The change in exported sales to Turkey between 1995 and 1996 was of 422 million francs (almost 64 million of euros) which is a huge quantity compared to the change in previous years. Almost 90% of this change came from an increase in exports by firms which were already exporting (column 3), while 17% was the exported sales by newly exporting firms and 10% by the exit-entry dynamic[8]. In levels, the entry-exit margin refers to almost 43 million francs between 1995 and 1996, almost the double than the 23 millions francs between 1994 and 1995.

[5] Under the hypothesis that each firm produces a different variety of goods, like all models with monopolistic competition suggest.

[6] Basically all models with love-of-variety utility function and monopolistic competition structure, from Krugman (1980) on.

[7] The finding that new entrants tend to export small quantities compared to continuing exporters seem to be true across all destinations. In Berger, Buono, Fadinger (2007) we provide more insights on this point by looking at French export toward all destinations through five years.

[8] This refers to exports by newly entered firms minus exports by exited firms.

Are these findings constant across sectors?

In Table 3 I report Decomposition 1 and 2 at sector level using 2-digit NES classification, the one used at INSEE[9]. The sectors are ordered by increasing capital intensity[10]. Here I have in mind neoclassical trade theory and the main concept of endowment comparative advantage. According to neoclassical theories each country specializes in those sectors which use relatively more intensively the factors the country is relatively more endowed with. As the French capital/labour ratio is higher than the Turkish one, neoclassical theory suggests that France should export capital intensive goods to Turkey and import labour intensive goods from Turkey. Even if existing models do not account for the movement of the extensive and the intensive margin across sectors with degree of comparative advantage[11], I expect that both margins should react more in capital intensive sectors, the one in which France enjoy a comparative advantage with respect to Turkey[12].

Surprisingly, results in Table 3 show this is not the case. The total export growth and the intensive margin vary a lot among different sectors in 1996 do not seem to be correlated with sector capital intensity. The margins of the second decomposition are also very volatile across sectors and their movement doesn't seem associated with sector capital intensity. The movement along the extensive margin, instead, presents a puzzling kind of regularity: it grew a lot in labour-intensive sectors like Apparel, Textile and Leather Products or Furniture and Fixture while it grew very slowly in capital-intensive sectors like Drugs, Soaps and Cleaners[13].

What are the possible explanations of this finding?

A first reason may be the existence of "outsourcing": after the reduction of Turkish tariffs more French firms export to Turkey intermediate goods and import back final goods. If this is the case we should observe an increase of the number of French importers from Turkey in the same period in labour-intensive sectors. Table 4 shows this is not the case, in fact total imports from

[9] The 2-digit NES classification consists in 15 manufacturing sectors while the 3-digit one consists in 60 manufacturing sectors. This is the maximum available disaggregation.

[10] Capital Intensity is calculated from NBER-US data. As I will explain in further section this refers to the "optimal capital intensity" of each sector and not to the actual capital intensity in French sectors even if the two measures are positively correlated.

[11] With the exception of Bernard-Redding-Schott (2006), which unfortunately do not provide closed form solutions to explore this issue.

[12] According to the standard HO model only comparative advantage sectors export, thus all the effects of a trade liberalization should happen in these sectors.

[13] This finding is true also controlling for the total number of firms in each sector. The probability of French firms to export to Turkey (measured as number of exporters over total number of active firms in each sector) is higher for firms in capital intensive sectors (Drugs and Soaps, Chemicals, Electric Components), but *increased by more* in less capital intensive ones after the Customs Union.

Turkey increased only by 6% in the same year of the Customs Union[14]. and the extensive margin reacted more in capital-intensive sectors.

A second reason may be a productivity change within French firms in the same years of CU. Recent models of trade suggest that more productive firms are the ones that export. It may be the case that French firms, in the same years I am analyzing, upgrade their productivity in some sectors while not in others and this is driving previous finding. At a first sight, figure 3A and3B show this is not the case. In these figures I plot for sectors with very different capital intensity their firms' productivity distribution[15] (in the left hand side panel of each figure) and the estimated probability of exporting for each productivity level (in the right hand side panel) for the period before and after the CU (1994-1995 vs 1996-1999). While firms' productivity distributions did not change very much in the two periods, the probability of exporting increased a lot after the 1996 for firms in Apparel, Textile and Leather Products for each level of TFP. The same is not true for other sectors like Drugs & Cleaners[16].

This description of French export to Turkey in the years around the entry of Turkey in CU showed that:

1. the growth rate of aggregate French exports to Turkey was huge;
2. the increase in exports was due to a massive entry of new French firms exporting to Turkey, albeit with small volumes; and to a big increase of volumes exported by firms that were already exporting to Turkey before the CU; the second effect is higher in magnitude than the first;
3. the entry of new French exporters to Turkey was higher in labour-intensive sectors, the ones in which France does not enjoy a comparative advantage with respect to Turkey.

In the rest of the paper I provide a model in which French firms could export or not to Turkey depending on their characteristics, on the level of Turkish import tariffs and on the comparative advantage their sector enjoys with respect to Turkey.

This framework clarifies that in a standard model that allows for asymmetries in the initial level of main variables we can generate the preliminary finding on the extensive margin. The key to the result lies in the fact that I am looking at an open economy which becomes more open, so at a marginal effect and not at an average one. The predictions of the model are then econometrically tested.

---

[14] The huge Turkish import growth rate in 1996 has been documented in some case studies. Erdogdu (2002) for example noticed that "Since the EU had already abolished its tariffs from imports from Turkey, the Customs Union did not bring about a significant liberalization of Turkish exports to the EU. On the contrary, the dismantlement of trade barriers in favour of the EU led to a surge in imports from Europe, culminating in steep rise in Turkey's trade deficit with EU in 1996".

[15] TFP is calculated according to Olley-Pakes as I will explain in further section

[16] I don't report graphs for other sectors since they are consistent with findings in Table 2.

2. The model

In this section I illustrate a trade model with standard assumptions on demand and supply side that predicts reactions at the firm-sector margin. I consider a continuum of sectors and a continuum of firms inside each sector. The heterogeneity of firms is introduced as in Melitz (2003): firms differ by an exogenous productivity. The heterogeneity of sectors is introduced similarly to a two factors Hecksher-Olihn model: each sector has a higher comparative advantage with respect to the trade partner if it uses more intensively the factor its country is more endowed with. Each country has a different capital-labour ratio (or skill-unskill ratio) and each sector uses a different share of each factor to produce. In this economy the asymmetry among countries is given by factor endowment; the asymmetry across sectors is given by factor intensities and the asymmetry across firms within sectors is given by exogenous productivity. However the firms' productivity distribution is the same across sectors and countries[17].

The assumptions of the model are the followings:

- There are two countries that only differ on factor abundance, skilled and unskilled workers[18]: Turkey, the foreigner country (T) is less skill-abundant with respect to France, the home country (F);
- Consumers have Cobb-Douglas preferences over different sectors goods and CES preferences over goods within each sector;
- There is a continuum of sectors $i \in (0,1)$ which use skilled and unskilled workers with a Cobb-Douglas technology. Technology is the same across countries and time. The index i ranks industries by relative factor intensity: industries with higher i are more skill intensive;
- The two factors, inelastically supplied, are mobile within country but not across them, thus skilled and unskilled wages are equalized across sectors in each country;
- In each sector there is a continuum of firms. Each firm has an exogenous productivity which does not change through time. Each sector has the same firms' productivity distribution;

[17] Bernard, Redding and Schott (2007) build a general equilibrium model with two countries, two production factors, two sectors and heterogeneous firms inside each sector. The following model, described in a partial equilibrium environment, can thus be considered a simplified version of their model with a continuity of sectors.

[18] or capital and labour.

- Each firm in each sector produce a different good using the same factor proportion as other firms in its sector and its own specific productivity;
- Firms compete in a monopolistic competition environment;
- There is no entry and exit of firms from the domestic market in each country;
- There are variable and fix costs to export (thus all firms produce for the domestic market and only some of them export);
- Wages are taken as given: the reduction of import tariffs in Turkey does not affect French labour market and viceversa.

These assumptions seem reasonable. First, France exports to Turkey just 1% of its total production, thus the partial equilibrium framework is a good environment to study this event. Second, the Customs Union did not allow for labour and capital movements between Turkey and European countries. As a consequence, the skill-premium difference between Turkey and France remained positive after the tariffs reduction. Finally, this Customs Union consisted mainly in the reduction of Turkey's import tariffs. French import tariffs from Turkey had already been low since the 1970s. This allows me to abstract from the increasing competition from Turkey to France and, as a consequence, from entry/exit in French domestic market[19].

The formal description of French (F) economy, under previous hypothesis, is described hereafter[20]. Consumer's utility is given by Equations 1 and 2, and the standard demand derived from this is given by Equation 3:

$$U = \int_0^1 b_i \ln C_i d_i \qquad \text{(Equation 1)}$$

$$C_i = \left[\int_0^1 q_i(\omega)^\rho d\omega \right]^{\frac{1}{\rho}} \qquad \text{with } 0<\rho<1 \qquad \text{(Equation 2)}$$

$$q^D{}_i(\omega) = \left(\frac{p_i(\omega)}{P_i} \right)^{-\sigma} \frac{E_i}{P_i} \qquad \text{(Equation 3)}$$

where $E_i = b_i Y$ is the fraction of income each consumer spends in goods of industry *i* and $\sigma = 1/(1-\rho)$ is the constant elasticity of substitution greater than 1, P_i is the Price Index for sector *i* and $p_i(\omega)$ is the price of good ω in sector *i*.

Price Index is given by the following:

[19] In fact as we saw in previous paragraph the French exports to Turkey grew by 40% between 1995 and 1996 while the French imports from Turkey increased by 6% in the same period: 421 millions of Francs against 14 million of Francs respectively.

[20] I omit the sub-index F, indicating France, when it is possible without creating confusion.

$$P_i = \left[\int_{\omega \in \Omega_i} p(i,\omega)^{1-\sigma} d\omega \right]^{\frac{1}{1-\sigma}} \qquad \text{(Equation 4)}$$

where Ω_i represents the exogenous mass of available goods in sector i.

Firms compete in a monopolistic competition environment. The output of each industry consists of a number of varieties that are imperfect substitutes for one another. Each variety is produced by a firm with a productivity level denoted by φ. In each sector and in each country the distribution of firms' productivity is the same. All firms produce for domestic market and only some of them export. From now on I focus only on the costs, revenues and profits from export, being the domestic ones standard. The total cost function for producing for foreigner country is:

$$TC_{i,x,F}(\varphi) = f_{i,x} + \frac{\hat{q}_i(\varphi)}{\varphi} w_{S,F}^{\beta_i} w_{L,F}^{1-\beta_i} \quad \text{if} \quad \hat{q}_i(\varphi) > 0 \qquad \text{(Equation 5)}$$

and

$TC_{i,x,F}(\varphi) = 0$ otherwise.

In the total-costs function $\hat{q}_i(\varphi)$ is the supplied quantity, $f_{i,x}$ is the fixed cost the firm pays to sell in foreign market, β_i is the skill-factor intensity in sector i and $w_{S,F}$ and $w_{L,F}$ are skilled and unskilled wages in France respectively.

Notice that β_i is higher for sectors which use more intensively skilled workers, that is for sectors that are ranked with a higher *i*. Since France is more skilled-endowed than Turkey, sectors located in France with higher β_i have a higher comparative advantage degree with respect to Turkey. Thus β_i is the theoretical measure of comparative advantage.

The price each F firm sets is:

$$p_{i,F}(\varphi) = \frac{\tau_{i,T} w_{S,F}^{\beta_i} w_{L,F}^{1-\beta_i}}{\rho\varphi} \qquad \text{(Equation 6)}$$

where $\tau_{i,T}$ is a standard iceberg trade cost that captures the tariff imposed by Turkey on sector *i*'s goods from F.

