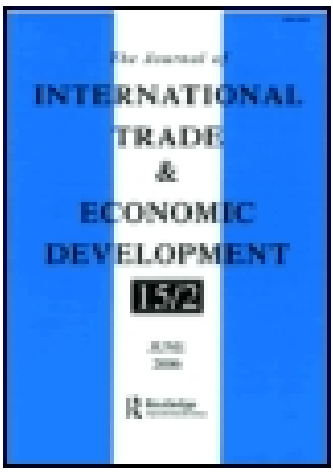

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On tariff changes and firm-production evolution: insights from Turkish manufacturing

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On tariff changes and firm-production evolution: insights from Turkish manufacturing

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We contribute to the yet limited evidence on the relationship between trade liberalisation and a firm's product mix and diversification strategies for an emerging economy, Turkey. Lower import barriers foster firms' specialisation in their core products. A drop in import tariffs, indeed, enhances a firm's propensity to drop fringe varieties and favours production growth of core products. More importantly, it favours firms' specialisation in more sophisticated goods. Export tariff cuts, instead, by relaxing competitive pressure at home and lowering the cost to export, only reduce the firms' incentive to innovate.

Keywords: product mix; production diversification; import tariffs; export tariffs

JEL Classifications: L25, F14, D21

1. Introduction

The empirical assessment of the consequences of trade liberalisation policies at home and abroad on firms' growth and product mix choices is an increasingly relevant topic for researchers and policy makers as it helps understand countries' structural change and development path in the current globalisation era. On the one hand, countries' prosperity is strictly related to the mix of goods they produce and to their pattern of diversification (Lucas 1988; Hausmann, Hwang, and Rodrik 2007). On the other hand, in recent decades unilateral and multilateral trade policies have importantly contributed to speed up and deepen the pace of global integration. It follows the interest to investigate how countries' product structure responds to trade policy changes. This topic is increasingly important for developing economies especially, as they urge to renew and adapt their product mix in order to hook onto a stable growth path.

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The evolution of countries' product space, however, ultimately originates from adjustments at the firm margin and at the product margin within firm.[1] Thus, recent countries' trade policy changes may have importantly contributed to shape the *extensive and intensive margins* of industrial production at the firm-product level. Higher competitive pressure, arising from reduced import tariffs, and easier access to foreign markets, originating from reduction in export tariffs, alter the context where firms operate and may push them to introduce new products, to drop some existing ones and/or to reallocate the available resources across products in their portfolio. In this context, we aim at providing evidence on the linkage between trade policy and firm-product churning and diversification for the Turkish manufacturing sector.

Recent theoretical studies depict product turnover as a further – *intra-firm* – adjustment margin that follows trade liberalisation and predict that the latter forces firms to shrink their product scope by shedding the lowest competence varieties (Nocke and Yeaple 2006; Bernard, Redding and Schott 2011; Eckel and Neary 2010). However, empirical evidence has been mixed so far. No impact of declining output tariffs is detected on Indian manufacturing firms' product scope and turnover (Goldberg et al. 2010b). On the contrary, creative destruction appears as rather intense in the Mexican manufacturing industry after the North American Free Trade Agreement (NAFTA) (Iacovone and Javorcik 2010). Also, the US–Canada bilateral liberalisation seems to differently hit the product scope and diversification of Canadian non-exporting and exporting firms, with the former increasing product specialisation and the latter displaying no response to tariff cuts (Baldwin and Gu 2009).

Compared to existing evidence, we provide some original contributions. From a methodological point of view, our empirical strategy consists of a twofold approach: we analyse the trade policy impact on the evolution of the extensive – product dropping and adding – and intensive – product growth – margins of firm production on the one side, and on overall firm diversification, on the other side. The simultaneous examination of firm-product churning and growth delivers important insights on how firms' product structure changes and evolves in response to external shocks. The investigation of firms' extent of diversification is essential to understand whether product mix changes induced by trade liberalisation push firms towards specialisation of production or not. Higher production specialisation could engender higher productivity and a superior overall firm performance. However, a reduced extent of diversification could also positively affect firms' volatility through an increased exposure to external asymmetric demand shocks. Also, firm-product dropping and adding could be informative about the possible structural change induced by external competitive pressure.

Concerning the economic context under investigation, to the best of our knowledge, our work is first to investigate the impact of import and export tariff changes on Turkish manufacturing firms. The Turkish experience is interesting for two main reasons. First, although most of the country's liberalisation effort took place starting from the 1980s, during the period of our analysis – 2005 to 2009 – ap-

plied rates on manufacturing goods have shown a heterogeneous pattern across products and, on average, have declined for the most important sectors of the Turkish economy (e.g. textiles, apparel and machinery). Second, Turkey in the last decades has experienced important changes in its production structure (Hidalgo 2009) and we aim at exploring whether trade integration has played a significant role in this process.[2] The country's growing involvement into global production supply chains, with the European Union especially, and tougher competition from other developing countries makes Turkey an interesting case study to analyse how differences in the extent of trade liberalisation across products and years may shape firms' production structures. The Turkish case we investigate can represent an important term of comparison for other emerging economies with similar international integration histories that are possibly willing to engage in policy actions to foster product diversification and the transition of production structures towards higher quality and more sophisticated goods.

The paper is organised as follows: the next section presents the data; our empirical strategy is described in Section 3; Section 4 shows the results and Section 5 concludes.

2. Data

2.1. The sample

All the data used in this work are sourced from the Turkish Statistical Office, TurkStat.

Our starting sample includes manufacturing firms with more than 20 employees in the 2005–2009 period and represents about 88% of Turkish manufacturing output and 77% of employment. The sample originates from the mergers of the Turkish Annual Industrial Product Statistics (AIPS) with the Structural Business Statistics (SBS) and with the Foreign Trade Statistics (FTS) databases. We then gather information on firms' sales and trade by product and on some firm-level characteristics for all firms included in the AIPS. In the latter, database products are recorded according to the Turkish PRODTR classification[3], which is uniform across years and contains more than three thousands 10 digit codes. In the following, a product is defined as a 10-digit PRODTR good, an industry as a 4-digit NACE code and a sector as a 2-digit NACE code. A detailed description of firm-level data sources is contained in Appendix A and Table B1.

Data on tariffs are retrieved from the WITS-TRAINS data-set. Import tariffs are the Turkish rates applied to the world for each HS six-digit product code. More specifically, they consist of a weighted average of Turkish applied rates across partners where weights are the share of each exporting country in Turkish total imports of each HS product in each year. Export tariffs also refer to the HS six-digit product code level and, by the same token, are weighted averages of tariffs effectively applied to Turkey by all of the country's export destination markets.[4] Therefore, within each product, importing and exporting countries' weights are time variant. This allows for import and export tariffs to account for changing

export destination and import source markets and for shocks affecting a given export or import market which could be cushioned by the decision of foreign and Turkish and foreign policy makers, respectively, over existing applied tariff rates. The adoption of time-running weights, though, could engender concerns over the causality direction of our findings, as changes in applied rates, destination and source markets could actually follow the evolution of Turkish manufacturing production. Nonetheless, the product level aggregate nature of tariffs attenuates this concern. When we analyse firms' diversification and product adding, we test for firm-level tariffs, both by focusing on the firm core product and by aggregating product level tariffs to firm level on the basis of product shares in Turkish imports/exports.

When assessing the results we get for export tariffs, the reader should keep in mind the difficulty to get a good indicator able to capture the easier/more burdensome access to export markets at our level of analysis. There is a lot of heterogeneity in terms of destination markets across products, years and firms. Our findings, indeed, could be sensitive to the weighting scheme we apply in order to summarise the tariff changes across destinations. Even if we tested for alternative proxy of export tariffs – by changing the weighting scheme – there may be still room for some neglected heterogeneity. The importance of a given export destination, for example, may differ across Turkish firms according to the province where they are located, and then according to their physical and cultural distance. If this is true, our measure of export tariff neglects this dimension of heterogeneity. The same could apply for import tariffs.

A more detailed description of computed tariffs is reported in Section 3.

2.2. *Firms' product structure in the Turkish economy*

Firms in our sample produce on average 1.7 products, as displayed in Table B2, and this evidence is quite stable over the period of our analysis. More specifically, as already shown for other countries (Goldberg et al. 2010b; Navarro 2012), multi-product firms play an important role in the manufacturing sector of the Turkish economy too, as they account for about 40% of firms and 70% of production and produce on average four different goods (Table B2).

Despite the relevant presence of multi-product firms, firms' manufacturing activity is, in general, highly concentrated. Consistently with the previous literature (Bernard, Redding, and Schott 2010; Goldberg et al. 2010b; Navarro 2012), the firm distribution of sales across products is rather skewed. Table 1 reports firm-production shares of products by sorting goods from the one with the largest share to the one with the smallest share. The firm's main product, regardless of the number of produced goods, accounts for a large percentage of the firm sales and only for firms producing more than nine products its share falls down below 50%. The shares of the second and third largest product are around 20% and 10%, respectively, and these figures are quite homogeneous across firms.[5] Moving on to the within firm changes of the product mix, Table 2 shows the firms' product

Table 1. Shares of product in the firm sales.

		Number of produced goods									
		1	2	3	4	5	6	7	8	9	10 or more
	1	100	78.84	68.94	62.32	56.82	55.19	52.00	52.72	47.94	43.30
	2		21.16	22.66	23.15	23.87	22.08	21.48	20.51	21.18	20.67
Share of	3			8.40	10.31	11.14	11.26	11.81	11.10	11.62	11.50
a product	4				4.23	5.69	6.47	7.09	6.67	7.30	7.78
in firm sales	5					2.48	3.39	4.25	4.25	4.88	5.45
(from the	6						1.61	2.38	2.59	3.15	3.81
largest one	7							1.00	1.43	2.15	2.63
to the	8								0.73	1.17	1.82
smallest one)	9									0.62	1.22
	10 or more										0.51

Source: Our elaborations on the sample obtained from the merge of AIPS, SBS, FTS databases.
Within firm-product shares presented in the table refer to year 2009. For the other sample years, we find similar figures, and the relative results are available from the authors upon request.

