

Trade liberalization and market competition: Evidence from Egypt firm-level data

Aya Ahmed¹

Chahir Zaki²

Preliminary and Incomplete Draft

September 2015

Abstract

This paper contributes to the literature in two ways. First, using Egyptian firm level data, it attempts to examine how export market concentration is affected by trade. Indeed, the number of firms should decrease after trade openness as the least productive firms exit from the markets as they could not afford the fixed cost of exporting. Hence, the market should be concentrated around the most productive firms (self-selection effect). Yet, if the number of destinations (extensive margin) served by the surviving firms' increases across time this may reflect a "learning by export" effect rather than a self-selection one. Second, we try to analyze how firms adjust their product scope following periods of trade openness. Using firm level data, we found that the market size exerts a positive and significant impact on the concentration index showing that tougher competition in an export market induces a firm to skew its export sales towards its best performing products.

JEL classification: F10, F12, F15.

Keywords: Trade, Competition, Firm-level data, Egypt.

¹ Aya Ahmed, PhD Student, Paris School of Economics, France. Email: aya.ahmed@psemail.eu

² Assistant Professor, Faculty of Economics and Political Science, Cairo University, Egypt; E-mail: chahir.zaki@fepe.edu.eg

1. Introduction

According to traditional trade theory, trade liberalization enhances the competition in the market as it increases the quality and the quantity of the products available to domestic buyers. This assumption could be true if markets are perfectly competitive. Nevertheless, in the new trade theory, since markets are imperfectly competitive, it has been seen that the decline in trade tariffs does not lead to a decrease in the level of price in many countries³. This is why many authors were interested in assessing the competitive effect of trade liberalization in both the domestic and the export market. Indeed, Melitz and Ottaviano (2008) showed in their model of monopolistic competition with heterogeneous firms and endogenous markups that free trade has leads to higher productivity, lower markups and greater products variety. Furthermore, in their model of multi-product firms, Eckel and Neary (2010) showed that increasing competition following trade openness leads to an increase in productivity but may lead to a negative effect as the number of varieties decline when firms concentrate on their core-competence. Finally, Mayer, Melitz and Ottaviano (2014) built a similar model to the previous one but with monopolistic competition rather than the oligopolistic one and, hence they do not account for the cannibalization effect. Their model suggests that trade openness reflected in more market competition encourages the firms to drop their least effective products and skew their production towards their "core competence".

At the empirical level, Altomonte and Baratieri (2014) estimated the impact of import penetration on the price markup for Italian firms in the manufacturing sector and found clear evidence for pro-competitive effect of trade at the aggregate level. However, when they do the same analysis for a more detailed industry level, they found that increasing import penetration could lead to higher price-cost margin reflecting a possible anti-competitive effect of trade openness. Moreover, Altomonte and Ogliari (2010) studied the same relationship for single vs. multi-product firms and found a pro-competitive effect in the long run for Italian firms between 2000 and 2007. Chen et al. (2009) investigated the impact of trade openness for the EU manufacturing sector and they found that in the short run, domestic market openness leads to pro-competitive effects through the decrease in price level, profit margin and an increase in the productivity. Yet, foreign openness leads to the opposite effects.

Thus, this paper contributes to the literature in two ways. First, using Egyptian firm level data, it attempts to examine how export market concentration is affected by trade (at both the intensive and extensive margins levels). Following the literature in this area, the number of firms should decrease after trade openness as the least productive firms exit from the markets as they could not afford the fixed cost of exporting. Hence, the market should be concentrated around the most productive firms (self-selection effect). Yet, if the number of destinations (extensive margin)

³ There are many models that study the possibility of collusion in a context of trade openness and found that cartel are more stable for more details see: Brander and Krugman (1983), Pinto (1986), Ashournia *et al.*, (2011) and Bond and Syropoulos (2008).

served by the surviving firms' increases across time this may reflect a "learning by export" effect rather than a self-selection one. Second, we try to analyze how firms adjust their product scope following periods of trade openness. Using firm level data, we found that the market size exerts a positive and significant impact on the concentration index showing that tougher competition in an export market induces a firm to skew its export sales towards its best performing products.