Foreign demand faced by each F exporter is given by:

$$q_{i,T}(\varphi) = \frac{E_{i,T}}{P_{i,T}} \left(\frac{\tau_{i,T} w_{S,F}^{\beta_i} w_{L,F}^{1-\beta_i}}{\rho \varphi P_{i,T}} \right)^{-\sigma} \qquad \text{(Equation 7)}$$

Thus total export-profits[21] are:

$$\pi_{i,x,F}(\varphi) = \tau_{i,T}^{1-\sigma} \frac{\left(w_{S,F}^{\beta_i} w_{L,F}^{1-\beta_i} \right)^{1-\sigma}}{\sigma} \frac{E_{i,T}}{(\rho P_{i,T})^{1-\sigma}} \varphi^{\sigma-1} - f_{i,x} \qquad \text{(Equation 8)}$$

The open economy version of Price Index in T can be written as:

$$P_{i,T}^{1-\sigma} = N_T \left(p_{i,d,T}(\tilde{\varphi}_T) \right)^{1-\sigma} + N_{i,x,F} \left(\tau_{i,T} p_{i,d,F}(\tilde{\varphi}_{i,x,F}) \right)^{1-\sigma} =$$
$$= \left(w_{S,T}^{\beta_i} w_{L,T}^{1-\beta_i} \right)^{1-\sigma} \frac{N_T}{(\rho \tilde{\varphi}_T)^{1-\sigma}} + \left(w_{S,F}^{\beta_i} w_{L,F}^{1-\beta_i} \right)^{1-\sigma} N_{i,x,F} \left(\frac{\tau_{i,T}}{\rho \tilde{\varphi}_{i,x,F}} \right)^{1-\sigma} \qquad \text{(Equation 9)}$$

that is an average of the prices of all the goods sold in Turkey weighted by the numbers of goods. In particular we can easily distinguish goods produced and sold in Turkey (the first addend) and goods imported from France (the second addend). N_T and $N_{i,x,F}$ are respectively the number of goods (or of firms) produced and sold by each sector in Turkey and the number of goods imported from F. While $\tilde{\varphi}_T$ and $\tilde{\varphi}_{i,x,F}$ are the average productivity of firms in Turkey and of importers from F. Notice that the first is equal across sectors since all sectors are assumed to have the same productivity distribution, while the second is sector dependent since each F sector can export a different number of varieties to Turkey:

$$\tilde{\varphi}_T = \left[\int_0^{\infty} \varphi_T^{\sigma-1} \mu(\varphi) d\varphi \right]^{\frac{1}{\sigma-1}}$$

$$\tilde{\varphi}_{i,x,F} = \left[\frac{1}{N_{i,x,F}} \int_{\varphi_{i,x,F}}^{\infty} \varphi_F^{\sigma-1} \mu(\varphi) d\varphi \right]^{\frac{1}{\sigma-1}}$$

Substituting the Turkish Price Index into profit function of France exporters we have:

[21] Notice that as in standard heterogeneous firm model if a firm export it is also active in the domestic market and its domestic profits are given by Equation 7 with no variable costs and domestic fixed costs. Exporting costs are sunk but we can introduce them each period like a share of the total sunk fixed cost.

$$\pi_{i,x,F}(\varphi) = \tau_{i,T}^{1-\sigma} \frac{\left(\frac{w_{S,F}^{\beta_i} w_{L,F}^{1-\beta_i}}{w_{S,T}^{\beta_i} w_{L,T}^{1-\beta_i}}\right)^{1-\sigma} \frac{1}{Z_T}}{1+\left(\frac{w_{S,F}^{\beta_i} w_{L,F}^{1-\beta_i}}{w_{S,T}^{\beta_i} w_{L,T}^{1-\beta_i}}\right)^{1-\sigma} \frac{Z_{x,F}}{Z_T}} \frac{E_{i,T}}{\sigma(\rho P_{i,T})^{1-\sigma}} \varphi^{\sigma-1} - f_{i,x} \qquad \text{(Equation 8.bis)}$$

where

$$\frac{Z_{x,F}}{Z_T} = \frac{N_{i,x,F}}{N_T}\left(\frac{\tilde{\varphi}_{i,x,F}}{\tau_{i,T}\tilde{\varphi}_T}\right)^{\sigma-1}$$

is a measure of the degree of competition between French exporters and Turkish domestic firms in Turkey. Since Turkey pre-liberalization tariffs were high and the number of French exporters was low compared to domestic producers, I analyze the case of a low degree of competition, in particular when $\frac{Z_{x,F}}{Z_T} \to 0$ we can rewrite export-profits (Equation 8.bis[22]) and export-revenues as follows:

$$\pi_{i,x,F}(\varphi) = \tau_{i,T}^{1-\sigma}\left[\left(\frac{SP_F}{SP_T}\right)^{1-\sigma}\right]^{\beta_i} \varphi^{\sigma-1} F_{i,T} - f_{i,x} \qquad \text{(Equation 8.ter)}$$

$$r_{i,x,F}(i,\varphi) = \tau_{i,T}^{1-\sigma}\left[\left(\frac{SP_F}{SP_T}\right)^{1-\sigma}\right]^{\beta_i} \varphi^{\sigma-1} F_{i,T} \qquad \text{(Equation 11)}$$

where $F_{i,T} = \left(\frac{w_{L,F}}{w_{L,T}}\right)^{1-\sigma} \frac{E_{i,T}}{\sigma Z_T \rho^{1-\sigma}}$ is a constant and SP is the skill-premium in each country.

A firm exports only if its productivity is high enough to cover fix and variable export costs and have non-negative profits. Setting Equation 8.ter equal to zero we obtain the exporting threshold, that is the minimum level of productivity that a French firm needs to have in each sector to be able to export to Turkey:

$$\varphi_{i,x,F} = \tau_{i,T}\left(\frac{SP_F}{SP_T}\right)^{\beta_i}\left[\frac{f_{i,x}}{F_{i,T}}\right]^{\frac{1}{\sigma-1}} = \tau_{i,T}\left(\frac{SP_F}{SP_T}\right)^{\beta_i} D_{i,T} \qquad \text{(Equation 12)}$$

where $D_{i,T}$ is a constant.

[22] This assumption can be relaxed and results are valid after more cumbersome algebra, under coefficients restrictions.

so all firms with productivity higher than $\varphi_{i,x,F}$ export.

Equation 12 shows how the exporting-threshold varies according to tariffs and comparative advantage for given fix costs to export, foreign expenditure and productivity distribution.

Export threshold and per firm revenue give us information on the way probability of exporting and export flows react in different sectors as Turkey decreases its tariffs toward France.

From Equation 12 we see that the threshold decreases when tariffs decrease and comparative advantage increases[23]. As expected a tariff liberalization increases the probability of exporting in all sectors, given comparative advantage (as in Melitz); the probability of exporting is higher for comparative advantage sectors given tariffs (HO intuition). However as the *starting* threshold is lower for comparative advantage sectors, a *marginal* tariffs reduction will affect *by more* the threshold in no comparative advantage sectors. As a consequence the probability of exporting of firms in those sectors will also be more affected. The three results are summarized by the following derivatives[24]:

$$\frac{\partial \varphi_{i,x,F}}{\partial \tau_{i,T}} > 0; \frac{\partial \varphi_{i,x,F}}{\partial \beta_i} < 0; \frac{\partial^2 \varphi_{i,x,F}}{\partial \tau_{i,T} \partial \beta_i} < 0$$

It worth emphasizing that in this exercise I analyze the change from an *open* to a *more open economy*. In recent liberalization episodes it is hard to argue that we observe a transition between autarchy and open economy. This was definitely not the case of France and Turkey since even before Customs Union there was bilateral trade in all sectors.

The intensive margin, namely the change in flows by continuing exporters, is captured by revenues in Equation 11[25]. The model leads to the following predictions on revenues from continuing exporting firm:

$$\frac{\partial r_{i,x,F}(\varphi)}{\partial \tau_{i,T}} < 0; \frac{\partial r_{i,x,F}(\varphi)}{\partial \beta_i} > 0; \frac{\partial^2 r_{i,x,F}(\varphi)}{\partial \tau_{i,T} \partial \beta_i} < 0$$

$$\varepsilon(r_{i,x,F}(\varphi), \tau_{i,T}) = 1 - \sigma < 0$$

As in Melitz (2003) I find that revenues increase with a decrease in tariffs. Similar to HO they are higher in comparative advantage sectors given firm productivity level and tariffs. Finally the effect of trade liberalization is higher for comparative advantage sectors as the cross derivative shows. The intuition of this result comes from the "Krugman" part of the model: the monopolistic competition hypothesis. Demand for goods depends more than proportionally on

[23] Since France is more endowed with skilled workers, its skill-premium is lower than the Turkish one, thus the ratio of skill-premiums is lower than 1.

[24] The full derivation is shown in the Appendix.

[25] I consider change in revenues instead that change in shipped quantities to be consistent with data.

prices (through σ). The price is inversely proportional to productivity and directly proportional to tariffs. When the price decreases (through a reduction in tariffs) demand increases more than proportional. This inflates revenues. Since revenues in sectors with a comparative advantage were already high, their level will increase by more than in no comparative advantage sectors.

The predictions obtained on the extensive and the intensive margins are at the firm-level. However we could obtain sector-level predictions as well. For example, the firm-level prediction on the *probability of each firm* to export becomes the sector-level prediction on the *proportion* of French exporters to Turkey. Some previous papers use a firm heterogeneity model to test sector-level predictions[26]. By doing this however we could incur problems both at the theoretical and at the empirical level. To obtain sector-level predictions we need to aggregate firm-level productivity at the sector-level. This is usually done in the literature using a Pareto distribution function, which has been argued to represent firm size distribution well[27]. However, depending on the chosen distribution function, this aggregation could change the direction of some theoretical results. I show this in Appendix A2 for this paper's results.

At the empirical level the aggregation of firm level data to sector level ones may give some problems. First, to do it, it's necessary to obtain few statistics that take account of firm productivity distribution, like the mean or the standard deviation of that distribution. By using firm level data, we actually account for the real productivity distribution. Second it may also be the case that firm level variables are correlated with sector level variables included in the regression. In this case using aggregate sector statistics instead of actual firm-level variables may bias the results[28].

3. Data and variables construction.

The dataset I used has been constructed from four different sources. Data on French firm level characteristics comes from the BRN dataset collected at INSEE-*Institute National de la Statistique et des Études Économiques*. This data set contains, for different years, balance-sheet information of French firms whose turnover is higher than 3,5 millions of francs (about 530.000 euros). The sample accounts for the 60% of all French firms. Each firm is classified according to 3-digit NES classification that accounts for 60 manufacturing sectors. The variables I use

[26] Helpman-Yeaple-Melitz (2004), Chaney (2006) among others.
[27] Firm size in these models is an increasing function of firm productivity.
[28] In my analysis this may be the case if firms in a sector with high level of comparative advantage are more productive than those in other sectors. For example Bernard-Redding-Schott (2007) model the HO comparative advantage induces a magnification of Ricardian comparative advantage.

from this dataset are described hereafter. *Labour* is a full time-equivalent measure that accounts for part-time workers and refers to the end of the year. *Value added* is defined as the difference between production and materials, added to production subsidies minus value added tax and other accrued taxes or credits for production. It is divided by the industry value added price index at the two-digit level of the French industrial classification taken by the national accounts. *Labour cost (wages)* is equal to the total labour compensation costs. *Real capital stock* is measured as the gross book value of fixed assets including construction and other fixed assets. It is adjusted for inflation assuming all the stock was bought in one time at a date computed as the difference between the considered year and the age of the stock of capital. The age itself is defined as the product of an assumed life time of 16 years and the ration of the net to gross book value ratio. *Total sales* and *total sales to export* are the balance sheet voices for domestic and shipped total sales (to any country). I take all firms in manufacturing industries reported in BRN data set after eliminating the ones with negative or null value added, number of workers and capital. For each firm I then take total export sales and Turkey export sales in different years from DOUANE dataset, also available at INSEE, which provides information about sales and export destination by each exporter. In some cases DOUANE and BRN have different information about the export status of a single firm; I thus eliminate these observations through all the years.

Table 5 reports numbers of observations in the dataset, showing per year number of operating firms, exporters, exporters to Turkey, as well as total sales to Turkey compared to total exported sales of French firms. The merged dataset contains information on an average of 60.000 firms between 1994 and 1999. The number of firms differs from year to year since some firms exit the BRN data sets. I consider these firms as exited ones. As found in many papers for other countries, the exporters are a small part of overall firms, around one third. Almost the 9% of all exporters export to Turkey and this percentage increases through time. Sales to Turkey represents around the 0.4 percent of total French production and 1% of total French exports, thus guaranteeing me that this could be examines within a partial equilibrium environment.