Table 2. Changes in the firm product mix.

The Within-firm product churning, % firms – 2009

	One-year interval				Three-year interval			
	No change	Add only	Drop only	Add and drop	No change	Add only	Drop only	Add and drop
All firms	75.75	9.55	6.41	8.29	55.39	12.60	9.10	22.90
Multi-product firms	58.23	11.59	15.25	14.92	31.64	11.46	21.81	35.09
Single-product firms	88.45	8.07	0.00	3.49	72.40	13.42	0.00	14.19
Exporters	72.29	10.33	8.14	9.24	53.57	12.65	11.27	22.51
Importers	75.75	9.48	6.47	8.3	55.25	12.06	9.83	22.86
Large firms	80.46	8.22	5.91	5.42	61.24	9.63	9.84	19.29

Production diversification by firm characteristics – *E*

	2005	2009
All firms	0.325	0.333
Exporters	0.453	0.474
Importers	0.361	0.364
Foreign owned	0.361	0.320
Large firms	0.394	0.382

Source: Our elaborations on the sample obtained from the merge of AIPS, SBS, FTS databases.
All changes in the product mix in the upper panel are computed for the year 2009, thus one-year and three-year intervals refer to changes in 2009/2008 and 2009/2006 periods, respectively. Large firms are the ones with more than 100 employees. Firm groups are defined on the basis of the corresponding firm-level variable at the beginning of the reference period.
In the lower panel, data on production diversification refer to the entropy index, *E* (Baldwin and Gu 2009).

churning activity according to their initial characteristics. It turns out that a large percentage of manufacturing firms are involved in product adding, dropping and adding & dropping. In particular, multi-product firms are obviously more prone to product turnover. Nevertheless, single product firms are also engaged in some product churning: 28% of single firms in 2007 modify their product basket in the following three-year period. The extensive diffusion of product churning among firms, however, is not fully informative about the evolution of the firm's production specialisation. The firm-production structure, indeed, may evolve even when its product scope stays unchanged, due to changes in the products' weight in its output. Thus, to assess the changes in the overall firm diversification, we follow Baldwin and Gu (2009) and focus on an entropy index[6], E_{it} (see Table B1 for the definition), and in the lower panel of Table 2, we report its evolution over time and across firm characteristics. It emerges the existence of some heterogeneity across firms. As expected, both internationalised and large firms tend to diversify more their activity across products. In particular, in the period of our analysis while both exporters and importers experience a slight increase in the index, foreign owned firms tend to concentrate their production on fewer products.

Focusing on the evolution of trade tariffs, Table 3 highlights a wide heterogeneity in the changes of import and export tariffs experienced by products, with some products experiencing cuts in export/import tariffs and others facing more stringent obstacles to trade. Changes in import tariffs range from cuts of around five percentage points, in the first percentile, to increases of around four percentage points, in the last percentile. A similar evidence emerges for export tariffs ranging from cuts of six percentage points to increase of seven percentage points. More specifically, when putting together the information on firm-product level evolution and tariff changes in Table 4, we find that the group of firm-product level observations exposed to import and export tariff changes below the median

Table 3. Percentiles of import and export tariffs.

Percentiles/variable	$\Delta\tau_j^m$	$\Delta\tau_j^x$
1%	−0.051	−0.063
5%	−0.010	−0.026
10%	−0.007	−0.015
25%	−0.003	−0.004
50%	0.000	0.001
75%	0.001	0.007
90%	0.007	0.023
95%	0.011	0.036
99%	0.044	0.070
Obs	67269	71035

Source: Our elaborations on WITS–TRAIN data.
$\Delta\tau_j^m$ and $\Delta\tau_j^x$ refer to the yearly changes of import and export tariffs at six-digit CPA product.

Table 4. *t*-test of equality of firm-product growth by tariff changes.

Group	Tariff changes below the median	Tariff changes above the median $\Delta\tau^m_{jt}$	*t*-test
Growth_{ijt}	0.041	0.118	−9.043
Obs	33,172	34,097	
		$\Delta\tau^x_{jt}$	
Growth_{ijt}	0.073	0.090	−2.106
Obs	35,484	35,551	

Notes: $\Delta\tau^m_j$ and $\Delta\tau^x_j$ refer to the yearly changes of import and export tariffs at six-digit CPA product. Growth_{ijt} refer to the production growth of product *j* produced by firm *i*. The table displays the average firm-product level production growth above and below the median of import/export tariff changes' distribution.

of the distribution, experience significantly lower growth rates and this difference is rather accentuated for the comparison of high vs. low import tariff rate changes. Thus, firms tend to expand less of those products where foreign competition may become tougher due to policy interventions directed to promote imports. Also, they tend to shrink production in those goods which may face higher barriers in the foreign markets' penetration due to the tariff increase implemented by Turkey's trade partners. These responses to trade policy can open the route to some within the firm restructuring process which importantly affects firms' product baskets and their diversification.

This descriptive evidence suggests the existence of important dynamics in the Turkish firms' product mix, which drive the country's ability to expand its product range and to adapt to the external competitive pressures. As shedding light on these empirical facts is of primary relevance for Turkey's future growth path, in the next section we explore in depth the role of both domestic and foreign trade policy interventions on the firms' product churning, growth and diversification.

3. Empirical strategy

A look at the firm-level dynamics may help to shed light on the determinants of the country's production structure that is ultimately related to firm's – either voluntary or driven by external conditions – decisions about its product mix. In order to explore whether trade liberalisation significantly affected Turkish firms' behaviour in the period of our analysis, we first investigate its impact on firms' production diversification, by means of the following empirical model:

$$E_{it} = \eta_0 + \boldsymbol{\nu}_0' T_{\check{c}t} + \boldsymbol{\iota}_0' X_{it-1} + \kappa_0 n\text{firms}_{r\check{c}t-1} + \lambda_i + \theta_s + \pi_r + \chi_t + \epsilon_{it} \qquad (1)$$

Here, E_{it} is an entropy index measuring the extent of diversification of firm *i* at time *t*. X_{it-1} is a vector containing the first lag of a set of firm-level characteristics,

which are labour productivity, lp_{it-1}, firm size, size_{it-1}, exporter[7] dummy, exp_{it-1}, import status, imp_{it-1} and foreign ownership status, foreign_{it-1}. The variable $n\text{firms}_{r\tilde{c}t-1}$ is the log number of firms located in the same NUTS3 region r where the firm i operates that in $t-1$ were producing the same firm's six-digit CPA core product $\tilde{c}$, that is the good accounting for the largest firm output share.[8] The latter is aimed at capturing the extent of competition in the product local market. λ_i, θ_s, π_r and χ_t, respectively, denote firm, four-digit NACE sector, region and year unobserved heterogeneity. $T_{\tilde{c}t}$ is a vector of export and import tariffs referred to the six-digit CPA firm's core product $\tilde{c}$. Since raw tariff data from WITS–TRAINS are available at the more disaggregated HS product level, we compute CPA level tariffs as weighted average tariffs over all HS products belonging to each CPA product. Each HS level tariff is, then, weighted by the ratio of the Turkish exports (imports) of that good over the sum of Turkish exports (imports) of all HS goods which belong to the same CPA code $\tilde{j}$, $\text{exports}^{\text{TUR}}_{hs} / \sum_{hs\in\tilde{j}} \text{exports}^{\text{TUR}}_{hs}$. In addition to focusing on the tariff of the firm's CPA core product, we also test for alternative firm-level export (import) weighted tariff rates over all goods produced by the firm. These firm-level measures are obtained by exploiting as weight the share in $t-1$ of the total Turkish exports (imports) of each CPA good $\tilde{j}$ produced by firm i in the total Turkish exports (imports) of the set Ni of goods produced by the firm, $\text{exports}^{\text{TUR}}_{\tilde{j}\,t-1} / \sum_{\tilde{j}\in N_i} \text{exports}^{\text{TUR}}_{\tilde{j}\,t-1}$.[9]

Second, we explore the underlying firm-product level dynamics by testing the role of trade liberalisation in the evolution of the extensive and intensive margins of firm production. As far as the extensive margin is concerned, an interesting question regards if and how the trade policy may affect firms' product innovation propensity. Existing literature (Lo Turco and Maggioni 2014) has shown that firms' internationalisation strategies affect their product scope and their introduction of new products. External competitive pressure from foreign actors is a further dimension of the globalisation process which could, indeed, contribute to shapes firms' decisions about their product baskets.

Testing a firm's probability to add a specific product would require building up a sample including of all firm-product combinations in order to consider for each firm all the products it could potentially introduce. Hence, in order to run a computationally feasible analysis, we explore the impact of tariff changes on product additions by estimating the following firm-level model of a firm's probability to add a new product to its product basket:

$$\text{Add}_{it} = \eta_1 + \boldsymbol{\nu}_1' T_{\tilde{c}t} + \boldsymbol{\iota}_1' X_{it-1} + \kappa_1 n\text{firms}_{r\tilde{c}t-1} + \lambda_i + \theta_s + \pi_r + \chi_t + \epsilon_{it}, \quad (2)$$

where Add_{it} is a dummy taking value 1 when firm i introduces a new product at time t that it was not producing in $t-1$ and zero otherwise, while the definition of vectors $T_{\tilde{c}t}$, X_{it-1} and $n\text{firms}_{r\tilde{c}t-1}$ is as above.