The paper is organized as follows. Section 2 reviews the literature on trade and competition. Section 3 presents some stylized facts. Section 4 shows the methodology and the data used. Section 5 displays the empirical results and section 6 concludes.

2. Literature Review

Several studies assessed the competitive effect of trade liberalization in both the domestic and the export markets using firm-level data. First, Altomonte and Baratieri (2014) estimate the impact of import penetration on the price markup for Italian firms in the manufacturing sector, they found clear evidence for pro-competitive effect of trade on the aggregate level. However, when they do the same analysis for a more detailed industry level, they found that increasing import penetration could lead to higher price-cost margin which reflects a possible anti-competitive effect of trade openness. This might be explained by the industry's product mix. After trade liberalization, industries may switch their product mix towards low elasticity goods which leads to higher mark-ups for firms in this industry. However, industries with more concentrated product mix are more competitive. As well, Altomonte and Ogliari (2010) studied the same relationship for single vs. multi-product firms, they found a pro-competitive effect in the long run for increasing import penetration for Italian firms between 2000 and 2007. This effect is lower for multi-product firms. However, in the short run the relationship is not significant. This result reveals that in the long run firms adjust their product scope following periods of liberalization.

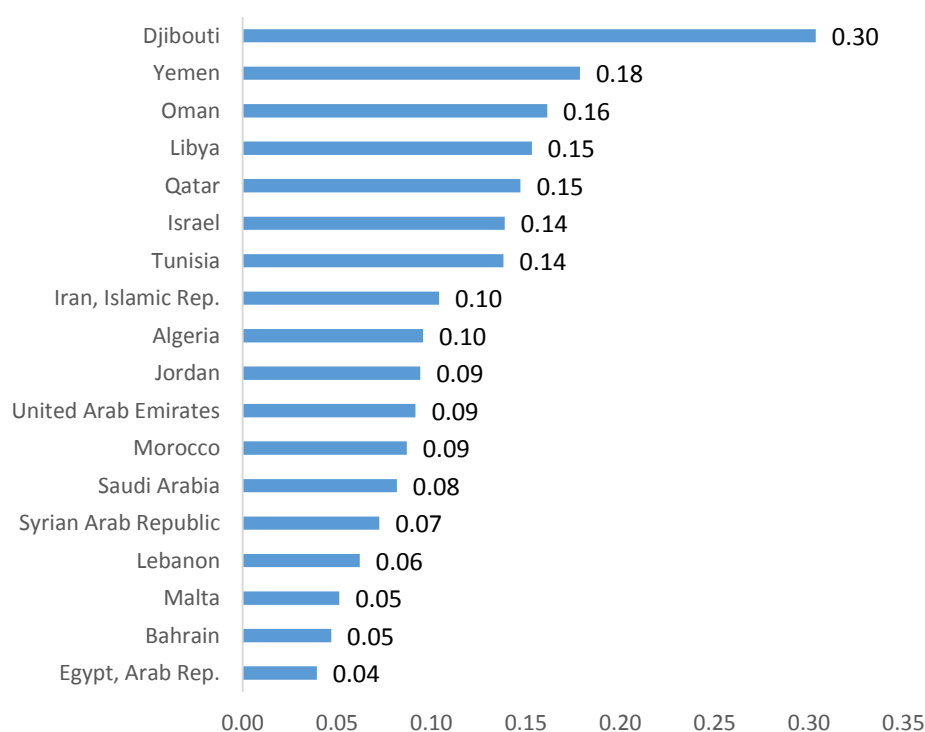
Melitz and Ottaviano (2008) showed in their model of monopolistic competition with heterogeneous firms and endogenous markups that free trade leads to higher productivity, lower markups and greater products variety. Their model combines all possible sources of welfare gain following trade in the same set-up. Chen et al. (2009) investigated the impact of trade openness for the EU manufacturing sector and they found that in the short run, domestic market openness leads to pro-competitive effects through the decrease in price level, profit margin and an increase in the productivity, however, foreign openness leads to the opposite impacts. Also, in the long run trade leads to more anti-competitive effect as the firms could react to increased competition through producing in more closed markets and sell to their domestic market through exports as it is less costly due to low trade costs. In their model of multi-product firms, Eckel and Neary (2010) showed that increasing competition following trade leads to an increase in the productivity but may lead to a negative effect as the varieties available decline when firms concentrate on their core-competence.