Standard statistics for variables used in the analysis are reported in Table 6. As shown in the model, more productive firms have a higher probability of being exporting firms. In the estimate of the effects of tariffs on probability of exporting I need to control for firm productivity in each period. As a first measure of productivity I take the distance between firm and sector average labour productivity (value added per worker)[29]. This productivity measure, although only a proxy for total factor productivity, works quite well throughout the analysis. However, as firm

[29] The normalization allows me to take account of the sector component of labour productivity.

productivity is the most important control variable in regression specifications, I also consider more sophisticated and reliable measures of Total Factor Productivity (TFP). TFP is usually estimated as a residual of a Cobb-Douglas log-linearized production function. However, as many previous empirical studies argued, this estimation is biased because of simultaneity and selection biases. The first bias arises because firms may adjust one of their production factor (capital) knowing a part of their productivity, which is unknown by the econometrician. Thus the estimated coefficient for capital may be biased since it is correlated with an unknown firm level heterogeneous term which is left in the error term. Selection bias, instead, may arise because in this dataset some firms exit and presumably they are the less productive ones. I thus use Olley-Pakes semi-parametric estimation method to measure TFP controlling for both biases[30]. The simultaneity bias is taken into account by using an investment function that links capital stocks to capital flows and to estimate the coefficient of capital with a non-parametric technique[31]. Selection bias is taken into account by incorporating an estimate of the survival function in the second non-parametric stage and by considering "exited" those firms that exited the BRN dataset[32]. Table 6 shows some descriptive statistics on TFP estimations[33].

Data on industry capital and skilled comparative advantage have been obtained using NBER Manufacturing Dataset. Skilled sector intensity is the ratio of non-production over total wages, while capital intensity is given by the logarithm of capital per worker[34][35]. Table 6 and Figure 2 show the measures of the capital and skilled labour comparative advantage for 2-digit sector level. French sector with higher level of comparative advantage with respect to Turkey are "Drugs, Soap and Cleaners", "Chemicals Products", "Transportation", "Mechanical Equipment" and "Electric and Electronic Components". As expected Turkey has higher comparative advantage in traditional sectors like "Apparel, Textile and Leather Products" and "Textile Mills".

Finally the tariffs come from WTO-TAINS dataset and they have been described in section 2. The final dataset I use report the information for the years 1995, 1997 and 1999.

---

[30] Pavnick (2002) and Arnold (2005) explain extensively this methodology.

[31] Levinshon-Petrin technique is very similar to the previous one but it consists in using a function for the demand of intermediate factors (material) instead of an investment function, since in firm level datasets many records for investment are zero. Results are robust to this productivity measure.

[32] I also use another measure of exit firms based on the information on illiquidity problems of firms. In fact a firm could exit BRN because of different reasons than the exit from the market itself. By using information on illiquidity in the "Defaillance" dataset I can control for this event. Results are similar with this TFP measure.

[33] Correlation among different measures is very high

[34] Measures in the same fashion have been recently used in Cuñat-Melitz (2005), Romalis (2004).

[35] Notice that since I am looking at the comparative advantage index among two countries I don't need to include a term that indicates the difference in capital or skilled labour endowment in the two countries since such a term would only change the scale of the comparative advantage measure.

4. The empirical results.

In this section I estimate the model's predictions on the impact of a tariffs reduction on French firms' export behaviour. The empirical identification is based on a generalized difference in difference methodology where the source of variation is the change in Turkish tariffs across 60 manufacturing industries (at the 3-difit NES classification) in 3 years (one before the CU: 1995 and two after: 1997, 1999).

I analyze predictions in this order: the change in the average probability of exporting, the change in the probability of exporting in sectors with different comparative advantage, the average change in flows to Turkey by continuing exporters, the change in those flows for sectors with different comparative advantage.

4.1 Extensive margin: the probability of exporting

The model predicts that a firm will export whenever its productivity is higher than the export productivity threshold in its sector. The export threshold, in turn, depends positively on tariffs. Therefore, when tariffs decrease some firms, among very productive non-exporters, enter the export market. This is captured by the following derivative: $\partial \varphi_{i,x,F} / \partial \tau_{i,T} > 0$.

To empirically test this prediction I run the following Linear Probability Model (LPM):

$$EXP\_TK_{ijt} = \beta_1 \tau_{jt} + \beta_2 \varphi_{ijt-1} + \beta_3 Z_{ijt-1} + \delta_j + \delta_t + \varepsilon_{ijt} \qquad \text{(R1)}$$

where i indexes firms; j indexes 3-digit-NES industries; t indexes time (years 1995, 1997, 1999); EXP_TK_{ijt} is a dummy with value 1 if the firm export to Turkey in a given year and 0 otherwise; τ_{jt} are Turkey tariffs toward France imports in each sector and year; φ_{ijt-1} is log firm productivity obtained with different measures as discussed in the previous section; Z_{ijt-1} refers to a set of firm time-variant controls which I describe afterward. Along with coefficients, regression R1 estimates a set of industry dummies (δ_j) that controls for unobserved time-invariant industry characteristics and a set of time-dummies (δ_t) that control for time-varying shocks that affect all industries proportionately. The first ones are introduced to control for all those sector characteristics that can affect on average the probability of exporting, such a specific fixed cost to export, comparative advantage itself, elasticity of substitution and so on.

Introducing them allows me to control for the possibility that the initial level of Turkish tariffs had been set to protect Turkey against the competition of specific French (or European) industries. Time fixed effect control for macro-shocks which could explain the change in probability of exporting besides the specific change in tariffs. Regression R1, estimated with sector fixed effect, is a pooled regression in which panel structure is not specified. This regression, thus, estimates the average effect of tariffs (or productivity) on the probability of exporting.

The expected sign of the tariffs coefficient in regression (1) is negative since the probability to export for a firm in the model is given by the distance between its level of productivity and the export threshold:

$$\frac{\partial \varphi_{j,x,F}}{\partial \tau_{j,T}} > 0 \rightarrow \frac{\partial \left(\varphi - \varphi_{j,x,F}\right)}{\partial \tau_{j,T}} < 0 \rightarrow \beta_1 < 0$$

These derivatives help us to understand why it is important to control for firm level productivity in the empiric exercise. Although in the model productivity is held fixed through time for each firm, this is not the case in real world. A firm could change its export status because of a productivity upgrading in the same period in which tariffs are reduced. If that upgrade is spuriously correlated with tariffs change, by omitting firm productivity, tariffs coefficient is biased.

However there could be concerns that firms that enter export market become more productive, thus I introduce one-year lagged firm productivity to control for endogeneity. However, in this analysis the endogeneity issue is not very likely since most of the firms which decide to enter the Turkish market after 1996 were already exporters, albeit in other markets. Thus, even if we are concerned by the existence of potential backward gains -from trade to firm productivity-, this is not an issue in this case.[36]

The second important control variable is a dummy that takes the value of 1 if the firm exports to any other destination besides Turkey the year before and 0 otherwise. Bernard and Jensen (2004) empirically shows that sunk cost to be an exporter (in any destination) are empirically relevant[37]. Thus, it may be that a firm that was an exporter albeit not to Turkey could enter

[36] There is however another reason to introduce lagged firm level productivity and this is the fact that labour is measured at the end of the year in my dataset, while export refers to any date before the end of the year, thus introducing a lag gives me a more precise time structure.

[37] In an ongoing project with Harald Fadinger (UPF and ULB) we are using the three dimensions of French dataset to disentangle between the destination-specific component of sunk costs (country-specific network relation and so on) and the fixed component of sunk cost to export.

Turkey after the reduction in tariffs much easier than another firm. If the starting export status of French firms was correlated with Turkish tariffs, then, by omitting it, we could have a biased coefficient. Having the information on export status to any other destination I can successfully control for this potential bias.

Finally other firm level controls are firm size measured as number of workers, firm capital intensity measured as capital per worker and firm's cost of labour, all introduced in logs. These variables are mainly introduced to control for other time-variant firm level characteristics which may be important in the decision of a firm to export. Moreover since measured productivity doesn't vary so much through time, these variables may capture with more precision firm dynamic structure.

Results for regression 1 are reported in columns (1) to (5) of Table 8. As expected, a reduction of Turkish tariffs increases the average firm's probability of exporting to Turkey. In the simplest specification, in which I introduce only tariffs in the right hand side of R1, 1 percentage-point decrease in these increases the probability to export by 0.053 percentage points. In specification (2) I add Olley-Pakes TFP estimation of firm productivity. I find that a 1 standard deviation increase in TFP increase the probability to export by 0.33 standard deviation log-points. In specification (3) I add the export status of previous year. As expected, if a firm was exporting to any destination except Turkey in previous year, it exports to Turkey with a higher probability in the current year. Not surprisingly the firm productivity coefficient is now lower, since productivity and export status were expected to be positivly correlated. When I add other firm characteristics the firm-productivity coefficient decreases from 0.030 to 0.017 due to the fact that in column (3) firm productivity was accounting for all time-variant firm level characteristics.

All the regressions have robust standard errors and are clustered at the 3-digit-NES sector level to take into account possible heteroskedasticity and to relax the hypothesis of independence of residuals, thus residuals are supposed independent across sectors but not within them.

A last observation regards the choice of using LPM instead of a probit (or a logit). Since it is necessary to estimate these regressions with fixed effects, I am more willing to accept the problems that a regression with LPM may have (prediction on probability outside the 0-1 range) than the consequences of the incidental parameter problem a probit/logit regressions have.

Regression R1 may be improved by allowing for the panel structure of the dataset and running the following:

$$EXP\_TK_{ijt} = \beta_1 \tau_{jt} + \beta_2 \varphi_{ijt-1} + \beta_3 Z_{ijt-1} + \delta_i + \delta_t + \varepsilon_{ijt} \qquad \text{(R2)}$$

which differs from R1 since it accounts for firm unobservable time-invariant heterogeneity through the introduction of firm, instead of sector, fixed effects. Results are reported in columns (6) to (10) of Table 8. Using R2 instead of R1 improves the results in different directions.

First, allowing for firm fixed effect, allows me to check for the case that Turkish tariffs are correlated with French firm characteristics. Suppose France has a sector with a very few number of firms with some specific characteristics. Suppose that this sector exports a very high volume of sales to Turkey. If Turkey set its tariff to protect against a specific French sector and if this sector is mainly composed by few firms, than it is plausible that initial Turkish tariffs are correlated with French firm characteristics (at least for some sectors), thus the tariff coefficient may be biased. If it exists, this bias is very small since tariffs coefficient in this specification does not change much, remaining in the range of -0.042.

Second, productivity coefficients in R1 are most probably biased since it is plausible that there are some unobservable firm characteristics (like management and so on) which are positively correlated with productivity. If they are not taken into account the productivity coefficients in columns (2) to (5) of Table 8 will be biased upwards. This seems to be the case since the estimated coefficients for TFP are much smaller when I allow for firm fixed effect (from 0.017 of column (4) to 0.007 of column (9)). The same intuition underlies the lower coefficient on past exporting status in this set of regression. Since being an exporter (to any destination) is very persistent in the dataset, the dummy that controls for past export status may be very correlated with a firm fixed effect and this is why this variable is no longer significant in some specifications of R2.

Third, with this specification I can control for a third potential problem, deriving from the sector disaggregation. The maximum sector disaggregation I have is 3-digit NES which consists in 60 manufacturing sectors. It is plausible that there are sector characteristics at a more disaggregated level which are correlated with initial level of tariff and that I am not capturing by using only 60 sectors. In this way I allow for unobservable effects which may be correlated with tariffs to vary at a much more disaggregating level.

Finally, with this specification, I am taking into account the panel structure of my data which I am not doing with the pooled OLS of the previous model. Even if, as long as individual fixed effect are not correlated with our variable of interest, the coefficients are unbiased, still this regression allows for more efficiency and for the specific fact that the mean effect (in the constant) is firm specific rather then constant over all observations. In column (7) I am looking

at the marginal change in probability of exporting within each firm when tariffs and firm productivity changes through time. Thus the coefficient of productivity now tells us that if within a firm the productivity increases by 1 standard deviation then the probability of exporting for this firm increases by 0.05 standard deviation log-points. The coefficient of tariffs is similar to that estimated with sector fixed effect, albeit more significant.

4.2 Extensive margin: testing the comparative advantage hypothesis

I now turn to test the second and new prediction of my model: the effect of a tariff's reduction on the probability of exporting is higher for firms in sector with lower comparative advantage. This is captured by the following derivative: $\frac{\partial^2 \varphi_{i,x,F}}{\partial \tau_{j,T} \partial \beta_i} < 0$. Again this prediction regards all firms in the same sector only because the model considers firm productivity constant through time, which is not the case in real world.