To proceed in the investigation of how tariff cuts shape the extensive margin of a firm's production, we inspect the impact of tariff changes on firm i's probability

to drop at time t a 10-digit product j that was in the firm's product basket in $t-1$, Drop_{ijt}, by means of the following model:

$$\text{Drop}_{ijt} = \alpha_0 + \boldsymbol{\omega}_0' T_{\tilde{j}t} + \boldsymbol{\beta}_0' X_{it-1} + \gamma_0 n\text{firms}_{jrt-1} + \delta_0 \text{share}_{ijt-1} + \lambda_i + \mu_j + \chi_t + \epsilon_{ijt}. \quad (3)$$

Finally, we turn to the intensive margin and explore the effect of tariff cuts on firm i's growth of product j, Growth_{ijt}:

$$\text{Growth}_{ijt} = \alpha_1 + \boldsymbol{\omega}_1' T_{\tilde{j}t} + \boldsymbol{\beta}_1' X_{it-1} + \gamma_1 n\text{firms}_{jrt-1} + \delta_1 \text{share}_{ijt-1} + \lambda_i + \mu_j + \chi_t + \epsilon_{ijt}. \quad (4)$$

For the firm-product dropping and growth, we are able to exploit the firm-product level detail of our data. Models 3 and 4, then, are firm-product level linear regression models with λ_i representing firm fixed effects and μ_j representing 10-digit product level fixed effects. In both models, vector T contains export and import tariff rates, which are included as absolute difference between t and $t-1$ and tariff rates are calculated at the level of six-digit CPA product $\tilde{j}$.[10] As in models 1 and 2, X contains the first lag of firm-level controls, while, differently from models 1 and 2, here the regional proxy for local competition is specific to the 10-digit product j. Finally, share_{ijt-1} is the lagged 10-digit product j's share in total firm sales to account for the product importance in the firm's product portfolio.

All models are estimated by means of OLS. In particular, when investigating a firms' probability to add a new product (model 2) and a firms' probability to drop a given product (model 3) we use a linear probability model (LPM). Despite the pitfalls of the LPM, the latter does not need any distributional assumption to model unobserved heterogeneity – in particular firm and product time invariant characteristics that may drive a firm's product choice – and in general delivers good estimates of the partial effects on the response probability near the centre of the distribution of the regressor (Wooldridge 2002).

In the firm-product level analysis, our standard errors are robust and clustered by the CPA product in order to account for the fact that our main variable of interest is measured at the higher CPA aggregation level (Moulton 1986, 1990)[11]. We thus also take into account that LPM is affected by heteroschedasticity. In the investigation of firm diversification and firm-product adding, instead, standard errors are clustered by firm.

By adopting aggregate trade policy measures, we try to attenuate reverse causality issues related to the tariff effect. In particular, tariffs are defined at the six-digit CPA level and weights of firm weighted average tariff measures are at the nation-product level. Then, it is rather unlikely that the firms' decision over a product or product mix drives the trade policy of Turkey and of its trade partners. Also, export tariffs can be treated as exogenous, since Turkey export partners (e.g.

the EU and the US) are large and import from several sources of which Turkey represents a marginal source country.

By including the first lag of the firm-level variables, we want to mitigate the issue of simultaneity. Even if our results on firm-level determinants cannot be interpreted as causal effects, they can be still informative about the evolution of the firm-production structure according to the firm heterogeneity.

4. Results

4.1. Tariff changes and firm diversification

Table 5 displays the determinants of product diversification.

Focusing on trade policy variables, no significant impact emerges for a change in the potential foreign competition driven by a tariff change on the firm's entropy index (column 1). The fall in import tariffs on a firm's main product, $\Delta\tau_{\tilde{c}}^{m}$, does not affect the firm's diversification choices, as firms probably perceive this policy intervention just as a potential but not as an actual increase of competitive pressure. In other words, our results suggest that the threat of foreign competition has no impact when the intervention concerns their most important product.

A different finding emerges when in columns 4–6 we use the firm weighted import and export tariff cuts, $\Delta\tau_i^{Mm}$ and $\Delta\tau_i^{Xx}$, which account for tariffs on all of the goods produced by the firm. A tariff cut leads to higher concentration of firms' sales. In particular, from column 6 of the Table, a 1 percentage point import tariff cut reduces the entropy index by 0.001 units which roughly corresponds to 50% of the total average index variation in our sample period (see the lower panel of Table 2). This evidence suggests that a firm's production mix is more affected by potential foreign competition in the marginal products which possibly pushes firms to focus on their main product and on goods less exposed to foreign competitive pressures. The coefficient on export tariff changes (column 6) implies a decrease in product concentration stemming from an easier access to foreign market which is, however, not robust to the inclusion of firm fixed effects. When export tariff changes are interacted with the export status dummy in columns 7 and 8, we find no statistically significant effect either for exporters or for non-exporters.

Among firm-level determinants, as expected, we find that larger firms are characterised by higher diversification, thus revealing their ability to operate in different product lines and, potentially, also in different sectors thanks to wider financial and operational resources (Baldwin and Gu 2009). Neither labour productivity nor unit wage seem to play a significant role in the explanation of a firm's diversification. In terms of a firm's international status, foreign ownership is not related to product diversification at all. Moreover, contrarily to relevant theoretical contributions (Rivera-Batiz and Romer 1991) and recent firm-level empirical evidence (Goldberg et al. 2010a), which predicts a positive impact of increased access to foreign inputs on the introduction of new goods, a firm's import activity does not affect its product mix. In line with the evidence on other countries (Bratti

Table 5. Diversification of production – entropy index, E_{it}.

	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
lp_{it-1}	0.000	0.000	0.000	−0.002	0.000	−0.002	0.000	−0.002
	[0.002]	[0.002]	[0.002]	[0.002]	[0.002]	[0.002]	[0.002]	[0.002]
$size_{it-1}$	0.032***	0.031***	0.032***	0.031***	0.031***	0.031***	0.032***	0.031***
	[0.006]	[0.005]	[0.006]	[0.006]	[0.005]	[0.006]	[0.006]	[0.006]
exp_{it-1}	0.017***	0.017***	0.017***	0.017***	0.015***	0.016***	0.017***	0.016***
	[0.004]	[0.004]	[0.004]	[0.004]	[0.004]	[0.004]	[0.004]	[0.004]
imp_{it-1}	0.004	0.005	0.004	0.003	0.004	0.003	0.004	0.003
	[0.005]	[0.004]	[0.005]	[0.005]	[0.004]	[0.005]	[0.005]	[0.005]
$wage_{it-1}$	−0.012*	−0.010*	−0.012*	−0.007	−0.008	−0.007	−0.012*	−0.007
	[0.006]	[0.006]	[0.006]	[0.006]	[0.006]	[0.006]	[0.006]	[0.006]
$foreign_{it-1}$	−0.037	−0.036	−0.037	−0.035	−0.041	−0.036	−0.036	−0.035
	[0.029]	[0.029]	[0.029]	[0.030]	[0.030]	[0.030]	[0.029]	[0.030]
$nfirms_{r\tilde{c}\,t-1}$	0.011***	0.011***	0.011***	0.012***	0.010**	0.012***	0.011***	0.012***
	[0.004]	[0.004]	[0.004]	[0.004]	[0.004]	[0.004]	[0.004]	[0.004]
$\Delta\tau^{m}_{\tilde{c}\,t}$	0.03		0.028				0.027	
	[0.032]		[0.032]				[0.032]	
$\Delta\tau^{x}_{\tilde{c}\,t}$		0.061	0.08				0.143	
		[0.062]	[0.074]				[0.088]	
$\Delta\tau^{Mm}_{i\,t}$				0.079		0.093*		0.094*
				[0.053]		[0.052]		[0.051]
$\Delta\tau^{Xx}_{i\,t}$					0.135**	0.129*		0.130
					[0.063]	[0.069]		[0.080]
$\Delta\tau^{x}_{\tilde{c}\,t}$*$exp_{it-1}$							−0.175	
							[0.137]	
$\Delta\tau^{Xx}_{i\,t}$*exp_{it-1}								−0.009
								[0.145]
$\Delta\tau^{x}_{\text{Exporter}}$							−0.032	0.121
							[0.117]	[0.125]
Fixed effects								
Firm	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
4d sector	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	48,194	50,985	48,191	46,573	50,073	46,547	48,191	46,547
R-squared	0.035	0.034	0.035	0.037	0.035	0.037	0.035	0.037
Number of id	15,703	15,915	15,702	15,446	15,732	15,438	15,702	15,438

***$p < 0.01$, **$p < 0.05$, *$p < 0.1$. Robust standard errors in brackets are clustered by firm.
The dependent variable is the entropy index of firm product diversification.
$\Delta\tau^{m}_{\tilde{c}\,t}$ ($\Delta\tau^{x}_{\tilde{c}\,t}$) is the change in import (export) tariffs on the firm main product between t and $t-1$.
$\Delta\tau^{Mm}_{i\,t}$ ($\Delta\tau^{Xx}_{i\,t}$) is the change in firm average weighted import (export) tariffs, where each HS product produced by the firm is weighted by its share in Turkish total imports (exports).
$\Delta\tau^{x}_{\text{Exporter}}$ denotes the coefficient, with the corresponding standard error, associated to the export tariffs for exporting firms which is estimated as $\Delta\tau^{x}_{\tilde{c}\,t}+\Delta\tau^{x}_{\tilde{c}\,t}$*$exp_{it-1}$ ($\Delta\tau^{Xx}_{i\,t}+\Delta\tau^{Xx}_{i\,t}$*$exp_{it-1}$).
Fixed effects included in the analysis are reported at the bottom of the table.

and Felice 2012; Hahn and Park 2011; Lo Turco and Maggioni 2014), instead, exporting own produced goods increases product diversification. Entry into more competitive markets and contacts with foreign customers can stimulate firms' innovative efforts and could also push them to provide a different product range in the domestic and foreign market, especially when these two markets are characterised by different consumers' preferences and income levels. Furthermore, we find that domestic competition is significantly related to diversification. A more competitive and thicker local market for a firm's main product pushes firms to diversify their portfolio by introducing new products or by expanding existing marginal ones, thus lowering the weight of the previous main product.

Table B3 in Appendix 7.1 shows that similar findings emerge when we substitute the log number of products a firm produces for the entropy index to measure a firm's diversification extent.[12]

4.2. Tariff changes and the extensive and intensive margins of firm production

Product adding: in order to shed light on the impact of tariff changes on the above-shown evolution of manufacturing firms' diversification of production, we test their effect on a firm's probability to introduce a new product and Table 6 shows results from the estimation of model 2.

As far as tariff changes are concerned, it emerges that while import tariffs play no role for product additions, weighted average export tariff cuts reduce a firm's propensity to introduce a product innovation. When we split the sample between multi- and single-product firms, we prove that this finding holds for both groups of firms and for single-product firms the two measures of firm-level tariffs, which are nearly equal, turn both significant. In order to ascertain whether this effect is driven by exporting firms, in columns 11 and 12 we interact export tariff changes with the firm export status dummy. We find that the positive coefficient only stands for non-exporting firms. The coefficient on the interaction term, instead, is negative and significant, nonetheless when testing for the total effect of export tariffs on exporters, as reported in the bottom part of the table, we find no statistically significant effect. Then we could interpret these findings as increased market access abroad reducing the extent of competitive pressure on domestic firms and hence relaxing the need to introduce new products.

On the one hand, since lower export tariffs could push exporters to reap new business opportunities and expand their presence abroad, non-exporting firms could benefit from a reduction in competition in the domestic market. On the other hand, a fall in foreign markets entry cost lowers the incentive to innovate for those non-exporting firms planning to start to export which could then be able to penetrate foreign markets with the existing product portfolio. Among firm-level characteristics, from columns 1 to 6 in the table it emerges that larger firms and

Table 6. Product adding, Add_{it}.

	[1]	[2]	[3]	[4]	[5]	[6]	[8] Single	[7] Multi	[10] Single	[9] Multi	[11] Interaction with export status	[12] Interaction with export status
lp_{it-1}	0.004	0.005	0.004	0.002	0.005	0.002	0.006	0.002	0.004	0.001	0.004	0.002
	[0.004]	[0.004]	[0.004]	[0.004]	[0.004]	[0.004]	[0.005]	[0.008]	[0.005]	[0.008]	[0.004]	[0.004]
$size_{it-1}$	0.023***	0.021**	0.023***	0.025***	0.021**	0.025***	0.014	0.056***	0.012	0.064***	0.024***	0.026***
	[0.009]	[0.008]	[0.009]	[0.009]	[0.008]	[0.009]	[0.010]	[0.017]	[0.010]	[0.017]	[0.009]	[0.009]
exp_{it-1}	−0.016**	−0.020**	−0.016**	−0.024***	−0.025***	−0.024***	−0.001	0.004	−0.009	0.002	−0.018**	−0.027***
	[0.008]	[0.008]	[0.008]	[0.008]	[0.008]	[0.008]	[0.011]	[0.014]	[0.011]	[0.014]	[0.008]	[0.008]
imp_{it-1}	−0.007	−0.005	−0.007	−0.008	−0.008	−0.008	−0.003	−0.014	−0.002	−0.024	−0.007	−0.008
	[0.008]	[0.007]	[0.008]	[0.008]	[0.007]	[0.008]	[0.009]	[0.015]	[0.009]	[0.016]	[0.008]	[0.008]
$wage_{it-1}$	0.003	0.001	0.003	0.008	0.005	0.008	0.005	0.023	0.002	0.039*	0.004	0.008
	[0.012]	[0.012]	[0.012]	[0.012]	[0.012]	[0.012]	[0.014]	[0.022]	[0.014]	[0.023]	[0.012]	[0.012]
$foreign_{it-1}$	−0.06	−0.058	−0.059	−0.054	−0.057	−0.055	0.037	−0.240**	0.017	−0.194	−0.06	−0.055
	[0.061]	[0.061]	[0.061]	[0.063]	[0.062]	[0.063]	[0.073]	[0.121]	[0.072]	[0.134]	[0.061]	[0.063]
$nfirms_{r\tilde{c}\,t-1}$	0.013	0.01	0.013	0.011	0.008	0.01	0.031***	−0.004	0.026**	−0.004	0.018**	0.015*
	[0.008]	[0.007]	[0.008]	[0.008]	[0.008]	[0.008]	[0.010]	[0.012]	[0.010]	[0.013]	[0.008]	[0.008]
$\Delta\tau^{m}_{\tilde{c}\,t}$	−0.011		−0.015				0.056	0.023			−0.019	
	[0.062]		[0.062]				[0.107]	[0.074]			[0.062]	
$\Delta\tau^{x}_{\tilde{c}\,t}$		0.066	0.113				0.493**	−0.062			0.290*	
		[0.123]	[0.140]				[0.201]	[0.216]			[0.169]	
$\Delta\tau^{Mm}_{i\,t}$				0.106		0.135			0.035	0.057		0.13
				[0.099]		[0.098]			[0.095]	[0.185]		[0.097]

(*Continue*).

Table 6. (*Continue*).

	[1]	[2]	[3]	[4]	[5]	[6]	[8] Single	[7] Multi	[10] Single	[9] Multi	[11] Interaction with export status	[12] Interaction with export status
$\Delta\tau_{i\,t}^{Xx}$					0.331**	0.337**			0.486***	0.702**		0.606***
					[0.141]	[0.149]			[0.161]	[0.340]		[0.176]
$\Delta\tau_{\tilde{c}\,t}^{x}$*exp$_{it-1}$											−0.497**	
											[0.251]	
$\Delta\tau_{i\,t}^{Xx}$*exp$_{it-1}$												−0.815***
												[0.271]
$\Delta\tau_{\text{Exporter}}^{x}$											−0.262	−0.209
											[0.195]	[0.237]
Fixed effects												
Firm	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
4d sector	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	48,194	50,985	48,191	46,573	50,073	46,547	27,445	20746	27,338	19,209	48,191	46,547
R-squared	0.072	0.07	0.072	0.072	0.07	0.072	0.059	0.105	0.059	0.105	0.073	0.073
Number of id	15,703	15,915	15,702	15,446	15,732	15,438	10,473	8260	10,412	7989	15,702	15,438

***$p < 0.01$, **$p < 0.05$, *$p < 0.1$. Robust standard errors in brackets are clustered by firm.
The dependent variable is the firm probability to add a new product in the existing product portfolio.
$\Delta\tau_{\tilde{c}\,t}^{m}$ ($\Delta\tau_{\tilde{c}\,t}^{x}$) is the change in import (export) tariffs on the firm main product between *t* and *t-1*.
$\Delta\tau_{i\,t}^{Mm}$ ($\Delta\tau_{i\,t}^{Xx}$) is the change in firm average weighted import (export) tariffs, where each HS product produced by the firm is weighted by its share in Turkish total imports (exports).
$\Delta\tau_{\text{Exporter}}^{x}$ denotes the coefficient, with the corresponding standard error, associated to the export tariffs for exporting firms which is estimated as $\Delta\tau_{\tilde{c}\,t}^{x}+\Delta\tau_{\tilde{c}\,t}^{x}$*exp$_{it-1}$ ($\Delta\tau_{i\,t}^{Xx}+\Delta\tau_{i\,t}^{Xx}$*exp$_{it-1}$).
Fixed effects included in the analysis are reported at the bottom of the table.

non-exporters[13] are more likely to add new products, while foreign ownership, firms' efficiency and unit wage are not significantly associated to product adding.

Product dropping: to further investigate the impact of tariff changes on firms' production choices, we test their effect on product droppings at the firm-product level. We thus present findings from the estimation of model 3 in Table 7. Results are mostly in line with our expectations.

As a matter of fact, import tariff cuts are significantly related to a higher probability of discontinuing a product in all of the specifications. From column 3 in the table, a 1 percentage point import tariff cut increases the probability of product dropping by 0.08 percentage points. Moreover, from column 4, core products – the ones whose weight in firm production is roughly higher than 66% – experience an expansion from tariff reductions at the expenses of fringe product varieties. This evidence is in line with the one displayed by Iacovone and Javorcik (2010) and is confirmed when we substitute the continuous variable share_{ijt-1} with three dummies for the lower, middle and upper quantiles of the product share distribution (column 7). Differently from the findings on Mexico (Iacovone and Javorcik 2010), throughout the Table, in columns 1–6, we find slight evidence that lower barriers to exports enhance the preservation of the product mix and this effect is magnified for a firm's core product, which is more likely to be advantaged by enhanced export opportunities.[14] Then, as confirmed in column 7 where three dummies for the lower, middle and upper quantiles of the product share distribution substitute for the continuous product share in firms' production value, firms tend to drop those products with difficult foreign market access, due to higher export tariff barriers and this is especially true for firms' core products.

All the effects we have described are driven by multi-product firms' product churning (column 9) and export tariff cuts do not differently affect exporters (column 10).

Turning to the remaining controls, we find that larger and more productive firms are less likely to discontinue their products' sales (columns 1–4). However, when firm fixed effects are included in columns 5–10, productivity is no more significantly related to the probability of firms of dropping a product, although larger firms are more likely to drop products. This result, which is in line with the one by Navarro (2012) on Chilean firms, may suggest that a firm's growth process goes with a change in its product mix. Also, we find that, across firms, higher wages are related to a decline in the probability to drop a product: if higher wages proxy higher skill intensity (Bernard and Jensen 2004), this result suggests that more skill intensive firms may better defend their products' positioning in the market. Nonetheless, a within firm increase of skill intensity increases the probability to drop a product (columns 5–10). Firms increasing their skill intensity could then be more specialised or could experience a change in their product structure, by abandoning some product lines for new ones requiring the new acquired competencies. Concerning firm internationalisation, exporters are more likely to preserve

Table 7. Probability of dropping produced goods, $Drop_{ijt}$.