To test empirically this prediction I run the followings Linear Probability Models (LPM):

$$EXP\_TK_{ijt} = \beta_1 \tau_{jt} + \beta_2 \tau_{jt} CA_j + \beta_3 \varphi_{ijt-1} + \beta_4 Z_{ijt-1} + \delta_j + \delta_t + \varepsilon_{ijt} \quad \text{(R3)}$$

$$EXP\_TK_{ijt} = \beta_1 \tau_{jt} + \beta_2 \tau_{jt} CA_j + \beta_3 \varphi_{ijt-1} + \beta_4 Z_{ijt-1} + \delta_i + \delta_t + \varepsilon_{ijt} \quad \text{(R4)}$$

where the first is a pooled OLS model with industry fixed effects and the second a panel FE model. Notice that the difference with respect to R1 and R2 lies in the introduction of an interacted tern between tariffs and the comparative advantage index. This specification thus allows for the effect of a tariff decrease to be different across sectors according to the measure of capital or skilled intensity. All other variables introduced in these regressions are the same ones I used in specification R1 and R2, which I discussed earlier.

According to theoretical predictions, I expect the coefficients of R3 and R4 to be as follows:

$$\frac{\partial \varphi_{i,x,F}}{\partial \tau_{j,t}} > 0 \rightarrow \frac{\partial (\varphi - \varphi_{i,x,F})}{\partial \tau_{j,t}} < 0 \rightarrow (\beta_1 + \beta_2 CA_j) < 0$$

$$\frac{\partial^2 \varphi_{i,x,F}}{\partial \tau_{j,T} \partial \beta_i} < 0 \rightarrow \frac{\partial^2 (\varphi - \varphi_{i,x,F})}{\partial \tau_{j,T} \partial \beta_i} > 0 \rightarrow \beta_2 > 0$$

Results of R3 and R4 are reported in Table 9. The coefficients of interest are significant in all specifications and of the expected sign. Table 10 reports the results of R3 and R4 using skilled comparative advantage measure instead of capital comparative advantage one. In this case only the model with firm fixed effect yields significant coefficients. The effect of tariffs reduction on the probability of exporting for different percentiles of capital and skill comparative advantage is reported in Table 16[38]. In column (2) I reported the average estimation obtained in regression R2, according to which a decrease of 1 percentage points of tariffs increase the probability of exporting of a firm by 0.042 percentage points.

However, if we allow for the effect to be different in sector with different comparative advantage, we find that the probability of exporting increase by 0.135 percentage points in a sector in the 1st low percentile of capital comparative advantage and by 0.012 percentage points in a sector in the 75th percentile of capital comparative advantage. Thus, how our accounting exercise was suggesting, the effect of the tariffs reduction on the probability of exporting has been higher for sectors without comparative advantage. A similar result holds for the skilled comparative advantage measure as reported in column (4) even if with a smaller magnitude. A caveat to these results is that the effect of tariffs for sectors whose capital (or skilled) comparative advantage is above the 90th percentile[39] becomes positive.

As a robustness check that previous results are not driven by sector-trends that might be correlated with tariffs I perform a series of control experiments. These consisted in running regressions R3 and R4 using, as dependent variable, the probability of French firms of exporting to different countries (Morocco, Romania, Hungary, Algeria, Italy, China, Russia) or to different groups of countries (any country, any country except Turkey). The measure of Turkey's import tariffs has no impact in the majority of these experiments. Table 11 shows detailed results for Morocco. Table 12 indicates for different models and different dependent variables if Turkish tariffs and Turkish tariffs interacted with a comparative advantage measure are statistically significant with the expected sign (v), statistically significant with the opposite sign (s) or not statistically significant (x). Both these Tables show that in almost all these control experiments we don't find the same effect we find for Turkey, thus assessing the robustness of previous results.

[38] Columns (3) and (4) of Table 16 report respectively the estimated coefficients for regressions in column (6) of Table 12 and column (5) in Table 13.

[39] This may be given by the rigid structure I used in R3 and R4 to account for comparative advantage, which I may relax by dividing sectors in different groups defined by their comparative advantage ranking.

4.3 Intensive margin: sales to Turkey for continuing exporters

The model predicts that those firms that were exporting to Turkey before the reduction in tariffs will begin to export higher quantities after the Customs Union formation. This prediction is estimated by the following regressions:

$$q_{ijt} = \beta_1 \tau_{jt} + \beta_2 \varphi_{ijt-1} + \beta_3 h_{ijt} + \beta_4 Z_{ijt-1} + \delta_j + \delta_t + \varepsilon_{ijt} \quad \text{(R5)}$$

$$q_{ijt} = \beta_1 \tau_{jt} + \beta_2 \varphi_{ijt-1} + \beta_3 h_{ijt} + \beta_4 Z_{ijt-1} + \delta_i + \delta_t + \varepsilon_{ijt} \quad \text{(R6)}$$

where the dependent variable is the logarithm of sales to Turkey of each firm in each period of time (1995, 1997 and 1999), h_{ijt} is the logarithm of sales to all other exporting markets[40] and the rest is as in R3 and R4. As before R5 controls for sector fixed effects, so it is a pooled OLS regression. R6 controls for firms time-invariant unobserved heterogeneity and is panel estimation with fixed effects.

Results are reported in Table 13. Notice that the number of observations is now reduced to 4020 firms: the once that were exporting to Turkey from 1995 on. The first four columns report results for R5 with and without time fixed effects, while the last four columns report the analogue results for the panel specification R6.

When I include time dummies (columns (1), (2), (5) and (6)), Turkey's import tariffs are not significantly different from zero in neither R5 nor R6. However without year dummies we find that a decrease in tariffs of 1 percentage points increases the exported quantity for an average exporter by a big 3%. This could be the case if tariffs are taking all the effect coming from a time trend. This may be an indication of the fact that exporters were sensitive to the entrance of Turkey in European Customs Union but not specifically to the reduction in tariffs. The intuition is strengthened by the fact that I control all regressions with the contemporaneous export to all other destination except Turkey for each firm. This variable captures the effect of a macro-shock on each French firm regarding its behaviour with respect to all destinations except Turkey. The tariffs coefficient captures the remaining effect of a time-trend on Turkey flows. The time varying component of the tariffs (or of another effect that came along the CU like non-

[40] I tried a different specification using the ratio of sales to Turkey on sales to all other destinations as dependent variable. Results on Turkey's import tariffs are similar to the ones reported.

tariffs barriers) is much stronger than the across sector component, thus time dummies capture all the effects once I include them[41].

This interpretation leads to the following tentative conclusions. Although, the intensive margin has been sensitive to the entry of Turkey in European CU, the channel didn't work through tariffs reduction. But instead through other changes, mainly at aggregate level, that tariffs capture improperly. Second, if we are willing to believe the previous conclusion, then the CU effect on the intensive margin has been much bigger than CU effect on extensive margin in magnitude, as the decomposition in section 1 showed[42]. Third, even if, on average, more productive firms export big volumes to Turkey (as I find in specification with pooled OLS), the marginal change of productivity within each firm does not help in explaining the increase in those volumes.(as it is clear in panel specifications). Also in the case of productivity changes it seems that the extensive margin is more reactive than the intensive margin.

Finally, results on coefficients in column (8) on other firms' characteristics seem interesting. Here I find that a firm that decreases its size (number of workers) but increases its capital intensity and its cost of labour (which is a measure of the level of wages) exports more to Turkey. The opposite sign on size and wage coefficient may be an indication of skill adoption by those firms. It is possible that these firms are decreasing their labour force but increasing paid wages since they are switching to a higher skill profile of their workers. Anyway this is only a possible explanation. More tests are needed to investigate this intuition[43].

4.4 Intensive margin and comparative advantage

What about the response of firms in sectors with different comparative advantage indexes? The model predicts that the effect of tariffs on firm export revenues should be higher if the firm is in a comparative advantage sector. I estimate this prediction with the following regressions:

$$q_{ijt} = \beta_1 \tau_{jt} + \beta_2 \tau_{jt} CA_j + \beta_3 \varphi_{ijt-1} + \beta_4 h_{ijt} + \beta_5 Z_{ijt-1} + \delta_i + \delta_t + \varepsilon_{ijt} \qquad \text{(R7 and R8)}$$

[41] I thank Paula Bustos to make me notice this.

[42] In fact decompositions in section 1 have been done for different years, before and after the CU, but they don't take into account the effect of tariffs on different margins. Thus the finding in this section are consistent with those findings.

[43] Bustos (2007) shows that as a consequence of trade liberalization, firms increase their technology adoption (which in turn implies higher skill-premium).

I estimate this, as before with sector and firm fixed effects and with capital as well as skilled comparative advantage. In terms of R7 and R8 the predictions of the model translates in the following expected signs of estimated coefficients:

$$\frac{\partial r^{x}_{i,j,F}}{\partial \tau_{j,T}} < 0 \rightarrow \left(\beta_1 + \beta_2 CA_j\right) < 0$$

$$\frac{\partial r^{x}_{i,j,F} \big/ \partial \tau_{j,T}}{\partial CA_j} < 0 \rightarrow \beta_2 < 0$$

Results for capital and skill comparative advantage measures are reported, respectively, in Tables 17 and 18. The first Table clarifies that capital comparative advantage has a role only in those panel regressions without time dummies and the effect, only significant at 10%, has an opposite sign with respect to the model's predictions. Skilled comparative advantage, instead, does not help to explain the variation of exported sales to Turkey. Table 17 shows the magnitude of the effect of R8 for the two measures of comparative advantage at different percentiles[44]. Column (3) shows that for a firm in a sector with very low capital comparative advantage (1st percentile) a decrease of tariffs of 1 percentage point increases the exported flows to Turkey of 5.49%, while a firm in a strongly comparative advantage sector (99th percentile) increases its flows to Turkey by 0.35%. Again the average effect of 3% hides a heterogeneous effect which is significantly linked to sector comparative advantage features. Finally column (4) shows the result, albeit not significantly different from zero, using skilled comparative advantage measure.

5. Conclusions.

In this paper I analyze how the reduction of Turkey's import tariffs, following the entry of Turkey in EU Customs Union, has affected French firms in their decision to begin exporting to Turkey or to adjust their exported sales there. I first estimate these effects for the average French firm taking into account its productivity, as well as other time-variant characteristics. I then further estimate how tariffs affect firms depending on the comparative advantage (capital intensity or skilled intensity) of their sectors.

On the extensive margin I find that a 1 percentage-point decrease of Turkey's import tariffs increases the probability of exporting to Turkey by 0.042 percentage points. However when I allow for the effect to be asymmetric across sectors I find that the change in the probability of

[44] These predictions refer to regressions in column (8) of Table 17 and in column (8) of Table 18.

exporting induced by the tariffs decrease, is inversely correlated to the capital (or skilled) comparative advantage.

This first finding is new and puzzling if we have in mind neoclassical models of trade with comparative advantage. Those models show that in open economy each country trade mostly the goods produced by its comparative advantage sectors for a given level of tariffs. My findings however do not refer to an *average effect*, but to *marginal effect*. I show that a model that introduces sector comparative advantage in a Heckscher-Olihn fashion in a partial equilibrium model a la Melitz (2003) can predict my findings along the extensive margin.

On the trade intensive margin (i.e. flows by continuing exporters) the empirical results are weaker. Turkish import tariffs have an effect of exported volumes by French firms only in those regressions without time-dummies, which control for macro-trends. The effect, however, is quite big, a 1 percentage-point reduction of tariffs increases French exports by 3%. Moreover, under the same caveat, I show that previous effect is bigger for firms in less capital intensive sectors. This last finding is, however, at odds with theoretical predictions of my model.

Taken as a whole, the results on intensive margin, suggest that the Customs Union had a strong effect on French volumes to Turkey but not along the change in tariffs. These, in turn, explained significantly the attitude of firms to export or not in Turkey.

This second finding, which would need further investigation, could be linked to the empirical adjustment effects which a static standard model does not address. From the supply side it may be that firms, in the presence of a Customs Union, may evaluate exporting to Turkey as the most important decision foreseeing a further liberalization and an increase in competitiveness in Turkey. From the demand side, it may be that Turkish demand, after the CU, has been more directed to new varieties (i.e. goods from different firms) than to increasing quantities of already imported varieties. Probably in the years just after the Customs Union this demand-driven effect explains the different movement along the intensive and the extensive margin of French firms.

Finally, results of this paper suggest that heterogeneity across sectors, associated with heterogeneity across firms, are both important in assessing the consequences of tariffs reduction and to enhance our understanding of trade.