	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8] Single	[9] Multi	[10] Interaction with Export Status
$share_{ijt-1}$	−0.241***	−0.239***	−0.242***	−0.241***	−0.330***	−0.329***			−0.297***	−0.330***
	[0.004]	[0.004]	[0.004]	[0.004]	[0.008]	[0.008]			[0.008]	[0.008]
lp_{it-1}	−0.004**	−0.004**	−0.004**	−0.004**	0.001	0.001	0.001	0.004	−0.001	0.001
	[0.002]	[0.002]	[0.002]	[0.002]	[0.003]	[0.003]	[0.003]	[0.003]	[0.004]	[0.003]
$size_{it-1}$	−0.008***	−0.008***	−0.008***	−0.008***	0.016**	0.016**	0.015**	−0.001	0.024***	0.016**
	[0.002]	[0.002]	[0.002]	[0.002]	[0.006]	[0.006]	[0.006]	[0.007]	[0.008]	[0.006]
exp_{it-1}	−0.013***	−0.012***	−0.013***	−0.013***	0.003	0.003	0.007	0.005	0	0.003
	[0.003]	[0.003]	[0.003]	[0.003]	[0.005]	[0.005]	[0.005]	[0.007]	[0.005]	[0.005]
imp_{it-1}	0.011***	0.010***	0.011***	0.011***	0.006	0.006	0.007	−0.001	0.01	0.006
	[0.003]	[0.003]	[0.003]	[0.003]	[0.005]	[0.005]	[0.005]	[0.007]	[0.007]	[0.005]
$wage_{it-1}$	−0.019***	−0.019***	−0.019***	−0.019***	0.022***	0.022***	0.023***	0.005	0.036***	0.022***
	[0.004]	[0.004]	[0.004]	[0.004]	[0.008]	[0.008]	[0.008]	[0.009]	[0.011]	[0.008]
$foreign_{it-1}$	−0.006	−0.006	−0.005	−0.006	−0.012	−0.012	−0.014	−0.019	0.01	−0.011
	[0.007]	[0.007]	[0.007]	[0.007]	[0.050]	[0.050]	[0.051]	[0.034]	[0.068]	[0.050]
$nfirms_{rjt-1}$	−0.001	−0.001	−0.001	−0.001	−0.012***	−0.012***	−0.012***	−0.034***	−0.010**	−0.012***
	[0.003]	[0.003]	[0.003]	[0.003]	[0.004]	[0.004]	[0.004]	[0.012]	[0.005]	[0.004]
$\Delta\tau^{m}_{jt}$	−0.077**		−0.081***	−0.162***	−0.082**	−0.140**	−0.138*	0.025	−0.090**	−0.082**
	[0.031]		[0.031]	[0.046]	[0.036]	[0.064]	[0.077]	[0.037]	[0.038]	[0.036]
$\Delta\tau^{x}_{jt}$		0.146***	0.175**	−0.176*	0.128*	−0.016	−0.145	−0.043	0.151*	0.191**
		[0.056]	[0.074]	[0.093]	[0.068]	[0.109]	[0.132]	[0.077]	[0.078]	[0.082]
$\Delta\tau^{m}_{jt}$*$share_{ijt-1}$				0.283***		0.202**				
				[0.091]		[0.102]				
$\Delta\tau^{x}_{jt}$*$share_{ijt-1}$				0.729***		0.303*				
				[0.160]		[0.170]				
$\Delta\tau^{m}_{jt}$*Qsh_2							0.072			
							[0.072]			
$\Delta\tau^{m}_{jt}$*Qsh_3							0.133			
							[0.093]			
$\Delta\tau^{x}_{jt}$*Qsh_2							0.360**			
							[0.150]			
$\Delta\tau^{x}_{jt}$*Qsh_3							0.394**			
							[0.179]			

(*Continue*).

Table 7. (*Continue*).

	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8] Single	[9] Multi	[10] Interaction with Export Status
Qsh_2							-0.142^{***}			
							[0.005]			
Qsh_3							-0.282^{***}			
							[0.006]			
$\Delta\tau^x_{j\,t}$*$\exp_{it-1}$										-0.169
										[0.110]
$\Delta\tau^m$ Qsh_2							-0.066^{**}			
$\Delta\tau^m$ Qsh_3							-0.006			
$\Delta\tau^x$ Qsh_2							0.215^{**}			
$\Delta\tau^x$ Qsh_3							0.249^{**}			
$\Delta\tau^x_{\text{Exporter}}$										0.022
$\omega^m_{\text{multi}} = \omega^m_{\text{single}}$								0.031	0.031	
$\omega^x_{\text{multi}} = \omega^x_{\text{single}}$								0.076	0.076	
Fixed Effects										
Product	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Region	Yes	Yes	Yes	Yes	No	No	No	No	No	No
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	YES
Observations	111432	117182	111398	111398	111398	111398	111398	27652	83746	111398
R^2	0.179	0.179	0.179	0.18	0.369	0.369	0.367	0.742	0.359	0.369

$^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$. Robust standard errors in brackets are clustered by 10-digit product.
The dependent variable is the firm probability to drop a produced 10-digit PRODTR good.
$\Delta\tau^m_{j\,t}$ ($\Delta\tau^x_{j\,t}$) is the change of import (export) tariff at six-digit CPA product level between t and t-1.
Qsh_2, Qsh_3 denotes dummies for the second and third quantiles of the firm-product share distribution. Qsh_1, which is the first quantile, is omitted.
$\Delta\tau^x_{Exporter}$ denotes the coefficient associated to the export tariffs for exporting firms which is estimated as $\Delta\tau^x_{j\,t}$+$\Delta\tau^x_{j\,t}$*$\exp_{it-1}$. Standard errors are not reported.
$\Delta\tau^m$ Qsh_2 and $\Delta\tau^m$ Qsh_3 ($\Delta\tau^x$ Qsh_2 and $\Delta\tau^x$ Qsh_2) denotes the estimated coefficient associated to the change in the import (export) tariffs for the second and third quantile of the firm-product share distribution. Standard errors are not reported.
$\omega^m_{\text{multi}} = \omega^m_{\text{single}}$ ($\omega^x_{\text{multi}} = \omega^x_{\text{single}}$) reports the p-value of the t-test of equality between coefficients associated to import (export) tariff changes for multi-product and single-product firms
Fixed effects included in the analysis are reported at the bottom of the table.

their products, whereas the purchase of foreign inputs is positively related to the probability of dropping a product. However, when firm fixed effects are included both internationalisation measures lose their significance. Foreign ownership, instead, is not significant. In line with previous works, the probability of dropping a product is higher, in general, for fringe products (Bernard, Redding, and Schott 2010; Iacovone and Javorcik 2010; Navarro 2012). This finding could also reveal firm engagement in a process of trials and errors in the product scope expansion and the entry in new productions and recalls analogous evidence on the uncertain profitability of new export product entry (Freund and Pierola 2010; Eaton et al. 2011; Albornoz et al. 2012). Firms may start small when entering the market with a new product because of the uncertainty about its success. After this initial experience, they can decide whether to continue their production or not. In this case, fringe products would also correspond to short tenured products. Finally, the existence of domestic local competitors emerges as an important driver of a firm's decisions about its product mix. When firm fixed effects are included (columns 5–10), the larger the number of firms producing a good in a region, the lower a firm's probability to drop that product. Thus, firms seem to maintain those products with a thicker market which could proxy higher expected profits.

Firm-product growth: findings from the estimation of equation 4 modelling firm product growth are shown in Table 8. As far as import tariffs are concerned, insights from this table mimic the ones from the previous one: import tariff cuts reduce production growth. In particular, they foster the expansion of the production of core products (columns 4, 6 and 7). Export tariff cuts, instead, by no means affect production growth and this effect is homogeneous across exporters and non-exporters. In Figure 1, we plot the predicted impact of import tariffs by relative product share on both the product growth and the probability of product dropping. The heterogeneous impact of import tariff changes clearly emerges for both variables. A 1 percentage point cut of import tariff increases the firm probability of dropping fringe goods from its product basket. In particular, the lower the relative product share the stronger is this effect. On the contrary, the effect turns positive for products which play a relevant role in the firms' production and account for more than 65% of production. The impact on product growth is also related to the importance of the product in the firm production, with the most detrimental effects recorded by fringe products. Products accounting for more than 58% of production experience, instead, an expansion following the tariff cut.

Turning to export tariffs, they do not significantly affect products' output growth.

As far as the remaining variables are concerned, it is interesting to notice that a higher number of firms producing the same product, besides reducing a firm's probability to drop that product, as previously documented, enhances its production growth in firms keeping on producing it. Thus, firms' product clusters push firms' specialisation. In terms of firm characteristics, smaller firms record higher expansion in their products, thus emerging as a dynamic element

Table 8. Firm product production growth.