This paper could be improved and extended in many directions.

First, a broader experiment using change in import tariffs from many countries may be helpful to generalize these new findings. I am at the moment working along this line by analyzing the effect of the multilateral tariffs reduction induced by the formation of the World Trade Organization (WTO) in 1995 on the export market participation of French firms. This experiment could also allows me to quantify the effect of tariffs reduction on the trade's

intensive and extensive margin with an econometric exercise instead of an accounting one, since I could use more source of variation than in this paper.

Second, from a theoretical point of view the analysis suggests that generalizing a standard model of firm heterogeneity to include sector characteristics is a fruitful area for future research.

References

Arnold, J.M. (2005). "Productivity Estimation at the Plant Level: A Practical Guide", *working paper*.

Aw, B. and A.R..Hwang (1995). "Productivity and the Export Market. A Firm-Level Analysis", *Journal of Development Economics, 47(2), 313-332.*

Baldwin, R. (2005). "Heterogeneous Firms and Trade: Testable and Untestable Properties of the Melitz Model", *NBER Working Paper* 11471.

Berger, S., Buono, I. and H.Fadinger (2007). "The Micro Dynamics of Exporting Firms", *Working Paper, mimeo*, Universitat Pompeu Fabra.

Bernard, A.B. and J.B. Jensen (2004). "Why Some Firms Export", *The Review of Economics and Statistics , 86(2), 561-569.*

Bernard, A.B. and J.B. Jensen (1997a). "Exporters, Skill-Upgrading, and the Wage Gap", *Journal of International Economics, 42 (1997), 3-31.*

Bernard, A.B., Jensen, J.B. and P.K. Schott (2006). "Trade Costs, Firms and Productivity", *Journal of Monetary Economics, 53 (2006), 917-937.*

Bernard, A.B., Jensen, J.B., Redding, S. and P.K. Schott (2007). "Firms in International Trade", forthcoming, *Journal of EconomicPerspectives.*

Bernard, A.B., Redding, S. and P.K. Schott (2007). "Comparative Advantage and Heterogeneous Firms", *Review of Economic Studies,* 74 (1), 31-66.

Bustos, P. (2005). "Impact of Trade on Technology and Skill Upgrading: Evidence from Argentina", *mimeo,* Universitat Pompeu Fabra.

Bustos, P. (2007). "Multilateral Trade Liberalization, Exports and Technology Upgrading: Evidence on the Impact of MERCOSUR on Argentinean Firms", *mimeo,* Universitat Pompeu Fabra.

Chaney, T.(2007). "Distorted Gravity: Heterogeneous Firms, Market Structure and the Geography of International Trade", *mimeo*, University of Chicago.

Dornbush, R., Fischer, S. and P.A. Samuelson (1980). "Heckscher-Ohlin Trade Theory with Continuum of Goods", *Quarterly Journal of Economics*, 1980(2), 203-224.

Eaton, J., Kortum S, and F. Kramarz (2004) "Dissecting Trade: Firms, Industries and Export Destinations", *American Economic Review Papers and Proceeding*, 94, 150-154.

Epifani, P. (2003). "Trade Liberalization, Firm Performance and Labor Market Outcomes in the Developing World: What Can We Learn from Micro-Level Data?", *World Bank Paper series.*

Erdogdu Erkan (2002) "Turkey and Europe: Undivided but Not United", *Middle East Review of International Affairs*, Vol. 6, N. 2.

Felbermayr and Kohler (2006) "Exploring the Intensive and Extensive Margins of World Trade" , *Review of World Economics*, Vol. 142 (4).

Helpman, E., Melitz, M.J. and S.R. Yeaple (2004). "Export Versus FDI with Heterogeneous Firms", *American Economic Review*, 94(1), 300-316.

Helpman, E. and P.R. Krugman (1985). "*Market Structure and Foreign Trade*", MIT Press. Cambridge MA.

Levinsohn J. and A. Petrin (2003). " Estimating Production Functions Using Inputs to Control for Unobservables", *Review of Economic Studies* 70, 317-342

Melitz, M.J. (2003). "The Impact of Trade on Intra-Industry Reallocations and Aggregate Industry Productivity", *Econometrica*, Vol. 71, November 2003, pp. 1695-1725.

Melitz, M.J. and A. Cuñat (2005). "Labour Market Flexibility and Comparative Advantage", *working paper, mimeo.*

Olley S. and A. Pakes (1996). "The Dynamics of Productivity in the Telecommunications Equipment Industry", *Econometrica* 64, 1263-1297

Pavcnik, N. (2002). "Trade Liberalization, Exit, and Productivity Improvements: Evidence from Chilean Plants", *Review of Economic Studies* 69, 245-276.

Romalis,J. (2004). "Factor Proportions and the Structure of Commodity Trade", *American Economic Review*, 94(1), 67-97.

Schor, A. (2004). "Heterogeneous Productivity Response to Tariff Reduction: Evidence from Brazilian Manufacturing Firms", *NBER Working Paper* W 10544.

Togan, S. (1995). "Trade Policy Review of the Republic of Turkey", in S. Arndt and C. Milner (eds), *The World Economy Global Trade Policy*, Blackwell, Oxford.

Togan,S. (1997). "Opening up the Turkish Economy in the Context of the Customs Union with the EU", *Journal of Economic Integration*, 12, 157-159.

Trefler, D. (2004). "The Long and Short of the Canada-US Free Trade Agreement", *The American Economic Review,* 94(4*),* pp 870-895.

Tybout, J.R.(2001). "Plant and Firm-Level Evidence on 'New' Trade Theories", *NBER Working Paper* W 8418.

Ulgen, S. and Y. Zahariadis (2004), "The Future of Turkish-EU Trade Relations: Deepening vs Widening", *EU-Turkey Working Papers, No5, Centre for European Policy Studies*.

APPENDIX A: formulas

Appendix A1: model

Predictions on probability of exporting

Starting from Equation 12 we obtain the following predictions:

$$\frac{\partial \varphi_{i,x,F}}{\partial \tau_{i,T}} = \left(\frac{SP_F}{SP_T}\right)^{\beta_i} D_{i,T} = \frac{\varphi_{i,x,F}}{\tau_{i,T}} > 0$$

$$\frac{\partial \varphi_{i,x,F}}{\partial \beta_i} = \tau_{i,T} D_{i,T} \frac{\partial\left[(SP_F/SP_T)^{\beta_i}\right]}{\partial \beta_i} = \tau_{i,T} D_{i,T} \left(\frac{SP_F}{SP_T}\right)^{\beta_i} \ln\left(\frac{SP_F}{SP_T}\right) = \varphi_{i,x,F} \ln\left(\frac{SP_F}{SP_T}\right) < 0$$

which holds given that Skill Premium is lower in France than in Turkey.

The cross derivative is simply:

$$\frac{\partial^2 \varphi_{i,x,F}}{\partial \tau_{i,T} \partial \beta_i} = D_{i,T} \left(\frac{SP_F}{SP_T}\right)^{\beta_i} \ln\left(\frac{SP_F}{SP_T}\right) = \frac{\varphi_{i,x,F}}{\tau_{i,T}} \ln\left(\frac{SP_F}{SP_T}\right) < 0$$

Predictions on exported flows at existing exporters

Starting from Equation 11 we obtain the following predictions:

$$\frac{\partial r_{x,F}(i,\varphi)}{\partial \tau} = (1-\sigma)\tau_{i,T}^{-\sigma}\left[\left(\frac{SP_F}{SP_T}\right)^{1-\sigma}\right]^{\beta_i} \varphi^{\sigma-1} F_{i,T} < 0 \quad \text{since } \sigma > 1$$

$$\frac{\partial r_{i,x,F}(\varphi)}{\partial \beta_i} = \left[(1-\sigma)\ln\left(\frac{SP_F}{SP_T}\right)\right]\left[\left(\frac{SP_F}{SP_T}\right)^{1-\sigma}\right]^{\beta_i} \tau_{i,F}^{1-\sigma} \varphi^{\sigma-1} F_{i,T} = r_{i,x,F}(\varphi)(1-\sigma)\ln\left(\frac{SP_F}{SP_T}\right) > 0$$

which holds given that Skill Premium is lower in France than in Turkey.

The cross derivative is the following:

$$\frac{\partial^2 r_{i,x,F}(\varphi)}{\partial \tau_{i,T} \partial \beta_i} = (1-\sigma)\tau_{i,F}^{-\sigma}\left[(1-\sigma)\ln\left(\frac{SP_F}{SP_T}\right)\right]\left[\left(\frac{SP_F}{SP_T}\right)^{1-\sigma}\right]^{\beta_i} \varphi^{\sigma-1} F_{i,T} < 0$$

Appendix A2: Threshold and Mass Effect

What are model predictions if we aggregate the results at the sector level? Suppose we don't observe the productivity of each firm in each sector but we know only the firm productivity distribution and we estimate the extensive margin looking at the number of exporter in each sector. In this case the change in tariffs could be decomposed in a mass and a threshold effect, which, as I will show, move in opposite direction when the productivity distribution is skewed toward the left as the Pareto[45] one.

The total number of exporters is given by the area lying below the productivity distribution on the right of the export-threshold:

$$N = \int_{\varphi_x(\tau)}^{h} \mu(\varphi) d\varphi$$

where $\mu(\varphi)$ is a generic distribution function, the threshold $\varphi_x(\tau)$ is indicated as a function of tariffs and the upper limit of integration *h* changes according to the distribution function we choose. The underlined hypothesis of the formula above is that the productivity distribution of firms does not change with tariffs (which is a good hypothesis for French data). Pareto distribution function is given by the following formula and it's defined between $[k, \infty)$

$$Pareto(pdf) = \mu^P(\varphi) = \frac{ak^a}{\varphi^{a+1}}$$

thus *h* for Pareto is infinity. Thus in this case we could better express the number of exporters N in the following way (where P stays for Pareto):

$$N = \int_k^{\infty} \mu^P(\varphi) d\varphi - \int_k^{\varphi_x(\tau)} \mu^P(\varphi) d\varphi = 1 - \int_k^{\varphi_x(\tau)} \mu^P(\varphi) d\varphi$$

where the first integral sum up to 1 since $\mu(\varphi)$ is a density function.

Using Leibnitz's rule for derivation we have:

$$\frac{\partial N}{\partial \tau} = -\left(\mu(\varphi_x) \frac{\partial \varphi_x(\tau)}{\partial \tau} - \varphi_x(\tau) \frac{\partial \mu(\varphi)}{\partial \tau} \Big|_k^{\varphi_x(\tau)} \right) =$$

$$= -\mu(\varphi_x) \frac{\partial \varphi_x(\tau)}{\partial \tau}$$

where the last equality derives from the fact that the productivity distribution is not a function of tariffs and the first term is the generic distribution function evaluated at $\varphi_x(\tau)$. Last formula exactly separates the distribution effect from the threshold one. Let's consider for example the

[45] The Pareto distribution has been extensively used in empirical studies on this literature since it describes rather well the actual size distribution of firms which, in model a la Melitz, is also a description of firms' exogenous productivity distribution.

effect of a tariff reduction on the total amount of firms when their productivity is distributed according to a uniform distribution compared to a Pareto one. The results are the following respectively for the uniform[46] and the Pareto distribution:

$$\frac{\partial N}{\partial \tau} = -\frac{1}{b-a}\frac{\partial \varphi_x(\tau)}{\partial \tau}$$

$$\frac{\partial N}{\partial \tau} = -\frac{ak^a}{(\varphi_x)^{a+1}}\frac{\partial \varphi_x(\tau)}{\partial \tau}$$

From results in previous Appendix on equation 12 in the paper we know that the threshold effect with respect to tariffs is always positive (if tariffs decreases the export threshold decreases as well), but now it's clear that the way productivities are distributed may have a role as well. In fact with a Pareto distribution function the marginal effect of tariffs on the number of exporters depends on the starting level of the threshold In fact if we derive last expressions also w.r.t. comparative advantage (which I generically call CA) we find:

$$\underset{(-)}{\frac{\partial^2 N}{\partial \tau \partial CA}} = \underset{(-)}{\frac{1}{b-a}\frac{\partial^2 \varphi_x}{\partial \tau \partial CA}}$$

CONSTANT DISTRIBUTION EFFECT — THRESHOLD EFFECT

$$\underset{(+)}{\frac{\partial^2 N}{\partial \tau \partial CA}} = ak^a\left(\underset{(+)}{\frac{\partial\left[(\varphi_x)^{-(a+1)}\right]}{\partial CA}}\underset{(+)}{\frac{\partial \varphi_x(\tau)}{\partial \tau}} + \underset{(-)}{\frac{ak^a}{(\varphi_x)^{a+1}}\frac{\partial^2 \varphi_x}{\partial \tau \partial CA}}\right)$$

DISTRIBUTION EFFECT — THRESHOLD EFFECT

In both previous expressions we can separate a distribution effect (which is constant for Uniform distribution function and positive for the Pareto distribution function) and a threshold effect (which is negative in both cases). With the Pareto distribution function we can moreover show that the positive effect dominates. Thus empirically we need to test for the actual firm productivity distribution function to uncover the effect of tariffs reduction on the probability to export for firms in heterogeneous sectors.