	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8] Interaction with export status
$share_{ijt-1}$	−0.384***	−0.385***	−0.384***	−0.385***	−0.981***	−0.982***		−0.981***
	[0.017]	[0.016]	[0.017]	[0.017]	[0.034]	[0.034]		[0.034]
lp_{it-1}	0.011*	0.011*	0.011*	0.011*	−0.037***	−0.037***	−0.036***	−0.037***
	[0.006]	[0.006]	[0.006]	[0.006]	[0.011]	[0.011]	[0.011]	[0.011]
$size_{it-1}$	−0.013***	−0.014***	−0.013***	−0.013***	−0.250***	−0.250***	−0.236***	−0.250***
	[0.005]	[0.005]	[0.005]	[0.005]	[0.024]	[0.024]	[0.024]	[0.024]
exp_{it-1}	−0.006	−0.006	−0.006	−0.006	−0.013	−0.013	0.032*	−0.013
	[0.008]	[0.008]	[0.008]	[0.008]	[0.018]	[0.018]	[0.018]	[0.018]
imp_{it-1}	0.004	0.007	0.004	0.004	−0.009	−0.008	−0.005	−0.009
	[0.009]	[0.009]	[0.009]	[0.009]	[0.019]	[0.019]	[0.019]	[0.019]
$wage_{it-1}$	−0.057***	−0.056***	−0.057***	−0.057***	−0.064**	−0.064**	−0.061**	−0.064**
	[0.012]	[0.011]	[0.012]	[0.012]	[0.027]	[0.027]	[0.028]	[0.027]
$foreign_{it-1}$	0.029*	0.032*	0.029	0.029*	0.071	0.073	0.016	0.072
	[0.018]	[0.017]	[0.018]	[0.018]	[0.104]	[0.104]	[0.098]	[0.104]
$nfirms_{rjt-1}$	0.008	0.01	0.008	0.008	0.019	0.019	−0.040***	0.019
	[0.007]	[0.007]	[0.007]	[0.007]	[0.015]	[0.015]	[0.015]	[0.015]
$\Delta\tau^m_{jt}$	0.181**		0.186**	0.404***	0.162*	0.411***	0.396***	0.161*
	[0.071]		[0.072]	[0.099]	[0.083]	[0.104]	[0.104]	[0.083]
$\Delta\tau^x_{jt}$		−0.152	−0.182	−0.554	−0.117	−0.47	0.052	−0.053
		[0.195]	[0.227]	[0.353]	[0.245]	[0.364]	[0.499]	[0.307]
$\Delta\tau^m_{jt}$*$share_{ijt-1}$				−0.682***		−0.796***		
				[0.227]		[0.293]		
$\Delta\tau^x_{jt}$*$share_{ijt-1}$				0.709		0.676		
				[0.458]		[0.475]		
$\Delta\tau^m_{jt}$*Qsh_2							−0.372**	
							[0.165]	
$\Delta\tau^m_{jt}$*Qsh_3							−0.689***	
							[0.197]	
$\Delta\tau^x_{jt}$*Qsh_2							−0.352	
							[0.532]	

(*Continue*).

Table 8. (*Continue*).

	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8] Interaction with export status
$\Delta\tau^x_{j\,t}$*Qsh_3							−0.241	
							[0.562]	
Qsh_2							0.636***	
							[0.020]	
Qsh_3							0.840***	
							[0.030]	
$\Delta\tau^x_{j\,t}$*exp_{it-1}								−0.178
								[0.395]
$\Delta\tau^m_{j\,t}$*Qsh_2							0.024	
$\Delta\tau^m_{j\,t}$*Qsh_3							−0.293*	
$\Delta\tau^x_{j\,t}$*Qsh_2							−0.3	
$\Delta\tau^x_{j\,t}$*Qsh_3							−0.189	
$\Delta\tau^x_{\text{Exporter}}$								−0.231
Fixed effects								
Product	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm	No	No	No	No	Yes	Yes	Yes	Yes
Region	Yes	Yes	Yes	Yes	No	No	No	No
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	89,696	94,655	89,668	89,668	89,668	89,668	89,668	89,668
R^2	0.056	0.055	0.056	0.056	0.216	0.216	0.225	0.216

***$p < 0.01$, **$p < 0.05$, *$p < 0.1$. Robust standard errors in brackets are clustered by 10-digit product.
The dependent variable is the yearly growth rate of production at firm-product level. Products are defined at 10-digit PRODTR level.
$\Delta\tau^m_{j\,t}$ ($\Delta\tau^x_{j\,t}$) is the change of import (export) tariff at six-digit CPA product level between t and $t-1$.
Qsh_2, Qsh_3 denotes dummies for the second and third quantiles of the firm-product share distribution. Qsh_1, which is the first quantile, is omitted.
$\Delta\tau^x_{\text{Exporter}}$ denotes the coefficient associated to the export tariffs for exporting firms which is estimated as $\Delta\tau^x_{j\,t}+\Delta\tau^x_{j\,t}$*$exp_{it-1}$. Standard errors are not reported.
$\Delta\tau^m$ Qsh_2 and $\Delta\tau^m$ Qsh_3 ($\Delta\tau^x$ Qsh_2 and $\Delta\tau^x$ Qsh_2) denotes the estimated coefficient associated to the change in the import (export) tariffs for the second and third quantile of the firm-product share distribution. Standard errors are not reported.
$\omega^m_{\text{multi}} = \omega^m_{\text{single}}$ ($\omega^x_{\text{multi}} = \omega^x_{\text{single}}$) reports the p-value of the t-test of equality between coefficients associated to import (export) tariff changes for multi-product and single-product firms
Fixed effects included in the analysis are reported at the bottom of the table.

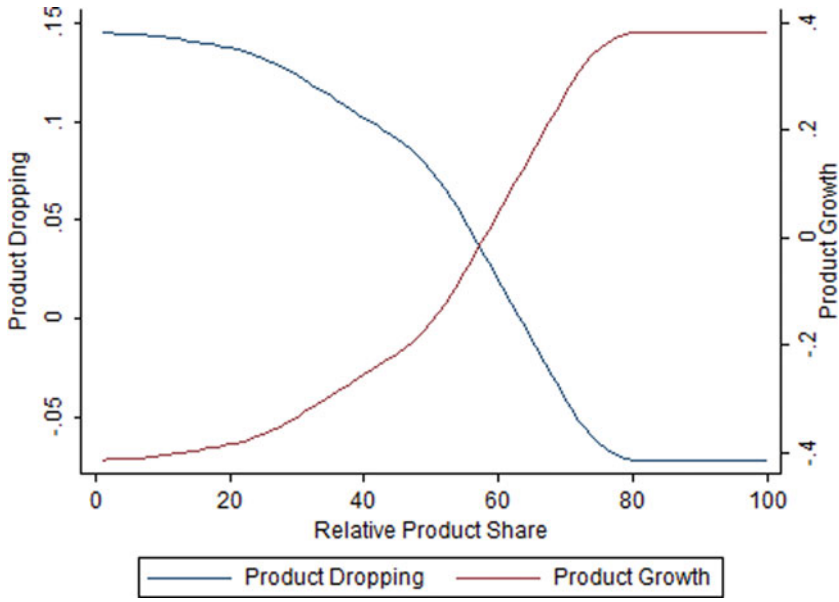

Figure 1. The impact of import tariff changes on product droppings and growth by relative product share.
Source: Own calculations from the predicted coefficients retrieved from column 6 of Table 7 for the firm probability of dropping a product and from column 6 of Table 8 for the product growth. The impact of a one percentage point reduction in import tariffs is plotted. The *x*-axis reports the firm-production share accounted by the product.

in manufacturing but they are also possibly more exposed to external shocks. High-wage firms expand their good production less than low-wage firms, and this could reveal the latter's higher ability to face cost competition. Furthermore, more productive firms experience higher product growth rates, but this correlation turns negative when we include firm fixed effects in the last two columns. Highly efficient firms are then the ones able to expand their share in the products' markets, but firms with a growing productivity may direct their efforts to innovation and to the introduction of new products, instead of expanding existing product lines. Finally, firms' internationalisation strategies do not seem to affect the evolution of a given product growth.

The role for product sophistication: f inally, we explore whether the impact of tariff cuts is shaped by heterogeneous product characteristics. In particular, we expect firms to respond differently to an increase in foreign competition and to the opening of new business opportunities abroad according to the sophistication level of their production.

In Table 9, we show the trade policy impact across different levels of product sophistication measured à la (Hausmann, Hwang, and Rodrik 2007) by means

Table 9. Trade policy effects by product sophistication.

	$Drop_{ij}$				$Growth_{ij}$			
	High [1]	Low [2]	High [3]	Low [4]	High [5]	Low [6]	High [7]	Low [8]
$share_{ijt-1}$	−0.221***	−0.253***	−0.288***	−0.344***	0.466***	0.472***	1.298***	1.161***
	[0.007]	[0.006]	[0.013]	[0.010]	[0.021]	[0.018]	[0.070]	[0.061]
lp_{it-1}	−0.010***	−0.001	0.001	0.001	0.003	0.023***	−0.054***	−0.031**
	[0.003]	[0.002]	[0.005]	[0.004]	[0.010]	[0.007]	[0.021]	[0.013]
$size_{it-1}$	−0.004	−0.009***	−0.013	0.027***	0.014*	0.028***	−0.197***	−0.229***
	[0.003]	[0.002]	[0.011]	[0.007]	[0.008]	[0.006]	[0.048]	[0.028]
exp_{it-1}	−0.019***	−0.009***	0.013	−0.006	0.088***	0.038***	0.064**	0.023
	[0.005]	[0.003]	[0.008]	[0.005]	[0.013]	[0.011]	[0.029]	[0.023]
imp_{it-1}	−0.003	0.017***	−0.013	0.012**	0.061***	−0.012	0.041	−0.022
	[0.005]	[0.004]	[0.009]	[0.006]	[0.016]	[0.011]	[0.035]	[0.023]
$wage_{it-1}$	−0.020***	−0.016***	−0.006	0.035***	−0.021	−0.040***	−0.096*	−0.043
	[0.006]	[0.005]	[0.011]	[0.010]	[0.017]	[0.015]	[0.052]	[0.033]
$foreign_{it-1}$	−0.009	−0.001	0.059	−0.073	−0.011	−0.039	0.162	−0.122
	[0.010]	[0.010]	[0.089]	[0.057]	[0.025]	[0.025]	[0.166]	[0.134]

(*Continue*).

Table 9. (*Continue*).

	$Drop_{ij}$				$Growth_{ij}$			
	High [1]	Low [2]	High [3]	Low [4]	High [5]	Low [6]	High [7]	Low [8]
$nfirms_{rjt-1}$	0.003	−0.004	−0.009	−0.017***	0.002	−0.003	−0.032	−0.053***
	[0.005]	[0.003]	[0.009]	[0.005]	[0.012]	[0.009]	[0.031]	[0.019]
$\Delta\tau^m_{jt}$	−0.572	−0.072**	−0.128	−0.079**	−1.425	0.165**	−2.102*	0.156*
	[0.377]	[0.030]	[0.362]	[0.035]	[1.185]	[0.066]	[1.144]	[0.084]
$\Delta\tau^x_{jt}$	0.235	0.189***	0.005	0.192***	0.222	−0.283	0.405	−0.218
	[0.174]	[0.072]	[0.116]	[0.074]	[0.441]	[0.274]	[0.534]	[0.285]
Fixed effects								
Product	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm	No	No	Yes	Yes	No	No	Yes	Yes
Region	Yes	Yes	No	No	Yes	Yes	No	No
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	37,050	74,348	37,050	74,348	31,103	58,565	31,103	58,565
R^2	0.197	0.171	0.477	0.381	0.093	0.052	0.316	0.220

***$p < 0.01$, **$p < 0.05$, *$p < 0.1$. Robust standard errors in brackets are clustered by product.
The dependent variable is the firm probability to drop a produced 10-digit PRODTR product in columns 1–4 and the yearly growth rate of production at firm-product level in columns 5–8.
High and Low at the top of the columns denote firm-product observations for which products are above or below the median of the *Prody* distribution.
$\Delta\tau^m_{jt}$ ($\Delta\tau^x_{jt}$) is the change of import (export) tariff at six-digit CPA product level between t and $t-1$.
Fixed effects included in the analysis are reported at the bottom of the table.

of the *Prody* indicator. The latter measures the income content of a product by taking the weighted average of per capita income levels of countries exporting that product, where each country's weight is equal to its revealed comparative advantage index in that product. By focusing on results with firm fixed effects in columns 3–4 and 7–8, it emerges that import tariff cuts push firms to contract production of low sophistication goods while they foster the expansion of highly sophisticated goods. Although the significance level is not as high as it would be desirable, this finding can be considered as rather important as it shows that import competition pressure drives Turkish firms to focus their efforts on a few higher complexity goods. Hence import competition in the form of import tariff cuts brings about a process of specialisation and upgrading of the manufacturing production.

5. Discussion and conclusions

With this paper, we contribute to the limited empirical literature on firms' product mix adjustments to trade policy. In particular, we provide evidence for Turkish manufacturing and we test for both import and export tariff changes. We therefore support the theoretical work on the impact of trade liberalisation on firms' production organisation (Nocke and Yeaple 2006; Bernard, Redding and Schott 2011; Eckel and Neary 2010), by giving a comprehensive picture of firms' intensive and extensive margin adjustments.

From our investigation, domestic and foreign trade policy emerge as a significant driver of a country's structural change. Our main finding concerns the role of import tariff cuts in shaping Turkish firms' decision over their product mix. Increased concentration following import tariff cuts implies that firms become more and more specialised in response to tougher competition from foreign actors. In particular, we find that, following increased import openness, firms tend to focus on their highest competence products and to dismiss fringe varieties from production. More importantly, due to tariff cuts, firms tend to expand production of highly sophisticated products and discard and contract production of the less sophisticated ones. Export tariff cuts, instead, emerge as displaying milder effects on Turkish firms' production. More specifically, by relaxing competitive pressure at home and lowering the cost to export, they reduce the firms' incentive to introduce new products.

All this evidence delivers important implications for the product structure at the country level. Domestic policy interventions in terms of trade barrier reduction fosters firms' specialisation in core productions. On the one hand, higher specialisation could engender higher productivity and a superior overall firm performance. On the other hand, a reduced extent of diversification could enhance firms' growth volatility through an increased exposure to external asymmetric demand shocks (Blattman, Hwang, and Williamson 2007; Novy and Taylor 2014). Nonetheless, as firms tend to specialise in high complexity goods, and empirical evidence shows that higher complexity at country level is related to lower volatility (Krishna and

Levchenko 2013) and higher growth (Hausmann, Hwang, and Rodrik 2007), our findings imply that firms' specialisation in sophisticated goods pushed by their exposure to foreign competition could cushion the effects of reduced diversification and foster the country's long-run growth.

Future research should be devoted to investigate the consequences of the product specialisation induced by trade liberalisation on the growth path stability of countries.

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Disclosure statement

No potential conflict of interest was reported by the authors.

Notes

1. Bernard, Redding, and Schott (2010) for the USA and Goldberg et al. (2010b) for India show that although the intensive margin – changes of existing products' output – is the main driver of output growth of continuing firms in manufacturing, their extensive margin – changes in firm product mix – is quantitatively significant. For Chilean firms the latter is, instead, the most important component of manufacturing output growth (Navarro 2012). Empirical evidence, thus, confirms that the within firm-product churning can significantly contribute to the economic development and, even in case of an unchanged basket of produced goods, the existing products' expansion and contraction is not an unimportant matter. Also, multi-product firms account for a relevant share of a country's manufacturing sector and changes in their product mix constitute an essential part of industry dynamics, both in developed and developing economies (Navarro 2012; Bernard, Redding, and Schott 2010).
2. The dynamism of the Turkish economy has been proved by Hidalgo (2009) who showed that Turkey, together with Brazil and Indonesia, was one of the few countries that dramatically increased its product space's complexity over the period 1963–2005.
3. The first eight digits of PRODTR codes correspond to PRODCOM codes, the first six digits to CPA codes and the first four digits to NACE codes.
4. WITS-TRAINS data-set provide us with the effectively applied tariffs by countries. Then if a preferential tariff exists, it will be used as the effectively applied tariff.
5. From the comparison of Table 1 and the similar statistics in Bernard, Redding, and Schott (2010), we could erroneously conclude that production in Turkey is less concentrated than in the United States. The classification used by Bernard, Redding, and Schott (2010) is however more aggregated than the one in this paper, thus preventing any direct comparison.
6. Similar results on the baseline specification were obtained when the Herfindahl index was used, nonetheless to provide a methodology that is in line with extant work on firm production choices we decided to stick to the entropy index.

7. We define as exporter those firms selling own produced goods to foreign customers, thus excluding from our definition firms acting as trade intermediary in foreign markets for other Turkish producers.
8. We alternatively tested tariff impacts on the two main firm's products and we got substantially similar results which are not shown for the sake of brevity, but are available from the authors upon request.
9. Results are similar when using other strategies in order to weight product level tariffs and build firm-level tariffs, such as exploiting the products' weight in the firm total production in the previous year. Results are available upon request.
10. Tariff data from WITS–TRAINS database are available at HS product level. In order to match tariff data with firm-product level data, we exploit the HS/CPA correspondence table, retrieved from Eurostat Ramon website, and we compute average tariffs for each CPA code.
11. When we cluster standard errors at the firm level, our results are not affected at all.
12. Furthermore, these findings are robust to the substitution of the continuous policy measures with dummy indicators for each quartile of the firm-level simple average tariff distribution (Lileeva and Trefler 2010). The only difference concerns the impact of export tariffs, as there is slight evidence that switching from high to low export costs increases firm diversification.
13. This evidence seems to be at odds with the evidence of learning by exporting found by part of literature (Wagner 2007). However, it could also suggest that the learning to export plays a major and more relevant role in Turkey. Before entering foreign markets, domestic firms get ready by adding new products, investing in tangible and intangible assets and engaging in productivity improvements. This anticipating effect can then drive the negative coefficient we find.
14. This effect may concern both established exporters and firms getting ready to enter export markets for the first time.

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Appendix A

The data sources

We make use of three different data sources, collected by the Turkish Statistical Office (TurkStat), to build up our sample.

The structural business statistics (SBS: the SBS collects information on the firm's output, input costs, employment, foreign ownership, its primary sector of activity and the region of location over the period 2003–2008. These data cover the whole population of firms with more than 20 employees and a representative sample of firms with less than 20 employees. The economic activities that are included in the survey are the ones in the NACE sections from C to K, and from M to O.E From this data-set, we gather the firm-level variables used as controls in our estimations.

The annual industrial product statistics (AIPS):the AIPS contain information on each produced goods, their volume and value of production together with the total quantity and value of total sales from goods produced within the reference year or preceding years. Product data are available for the years 2005–2009 and are collected at the 10-digit PRODTR level, a national product classification with the first 8 digits corresponding to PRODCOM classification and, as a consequence, the first 6 digits corresponding to CPA codes. The PRODTR classification is the 2006 one, thus it is homogeneous across the years and does not require any harmonisation procedure. The production data are available for the firms with more than 20 persons employed and whose primary or secondary activity is in either C section (mining and quarrying) or D section (manufacturing) of NACE Rev 1.1. This database allows us to identify the firm-product scope and diversification and the probability of adding and dropping produced goods.

The foreign trade statistics (FTS): FTS are used in combination with AIPS in order to retrieve information on the firm status of importer and produced exporter. Foreign trade data are sourced from customs declarations and are available for the 2002–2009 time span. They cover the universe of the importers and exporters.