[46] Notice that with uniform distribution h=b because the function is defined between a and b, but calculus are the same since the integral over the total support is 1 being a probability function.

APPENDIX B: Tables, figures and graphs

Table 1
Decomposition 1 of Total French *Export* by years (log growth rate).

Growth rate of French export to Turkey, to the Rest of the World and to Morocco (%)			
	94-95	95-96	95-99
Turkey: total	0.02	**0.40**	**0.80**
Turkey: number of firms	0.13	**0.16**	**0.21**
Turkey: average quantity	-0.11	**0.24**	**0.60**
ROW: total	0.10	-0.01	0.16
ROW: number of firms	0.012	-0.007	-0.043
ROW: average quantity	0.088	-0.003	0.21
Morocco: total	0.12	-0.04	0.25
Morocco: number of firms	0.001	0.0004	0.01
Morocco: average quantity	0.12	-0.040	0.24

Table 2
Decomposition 2 of Total French *Export* to Turkey by years.

NET DECOMPOSITION OF CHANGE IN EXPORTED QUANTITIES						
year	ΔQ_t^{TOTAL}	$\frac{\Delta Q_t^{TOTAL}}{Q_{t-1}^{TOTAL}}$	$\frac{\Delta Q_t^{STAY}}{\Delta Q_t^{TOTAL}}$	$\frac{\Delta Q_t^{ENTRY}}{\Delta Q_t^{TOTAL}}$	$\frac{\Delta Q_t^{EXIT}}{\Delta Q_t^{TOTAL}}$	$\frac{\Delta Q_t^{ENTRY} + \Delta Q_t^{EXIT}}{\Delta Q_t^{TOTAL}}$
1994-1995	12.90	0.02	-0.79	3.43	-1.64	1.79
1995-1996	**421.80**	**0.49**	**0.9**	**0.17**	**-0.7**	**0.1**
1996-1997	276.00	0.22	0.92	0.19	-0.11	0.08
1997-1998	84.50	0.05	0.87	0.55	-0.41	0.13
1998-1999	267.20	0.16	1.07	0.17	-0.24	-0.07

Note: first column in millions of francs

Table 3
Decomposition 1 and 2 of Total French *Export* to Turkey by Increasing Capital Intensity Industries.

French industries export growth toward Turkey between 1995-1996 and its different components

	Decomposition 1			Decomposition 2	
	1	2	3	4	5
	TOTAL	AVERAGE	NUMBER	STAY	NET ENTRY
Total	0.40	0.24	0.16	0.90	0.10
by 2 digit_NES sector					
Apparel, Textile and Leather Products	0.81	0.40	0.41	0.70	0.30
Furniture and Fixture	0.27	-0.05	0.32	0.82	0.18
Printing and Publishing	0.45	0.23	0.22	0.52	0.48
Paper, Lumber and Wood Products	0.02	-0.19	0.22	3.36	-2.36
Transportation Equipment	1.29	1.29	0.00	1.003	-0.003
Textile Mill Products	0.06	-0.13	0.19	0.85	0.15
Mechanic Equipment	0.55	0.45	0.11	0.82	0.18
Electric and Electronic Equipment	0.13	0.14	-0.02	0.28	0.72
Electric and Electronic Components	0.38	0.26	0.12	0.88	0.12
Food, Beverages and Tobacco	1.12	1.06	0.06	1.04	-0.04
Mineral Products (Stone, Clay, Glass Products)	0.51	0.29	0.23	0.96	0.04
Chemicals and Allied Products	0.27	0.21	0.06	0.90	0.10
Fabricated Metal Products	0.57	0.32	0.24	0.79	0.21
Motor Vehicles and Equipment	0.02	-0.04	0.07	0.67	0.33
Drugs, Soaps and Cleaners	0.20	0.13	0.07	0.98	0.02

Table 4
Decomposition 1 of Total French *Import* from Turkey by Increasing Capital Intensity Industries.

French industries IMPORT growth from Turkey between 1995-1996			
	TOTAL	INTENSIVE	EXTENSIVE
Total	0.06	-0.07	0.13
by sector			
Apparel, Textile and Leather Products	0.13	0.04	0.09
Furniture and Fixture	0.47	0.40	0.06
Printing and Publishing	-0.70	-0.11	-0.59
Paper and Allied Products, Lumber and Wood Products	0.13	0.30	-0.17
Transportation Equipment	0.16	0.16	0.00
Textile Mill Products	-0.12	-0.21	0.08
Mechanic Equipment	0.69	0.35	0.34
Electric and Electronic Equipment	0.06	-0.38	0.44
Electric and Electronic Components	0.27	-0.09	0.36
Food, Beverages and Tobacco	-0.25	-0.29	0.04
Mineral Products (Stone, Clay and Glass Products)	-0.17	-0.61	0.44
Chemicals and Allied Products	-0.02	-0.05	0.03
Fabricated Metal Products	0.13	-0.20	0.33
Motor Vehicles and Equipment	0.28	0.11	0.17
Drugs, Soaps and Cleaners	1.35	1.62	-0.27

Table 5
Observations in the sample

	Number of observations per year					
	1994	1995	1996	1997	1998	1999
Operating firms	69563	64939	61326	59848	57257	55016
of which exporters	24349	23807	23395	23469	23254	22622
of which exporters to Turkey	2082	2323	2698	2926	3015	2838
as % of operating firms	**2.99**	**3.58**	**4.40**	**4.89**	**5.27**	**5.16**
as % of total exporters	**8.55**	**9.76**	**11.53**	**12.47**	**12.97**	**12.55**
Total production (billion of Francs)	338	351	346	360	372	372
Total exported sales (billion of Francs)	119	130	129	146	155	154
Total exported sales to TK (billion of Francs)	0.842	0.847	1.270	1.540	1.610	1.890
as % of total production	**0.25**	**0.24**	**0.37**	**0.43**	**0.43**	**0.51**
as % of total exported sales	**0.71**	**0.65**	**0.98**	**1.05**	**1.04**	**1.23**

Table 6
Basic Statistics

	main variables statistics				
	Obs	Mean	Std. Dev.	Min	Max
Dataset firm level variables					
workers in log	367949	2.58	1.35	0	11
value added in log	366059	8.09	1.47	0	17.7
capital in log	367949	7.71	1.79	0	17.8
materials in log	347894	8.14	1.81	0	18.9
wage in log	469614	6.54	1.44	0	15.4
Obtained firm level variables					
labour productivity	366059	-0.13	0.51	-5.96	5.64
TFP (OP)	366059	1.51	0.13	-3.67	2.31
TFP (OP-SB)	366058	1.52	0.14	-4.45	2.34
Dataset sector level variables					
Turkey import tariffs 1995	58	9.80	7.76	0.50	52
Turkey import tariffs 1997	58	8.17	10.84	0.00	67
Turkey import tariffs 1999	58	7.79	12.12	0.05	77
Obtained sector level variables					
US Capital Intensity	57	4.30	0.71	2.49	6
US Skill Intensity	57	0.39	0.13	0.19	0.74

Table 7
Comparative Advantage Measures and Tariffs Decrease by 2-digit NES Classification

sectors at 2-digit NES classification	Turkish Applied Import Tariffs			Difference in Tariffs		Comparative Advantage	
	1995	1997	1999	95-97	97-99	US Capital Intensity	US Skill Intensity
Apparel, Textile and Leather Products	18.83	9.22	11.18	-9.610	1.960	2.63	0.29
Furniture and Fixture	9.87	9.34	7.57	-0.529	-1.778	3.48	0.38
Printing and Publishing	8.02	5.16	3.87	-2.865	-1.285	3.65	0.56
Paper, Lumber and Wood Products	6.48	3.63	2.44	-2.848	-1.188	3.73	0.28
Transportation Equipment	6.60	3.14	2.33	-3.460	-0.806	3.84	0.41
Textile Mill Products	11.30	9.14	18.46	-2.166	9.326	3.97	0.24
Mechanic Equipment	5.27	2.85	1.92	-2.419	-0.927	3.98	0.42
Electric and Electronic Equipment	5.53	3.37	2.12	-2.164	-1.251	4.02	0.62
Electric and Electronic Components	7.95	4.21	2.46	-3.742	-1.754	4.17	0.45
Food, Beverages and Tobacco	18.40	30.71	31.07	12.311	0.361	4.27	0.33
Mineral Products (Stone, Clay, Glass Products)	6.45	3.52	2.74	-2.931	-0.777	4.36	0.31
Chemicals and Allied Products	8.96	6.53	6.02	-2.425	-0.514	4.37	0.38
Fabricated Metal Products	12.29	4.23	3.34	-8.063	-0.885	4.47	0.30
Motor Vehicles and Equipment	9.07	6.95	5.55	-2.126	-1.401	4.66	0.21
Drugs, Soaps and Cleaners	7.03	4.16	3.68	-2.870	-0.480	4.80	0.58

Table 8
Probability to Export to Turkey
LPM with sector and firm fixed effect

Dependent Variable: export to Turkey

	linear probability model with sector FE (pooled LPM)					linear probability model with firm FE (panel)				
	1	2	3	4	5	6	7	8	9	10
Turkey import tariffs	**-0.053**	**-0.051**	**-0.046**	**-0.044**	**-0.044**	**-0.081**	**-0.044**	**-0.044**	**-0.042**	**-0.041**
	(5.55)***	(2.04)**	(1.98)*	(1.78)*	(1.75)*	(5.55)***	(7.02)***	(7.00)***	(6.58)***	(6.55)***
firm TFP (OP)		**0.043**	**0.030**	**0.017**			**0.005**	**0.005**	**0.007**	
		(5.45)***	(4.58)***	(2.93)***			(4.17)***	(4.13)***	(3.69)***	
firm TFP (OP-SB)					**0.017**					**0.007**
					(2.88)***					(3.72)***
exporter to OD			**0.092**	**0.034**	**0.034**			**0.002**	**0.001**	**0.001**
			(8.31)***	(7.41)***	(7.37)***			(2.35)**	(1.00)	(1.00)
firm size				**0.008**	**0.009**				**0.009**	**0.009**
				(1.25)	(1.17)				(4.30)***	(4.32)***
firm capital intensity				**0.016**	**0.016**				**0.004**	**0.004**
				(6.36)***	(6.38)***				(3.78)***	(3.75)***
firm wage level				**0.016**	**0.015**				**0.004**	**0.003**
				(2.42)**	(1.94)*				(1.69)*	(1.67)*
N· observations	183686	183686	183686	183681	183681	183686	183686	183686	183681	183681
R^2	0.05	0.06	0.1	0.16	0.16					
Cluster	NES 3	NES 3	NES 3	NES 3	NES 3					
Robust CI	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
year dummies	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
sector dummies	YES	YES	YES	YES	YES					

*significant at 10%;**significant at 5%; *** significant at 1%

Notes: Plant-level regression. Robust t-statistics (in parenthesis) are adjusted for clustering at the 3-digit NES industry level classification. *** significant at the 1% level; ** significant at the 5% level; * significant at the 10% level. Dependent variable is a dummy taking value of 1 if the plant exports to Turkey and 0 otherwise. Constant and dummies coefficient are not reported.