Appendix B

Additional tables

Table B1. Variables definition and description

Dependent variables	Description
E_{it}	Entropy diversification index calculated as $\sum_j \text{share}_{ij} * \log(\frac{1}{\text{share}_{ij}})$ with j indexing products and share the weight of each product in the firm total sales. It varies between 0 (maximum concentration) and infinity (maximum diversification)
N_{it}	Log of the number of products produced by the firm
Add_{it}	Probability to add a product measured as a dummy taking value 1 if firm i adds a new product in t that it was not producing it in $t-1$
Drop_{ijt}	Probability to drop a product from the product mix measured as a dummy taking value 1 if firm i drops product j in t and was producing it in $t-1$
Growth_{ijt}	Production growth of product j produced by firm i calculated as the difference between t and $t-1$ of the log of firm production of good j
Independent variables	
$\text{size}_{i\,t-1}$	Firm size measured as the log of the number of employees in $t-1$
$\text{wage}_{i\,t-1}$	Firm unit wage measured as the log of the average wage in $t-1$
$lp_{i\,t-1}$	Labour productivity measured as the log of real value added per worker in $t-1$
$\text{exp}_{i\,t-1}$	Exporter dummy equal to 1 if the firm exports own products in $t-1$ and 0 otherwise
$\text{imp}_{i\,t-1}$	Importer dummy equal to 1 if the firm imports in $t-1$ and 0 otherwise
$\text{foreign}_{i\,t-1}$	Foreign ownership dummy equal to 1 if the firm is foreign owned in $t-1$ and 0 otherwise. Information on foreign ownership is available in 2006 and 2007 only Then, we attribute to all years before 2006 (after 2007) the same ownership status of 2006 (2007).
$\text{nfirms}_{r\tilde{c}\;t-1}$	Log of the number of firms in the region r producing the firm core product $\tilde{c}$ at time $t-1$
$\text{share}_{ij\,t-1}$	Share of product j in total firm output in $t-1$
$\text{nfirms}_{rj\,t-1}$	Log of the number of firms in the region r adding product j at time t

(*Continue*).

Table B1. (*Continue*).

Trade policy measures	Description
$\Delta\tau^{m}_{\tilde{j}\,t}$	Change of import tariff on six-digit CPA product $\tilde{j}$ between t and $t-1$. We exploit the CPA/HS correspondence Table from Eurostat RAMON website, for any CPA product $\tilde{j}$: $\tau^{m}_{\tilde{j}} = \frac{\sum_{hs\in\tilde{j}} \text{imports}^{\text{TUR}}_{hs} \times \tau^{m}_{hs}}{\sum_{hs\in\tilde{j}} \text{imports}^{\text{TUR}}_{hs}}$. $\text{imports}^{\text{TUR}}_{hs}$ refers to import values of Turkey by HS code and $\tau^{m}_{\tilde{j}}$ represents the weighted average tariff across HS codes belonging to the same CPA code $\tilde{j}$
$\Delta\tau^{x}_{\tilde{j}\,t}$	Change of export tariff of 6 digit CPA product $\tilde{j}$ between t and $t-1$. Exploiting the CPA/HS correspondence Table from Eurostat RAMON website, for any CPA product $\tilde{j}$: $\tau^{x}_{\tilde{j}} = \frac{\sum_{hs\in\tilde{j}} \text{exports}^{\text{TUR}}_{hs} \times \tau^{x}_{hs}}{\sum_{hs\in\tilde{j}} \text{exports}^{\text{TUR}}_{hs}}$.
$\Delta\tau^{Mm}_{it}$	Change of firm i' s specific average import tariff between t and $t-1$. The average import tariff is a weighted tariff based on the weight in $t-1$ of the total Turkish imports of each good produced by firm i in the total Turkish imports of the set N_i of goods produced by the firm : $\tau^{Mm}_{i\,t} = \frac{\sum_{\tilde{j}\in N_i} \text{imports}^{\text{TUR}}_{\tilde{j}\,t-1} \times \tau^{m}_{\tilde{j}\,t}}{\sum_{\tilde{j}\in N_i} \text{imports}^{\text{TUR}}_{\tilde{j}\,t-1}}$.
$\Delta\tau^{Xx}_{it}$	Change of firm i's specific average export tariff between t and $t-1$. The average export tariff is a weighted tariff based on the weight in $t-1$ of the total Turkish exports of each good produced by firm i in the total Turkish exports of the set N_i goods produced by the firm i: $\tau^{Xx}_{i\,t} = \frac{\sum_{\tilde{j}\in N_i} \text{exports}^{\text{TUR}}_{\tilde{j}\,t-1} \times \tau^{x}_{\tilde{j}\,t}}{\sum_{\tilde{j}\in N_i} \text{exports}^{\text{TUR}}_{\tilde{j}\,t-1}}$.
$\Delta\tau^{m}_{\tilde{c}\,t}$	Change of import tariff between t and $t-1$ in the firm core six-digit CPA product $\tilde{c}$
$\Delta\tau^{x}_{\tilde{c}\,t}$	Change of export tariff between t and $t-1$ in the firm core six-digit CPA product $\tilde{c}$

Table B2. Firm product scope and relevance of multi-product firms.

	# of products		Share of firms		Share of output	
	2005	2009	2005	2009	2005	2009
All firms	1.65	1.67	100	100	100	100
Multi-product	4.0	3.9	42.34	43.93	73.36	68.39
Multiple CPA product	3.5	3.4	37.57	39.65	68.48	64.08
Multi-industry	2.7	2.7	29.13	30.40	47.77	44.42
Multi-sector	2.2	2.2	15.39	16.16	30.90	26.64

Source: Our elaborations on the sample obtained from the merge of AIPS, SBS, FTS databases. Multi-product, multiple CPA product, Multi-industry and Multi-sector firms refer to firms producing more than one 10-digit, 6-digit, 4-digit and 2-digit product, respectively.

Table B3. Diversification of production – number of products, N_{it}.

	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
lp_{it-1}	0.000	0.000	0.000	−0.002	0.000	−0.002	0.000	−0.002
	[0.002]	[0.002]	[0.002]	[0.002]	[0.002]	[0.002]	[0.002]	[0.002]
$size_{it-1}$	0.032***	0.031***	0.032***	0.031***	0.031***	0.031***	0.032***	0.031***
	[0.006]	[0.005]	[0.006]	[0.006]	[0.005]	[0.006]	[0.006]	[0.006]
exp_{it-1}	0.017***	0.017***	0.017***	0.017***	0.015***	0.016***	0.017***	0.016***
	[0.004]	[0.004]	[0.004]	[0.004]	[0.004]	[0.004]	[0.004]	[0.004]
imp_{it-1}	0.004	0.005	0.004	0.003	0.004	0.003	0.004	0.003
	[0.005]	[0.004]	[0.005]	[0.005]	[0.004]	[0.005]	[0.005]	[0.005]
$wage_{it-1}$	−0.012*	−0.010*	−0.012*	−0.007	−0.008	−0.007	−0.012*	−0.007
	[0.006]	[0.006]	[0.006]	[0.006]	[0.006]	[0.006]	[0.006]	[0.006]
$foreign_{it-1}$	−0.037	−0.036	−0.037	−0.035	−0.041	−0.036	−0.036	−0.035
	[0.029]	[0.029]	[0.029]	[0.030]	[0.030]	[0.030]	[0.029]	[0.030]
$nfirms_{r\tilde{c}\,t-1}$	0.011***	0.011***	0.011***	0.012***	0.010**	0.012***	0.011***	0.012***
	[0.004]	[0.004]	[0.004]	[0.004]	[0.004]	[0.004]	[0.004]	[0.004]
$\Delta\tau^{m}_{\tilde{c}\,t}$	0.03		0.028				0.027	
	[0.032]		[0.032]				[0.032]	
$\Delta\tau^{x}_{\tilde{c}\,t}$		‘0.061	0.08				0.143	
		[0.062]	[0.074]				[0.088]	
$\Delta\tau^{Mm}_{i\,t}$				0.079		0.093*		0.094*
				[0.053]		[0.052]		[0.051]

(*Continue*).

Table B3. (*Continue*).

	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
$\Delta\tau_{i\,t}^{Xx}$					0.135**	0.129*		0.130
					[0.063]	[0.069]		[0.080]
$\Delta\tau_{\tilde{c}\,t}^{x}$*exp$_{it-1}$							−0.175	
							[0.137]	
$\Delta\tau_{i\,t}^{Xx}$*exp$_{it-1}$								−0.009
								[0.145]
$\Delta\tau_{\text{Exporter}}^{x}$							−0.032	0.121
							[0.117]	[0.125]
Fixed effects								
Firm	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
4d sector	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	48,194	50,985	48,191	46,573	50,073	46,547	48,191	46,547
R-squared	0.035	0.034	0.035	0.037	0.035	0.037	0.035	0.037
Number of id	15,703	15,915	15,702	15,446	15,732	15,438	15,702	15,438

***$p < 0.01$, **$p < 0.05$, *$p < 0.1$. Robust standard errors in brackets are clustered by firm.
The dependent variable is the entropy index of firm-product diversification.
$\Delta\tau_{\tilde{c}\,t}^{m}$ ($\Delta\tau_{\tilde{c}\,t}^{x}$) is the change in import (export) tariffs on the firm main product between *t* and *t-1*.
$\Delta\tau_{i\,t}^{Mm}$ ($\Delta\tau_{i\,t}^{Xx}$) is the change in firm average weighted import (export) tariffs, where each HS product produced by the firm is weighted by its share in Turkish total imports (exports).
$\Delta\tau_{\text{Exporter}}^{x}$ denotes the coefficient, with the corresponding standard error, associated to the export tariffs for exporting firms which is estimated as $\Delta\tau_{\tilde{c}\,t}^{x}+\Delta\tau_{\tilde{c}\,t}^{x}$*exp$_{it-1}$ ($\Delta\tau_{i\,t}^{Xx}+\Delta\tau_{i\,t}^{Xx}$*exp$_{it-1}$).
Fixed effects included in the analysis are reported at the bottom of the table.