Table 9
Probability to Export to Turkey
Capital comparative advantage
LPM with sector fixed effect and firm fixed effects

Dependent Variable: export to Turkey

	linear probability model with sector FE (pooled LPM)				linear probability model with firm FE (panel)			
	1	2	3	4	5	6	7	8
Turkey import tariffs	**-0.353**	**-0.369**	**-0.372**	**-0.331**	**-0.252**	**-0.274**	**-0.275**	**-0.264**
	(2.39)**	(2.60)**	(2.63)**	(2.49)**	(3.94)***	(4.29)***	(4.30)***	(4.12)***
* US Capital Intensity	**0.073**	**0.078**	**0.078**	**0.068**	**0.050**	**0.056**	**0.056**	**0.053**
	(2.11)**	(2.31)**	(2.35)**	(2.17)**	(3.36)***	(3.75)***	(3.77)***	(3.57)***
firm TFP (OP)	**0.030**	**0.017**			**0.006**	**0.007**		
	(4.52)***	(2.90)***			(4.23)***	(3.77)***		
firm TFP (OP-SB)			**0.018**				**0.007**	
			(2.89)***				(3.81)***	
firm labour productivity				**0.023**				**0.007**
				(5.07)***				(3.72)***
exporter to OD	**0.093**	**0.034**	**0.034**	**0.034**	**0.003**	**0.001**	**0.001**	**0.001**
	(8.21)***	(7.28)***	(7.24)***	(7.21)***	(2.36)**	(1.00)	(1.00)	(1.01)
firm size		**0.008**	**0.009**	**0.020**		**0.009**	**0.009**	**0.011**
		-1.23	-1.16	(4.28)***		(4.30)***	(4.33)***	(4.42)***
firm capital intensity		**0.016**	**0.016**	**0.012**		**0.005**	**0.004**	**0.003**
		(6.34)***	(6.36)***	(5.78)***		(3.84)***	(3.82)***	(2.67)***
firm wage level		**0.016**	**0.015**	**0.010**		**0.004**	**0.004**	**0.004**
		(2.37)**	(1.88)*	(1.76)*		(1.72)*	(1.69)*	(1.77)*
N· observations	180585	180580	180580	180580	180585	180580	180580	180580
R^2	0.1	0.16	0.16	0.16	YES	YES	YES	YES
Cluster	NES 3	NES 3	NES 3	NES 3	YES	YES	YES	YES
Robust CI	YES	YES	YES	YES	YES	YES	YES	YES
year dummies	YES	YES	YES	YES	YES	YES	YES	YES
sector dummies	YES	YES	YES	YES				

*significant at 10%;**significant at 5%; *** significant at 1%

Notes: Plant-level regression. Robust t-statistics (in parenthesis) are adjusted for clustering at the 3-digit NES industry level classification. *** significant at the 1% level; ** significant at the 5% level; * significant at the 10% level. Dependent variable is a dummy taking value of 1 if the plant exports to Turkey and 0 otherwise. Constant and dummies coefficient are not reported.

Table 10
Probability to Export to Turkey
Skill comparative advantage
LPM with sector and firm fixed effect

Dependent Variable: export to Turkey	linear probability model with sector FE (pooled LPM)			linear probability model with firm FE (panel)		
	1	2	3	4	5	6
Turkey import tariffs	**-0.134**	**-0.137**	**-0.134**	**-0.137**	**-0.127**	**-0.126**
	(1.13)	(1.11)	(1.08)	(5.13)***	(4.73)***	(4.69)***
* US Skill Intensity	**0.249**	**0.263**	**0.257**	**0.265**	**0.243**	**0.241**
	(0.84)	(0.87)	(0.84)	(3.74)***	(3.41)***	(3.38)***
firm TFP (OP)	**0.030**	**0.017**		**0.006**	**0.007**	
	(4.53)***	(2.90)***		(4.07)***	(3.63)***	
firm TFP (OP-SB)			**0.017**			**0.007**
			(2.87)***			(3.65)***
exporter to OD	**0.093**	**0.034**	**0.034**	**0.002**	**0.001**	**0.001**
	(8.21)***	(7.27)***	(7.23)***	(2.31)**	(0.98)	(0.98)
firm size		**0.008**	**0.009**		**0.009**	**0.009**
		(1.24)	(1.16)		(4.22)***	(4.23)***
firm capital intensity		**0.016**	**0.016**		**0.004**	**0.004**
		(6.34)***	(6.36)***		(3.76)***	(3.74)***
firm wage level		**0.016**	**0.015**		**0.004**	**0.004**
		(2.38)**	(1.89)*		(1.65)*	-1.64
N· observations	180585	180580	180580	180585	180580	180580
R^2	0.1	0.16	0.16			
Cluster	NES 3	NES 3	NES 3			
Robust CI	YES	YES	YES	YES	YES	YES
year dummies	YES	YES	YES	YES	YES	YES
sector dummies	YES	YES	YES	NO	NO	NO

*significant at 10%;**significant at 5%; *** significant at 1%

Notes: Plant-level regression. Robust t-statistics (in parenthesis) are adjusted for clustering at the 3-digit NES industry level classification. *** significant at the 1% level; ** significant at the 5% level; * significant at the 10% level. Dependent variable is a dummy taking value of 1 if the plant exports to Turkey and 0 otherwise. Constant and dummies coefficient are not reported.

Table 11
Control experiment with Morocco
LPM with sector and firm fixed effect

Dependent Variable: export to Morocco	OLS with firm FE (panel)				OLS with firm FE (panel)			
	1	2	3	4	5	6	7	8
Turkey import tariffs	**-0.147**	**-0.148**	**-0.034**	**-0.032**	**-0.049**	**-0.050**	**-0.012**	**-0.011**
	(1.71)*	(1.75)*	(0.37)	(0.34)	(0.69)	(0.7)	(0.37)	(0.34)
* US capital Intensity	**0.032**	**0.033**			**0.010**	**0.011**		
	(1.56)	(1.6)			(0.63)	(0.64)		
* US skill Intensity			**0.066**	**0.062**			**0.017**	**0.015**
			(0.29)	(0.27)			(0.2)	(0.17)
firm TFP (OP)	**0.011**		**0.011**		**0.007**		**0.007**	
	(2.13)**		(2.12)**		(3.29)***		(3.27)***	
firm TFP (OP-SB)		**0.011**		**0.011**		**0.007**		**0.007**
		(1.93)*		(1.91)*		(3.29)***		(3.27)***
exporter to OD	**0.084**	**0.084**	**0.084**	**0.084**	**0.008**	**0.008**	**0.008**	**0.008**
	(9.82)***	(9.83)***	(9.82)***	(9.83)***	(4.74)***	(4.74)***	(4.74)***	(4.74)***
firm size	**0.002**	**0.002**	**0.002**	**0.002**	**0.015**	**0.015**	**0.015**	**0.015**
	(0.36)	(0.32)	(0.36)	(0.32)	(5.89)***	(5.89)***	(5.88)***	(5.87)***
firm capital intensity	**0.013**	**0.013**	**0.013**	**0.013**	**0.004**	**0.004**	**0.004**	**0.004**
	(5.76)***	(5.61)***	(5.76)***	(5.61)***	(3.07)***	(3.04)***	(3.06)***	(3.03)***
firm wage level	**0.028**	**0.028**	**0.028**	**0.028**	**0.004**	**0.004**	**0.004**	**0.004**
	(3.69)***	(3.07)***	(3.70)***	(3.07)***	(1.51)	(1.52)	(1.5)	(1.51)
N· observations	180580	180580	180580	180580	180580	180580	180580	180580
R^2	0.19	0.19	0.19	0.19				
Cluster	NES 3	NES 3	NES 3	NES 3				
Robust CI	YES	YES	YES	YES	YES	YES	YES	YES
year dummies	YES	YES	YES	YES	YES	YES	YES	YES
sector dummies	YES	YES	YES	YES	NO	NO	NO	NO

*significant at 10%;**significant at 5%; *** significant at 1%

Notes: Plant-level regression. Robust t-statistics (in parenthesis) are adjusted for clustering at the 3-digit NES industry level classification. *** significant at the 1% level; ** significant at the 5% level; * significant at the 10% level. Dependent variable is a dummy taking value of 1 if the plant exports to Morocco and 0 otherwise. Constant and dummies coefficient are not reported.

Table 12
Summary of Controls Experiments
LPM with sector and firm fixed effect

Dependent Variable: export to each of the following country

	Linear Probability model with sector FE		Linear Probability model with firm FE		Linear Probability model with sector FE		Linear Probability model with firm FE	
	Capital Intensity				Skill Intensity			
	tariff	tariff*CI	tariff	tariff*CI	tariff	tariff*SI	tariff	tariff*SI
Turkey	v	v	v	v	x	x	v	v
Morocco	v	x	x	x	x	x	x	x
Romania	x	x	v	v	x	x	v	x
Hungary	v	x	v	x	x	x	v	x
Algeria	x	x	x	x	x	x	x	x
Italy	v	v	x	x	x	x	x	x
China	x	x	x	x	x	x	x	x
Russia	v	v	v	v	x	x	v	x
All the world	x	x	s	s	x	x	s	s
All the world (except TK)	x	x	s	s	x	x	s	s
Cluster	NES 3	NES 3	NO	NO	NES 3	NES 3	NO	NO
Robust CI	YES	YES	YES	YES	YES	YES	YES	YES
year dummies	YES	YES	YES	YES	YES	YES	YES	YES
sector dummies	YES	YES	NO	NO	YES	YES	NO	NO

Notes: **v** indicates that the coefficient is significant and of the expected sign;
x indicates a not-significant coefficient;
s indicates a significant coefficient but with the opposite sign.

Table 13
Intensive Margin for Continuing Exporters (1)
OLS with sector and firm fixed effect

Dependent Variable: exported sales to Turkey (in logs)

	Pooled OLS with sector FE				OLS with firm FE (panel)			
	1	2	3	4	5	6	7	8
Turkey import tariffs	**-0.18**	**-0.22**	**-2.92**	**-2.81**	**-0.27**	**-0.27**	**-3.13**	**-2.73**
	(0.45)	(0.52)	(1.99)*	(1.99)*	(0.46)	(0.47)	(4.44)***	(4.00)***
firm TFP (OP)	**0.16**	**0.17**	**0.16**	**0.15**	**0.16**	**0.15**	**0.14**	**0.09**
	(2.18)**	(1.96)*	(2.13)**	(1.64)	(1.5)	(1.38)	(1.28)	(0.76)
exported sales to OD (in logs)	**0.61**	**0.52**	**0.61**	**0.53**	**0.36**	**0.34**	**0.50**	**0.44**
	(18.80)***	(8.37)***	(18.96)***	(8.46)***	(5.25)***	(4.83)***	(7.44)***	(6.24)***
firm size		**-0.17**		**-0.24**		**-0.09**		**-0.46**
		(0.99)		(1.37)		(0.44)		(2.23)**
firm capital intensity		**0.15**		**0.16**		**0.07**		**0.30**
		(2.73)***		(2.81)***		(0.68)		(2.97)***
firm wage level		**0.10**		**0.16**		**0.13**		**0.40**
		(0.59)		(0.9)		(0.73)		(2.08)**
N· observations	4020	4019	4020	4019	4020	4019	4020	4019
R^2	0.4	0.41	0.39	0.4				
Cluster	NES 3	NES 3	NES 3	NES 3				
Robust CI	YES	YES	YES	YES	YES	YES	YES	YES
year dummies	YES	YES	**NO**	**NO**	YES	YES	**NO**	**NO**
sector dummies	YES	YES	YES	YES				

*significant at 10%;**significant at 5%; *** significant at 1%

Notes: Plant-level regression for continuing exporters. Robust t-statistics (in parenthesis) are adjusted for clustering at the 3-digit NES industry level classification. *** significant at the 1% level; ** significant at the 5% level; * significant at the 10% level. Constant and dummies coefficient are not reported.

Table 14
Intensive Margin for Continuing Exporters (2)
Capital comparative Advantage
OLS with sector and firm fixed effect

Dependent Variable: exported sales to Turkey (in logs)

	Pooled OLS with sector FE				OLS with firm FE (panel)			
	1	2	3	4	5	6	7	8
Turkey import tariffs	**-2.90**	**-3.17**	**-7.76**	**-7.89**	**-4.39**	**-4.45**	**-9.30**	**-9.06**
	(1.36)	(1.42)	(1.62)	(1.71)*	(1.34)	(1.35)	(2.68)***	(2.62)***
* US Capital Intensity	**0.66**	**0.71**	**1.17**	**1.23**	**1.00**	**1.01**	**1.50**	**1.53**
	(1.31)	(1.36)	(0.92)	(1.00)	(1.29)	(1.3)	(1.75)*	(1.82)*
firm TFP (OP)	**0.16**	**0.17**	**0.16**	**0.15**	**0.16**	**0.16**	**0.15**	**0.10**
	(2.19)**	(1.96)*	(2.16)**	(1.66)	(1.55)	(1.42)	(1.36)	(0.84)
exported sales to OD (in logs)	**0.61**	**0.52**	**0.61**	**0.53**	**0.36**	**0.34**	**0.50**	**0.44**
	(18.76)***	(8.33)***	(18.84)***	(8.39)***	(5.23)***	(4.81)***	(7.39)***	(6.19)***
firm size		**-0.17**		**-0.24**		**-0.09**		**-0.46**
		(0.98)		(1.36)		(0.46)		(2.22)**
firm capital intensity		**0.15**		**0.15**		**0.07**		**0.31**
		(2.69)***		(2.77)***		(0.7)		(2.99)***
firm wage level		**0.11**		**0.16**		**0.14**		**0.40**
		(0.59)		(0.9)		(0.74)		(2.06)**
N· observations	4002	4001	4002	4001	4002	4001	4002	4001
R^2	0.4	0.41	0.39	0.4				
Cluster	NES 3	NES 3	NES 3	NES 3				
Robust CI	YES	YES	YES	YES	YES	YES	YES	YES
year dummies	YES	YES	NO	NO	YES	YES	NO	NO
sector dummies	YES	YES	YES	YES				

*significant at 10%;**significant at 5%; *** significant at 1%

Notes: Plant-level regression for continuing exporters. Robust t-statistics (in parenthesis) are adjusted for clustering at the 3-digit NES industry level classification. *** significant at the 1% level; ** significant at the 5% level; * significant at the 10% level. Constant and dummies coefficient are not reported.

Table 15
Intensive Margin for Continuing Exporters
Skill Comparative Advantage
OLS with sector and firm fixed effect

Dependent Variable: exported sales to Turkey (in logs)

	Pooled OLS with sector FE				OLS with firm FE (panel)			
	1	2	3	4	5	6	7	8
Turkey import tariffs	**-1.25**	**-1.29**	**0.39**	**-0.07**	**-1.44**	**-1.52**	**0.48**	**-0.82**
	(0.69)	(0.68)	(0.08)	(0.02)	(0.6)	(0.63)	(0.18)	(0.31)
* US skill Intensity	**3.06**	**3.06**	**-9.10**	**-7.55**	**3.33**	**3.54**	**-9.98**	**-5.32**
	(0.64)	(0.62)	(0.66)	(0.57)	(0.51)	(0.54)	(1.29)	(0.7)
firm TFP (OP)	**0.16**	**0.17**	**0.16**	**0.14**	**0.16**	**0.15**	**0.13**	**0.08**
	(2.17)**	(1.96)*	(2.10)**	(1.62)	(1.5)	(1.38)	(1.2)	(0.71)
exported sales to OD (in logs)	**0.61**	**0.52**	**0.61**	**0.53**	**0.36**	**0.34**	**0.49**	**0.44**
	(18.80)***	(8.35)***	(18.98)***	(8.45)***	(5.26)***	(4.84)***	(7.21)***	(6.17)***
firm size		**-0.17**		**-0.24**		**-0.09**		**-0.45**
		(0.98)		(1.34)		(0.45)		(2.20)**
firm capital intensity		**0.15**		**0.15**		**0.07**		**0.29**
		(2.69)***		(2.77)***		(0.69)		(2.81)***
firm wage level		**0.11**		**0.16**		**0.14**		**0.40**
		(0.59)		(0.89)		(0.74)		(2.06)**
N· observations	4002	4001	4002	4001	4002	4001	4002	4001
R^2	0.4	0.41	0.39	0.4				
Cluster	NES 3	NES 3	NES 3	NES 3				
Robust CI	YES	YES	YES	YES	YES	YES	YES	YES
year dummies	YES	YES	NO	NO	YES	YES	NO	NO
sector dummies	YES	YES	YES	YES				

*significant at 10%;**significant at 5%; *** significant at 1%

Notes: Plant-level regression for continuing exporters. Robust t-statistics (in parenthesis) are adjusted for clustering at the 3-digit NES industry level classification. *** significant at the 1% level; ** significant at the 5% level; * significant at the 10% level. Constant and dummies coefficient are not reported.

Table 16
Estimated change in probability to export to Turkey for different levels of Capital and Skill Comparative Advantage (measured at different percentiles)

The estimated effects of a reduction of Tariffs by 1 percentage points on Probability to Export to Turkey

1	2	3	4
percentiles	average	over Capital Intensity	over Skill Intensity
1%	0.042%	0.135%	0.081%
5%	0.042%	0.096%	0.074%
10%	0.042%	0.083%	0.071%
25%	0.042%	0.057%	0.057%
50%	0.042%	0.037%	0.040%
75%	0.042%	0.012%	0.020%
90%	0.042%	-0.027%	-0.021%
95%	0.042%	-0.038%	-0.029%
99%	0.042%	-0.054%	-0.055%

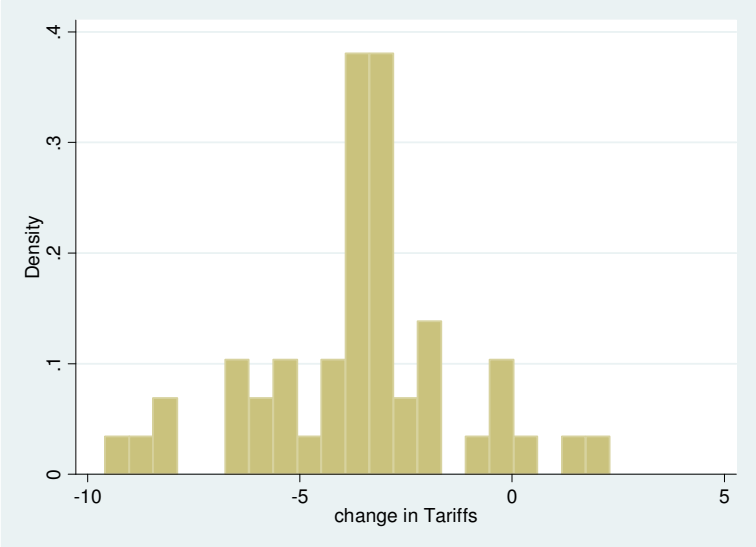
Table 17
Estimated change in exported flows to Turkey for different levels of Capital and Skill Comparative Advantage (measured at different percentiles)

The estimated effects of a reduction of Tariffs by 1 percentage points on Exported Sales to Turkey

1	2	3	4
percentiles	average	over Capital Intensity	over Skill Intensity
1%	3%	5.49%	1.83%
5%	3%	4.45%	1.99%
10%	3%	4.08%	2.04%
25%	3%	3.38%	2.36%
50%	3%	2.83%	2.74%
75%	3%	2.14%	3.16%
90%	3%	1.08%	4.07%
95%	3%	0.76%	4.22%
99%	3%	0.35%	4.81%

Figure 1
Change in Turkish import Tariffs after the entrance in European Customs Union (1995-1999)

1a. All sectors excluding "Food, Beverages and Tobacco"



1b. All sectors

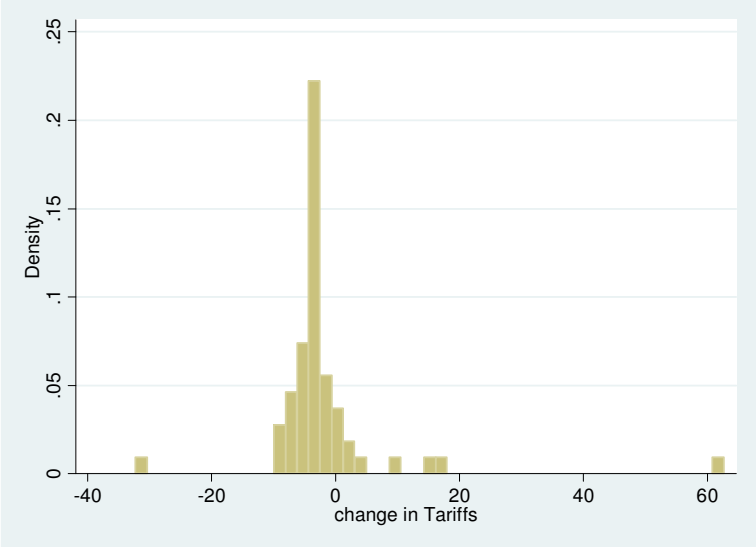


Figure 2
US skill intensity and US capital intensity

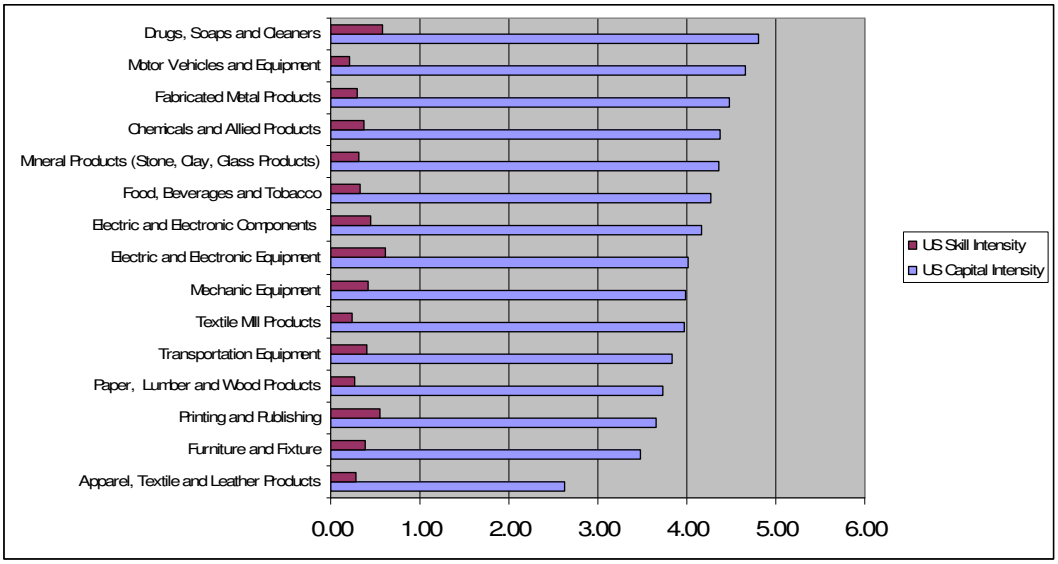
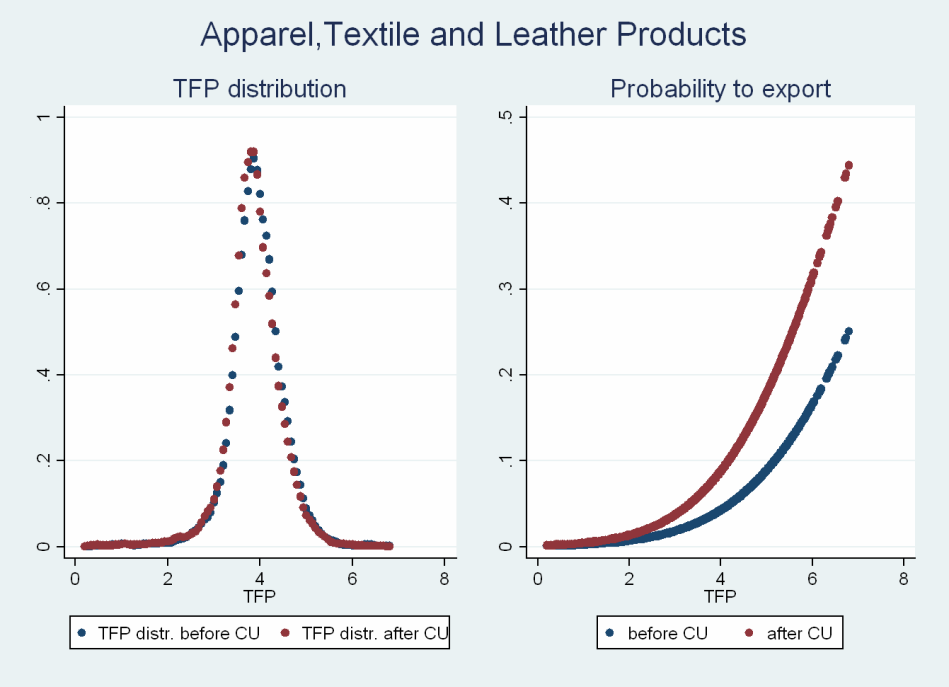


Figure 3
TFP Kernel Distribution and Probability to Export before and after CU for some sectors

3a



3b