Mayer, Melitz and Ottaviano (2014) built a similar model to the previous one but with monopolistic competition rather than the oligopolistic one and, hence they do not account for the cannibalization effect. Their model suggests that trade openness reflected in more market competition encourages the firms to drop their least effective products and skew their production towards their "core competence". This model has a higher impact on total productivity than in the case of single product firms due to two main channels: the firms cancel the products far from core competence (selection effect) and better allocation of resources as the production is now concentrated on the more efficient products.

3. Stylized Facts

Since most of the MENA countries are oil dependent, diversification of exports has become an economic policy priority in the MENA countries since the 1990s. This diversification holds both at the exported products level and the number of destination. Figure 1 shows that MENA countries are quite different ranging from countries with concentrated markets⁴ such as Djibouti and Yemen to less concentrated ones such as Egypt, Bahrain and Malta.

Figure 1: HH Market concentration index



Source: WITS dataset.

⁴ HHI is a measure of dispersion of trade value across an exporter partners. A country with trade (exports and imports) concentrated in a very few markets will have an index value close to 1. Similarly, a country with perfectly diversified trade portfolio will have an index close to zero.

At the product level, Table 1 presents the share of top four exported products in total commodity exports which is an indicator of concentration of exports on certain products. In oil and natural gas rich countries like Algeria, Kuwait, Oman and Saudi Arabia, only four products constitute about 90% of total exports. Countries like Egypt, Jordan and Tunisia are more diversified since they experienced a decrease by 29.7, 25 and 18 percent respectively in this share between 1991 and 2009.

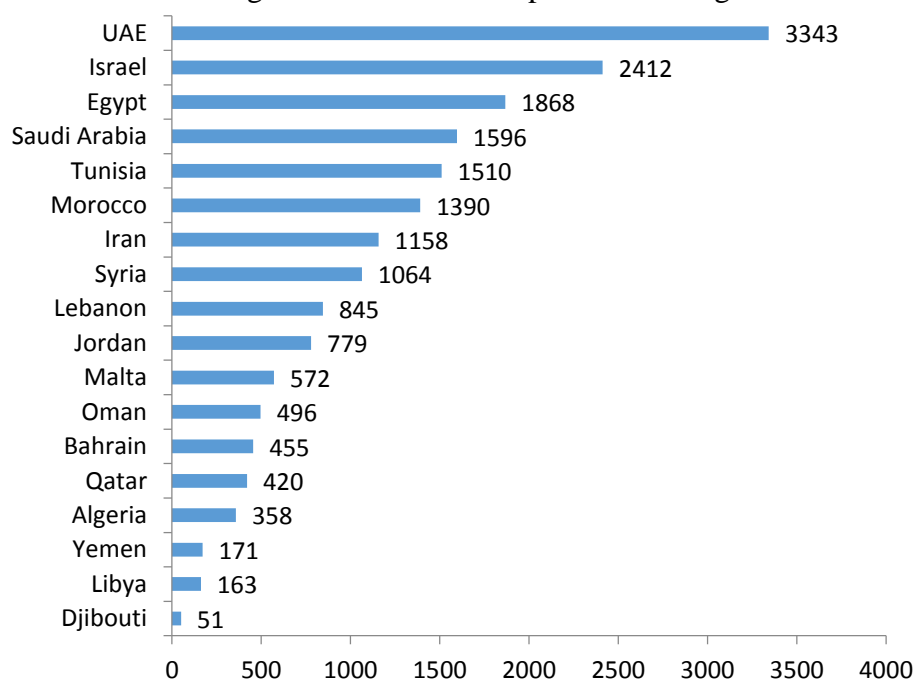
Table 1: Share of Top Four Products in Selected MENA countries

	Algeria	Egypt	Jordan	Kuwait	Morocco	Oman	Saudi Arabia	Tunisia
1991	97.15	62.43	50.37	90.65	34.27	91.4	93.95	41.66
1995	94.42	50.38	47.08	96.51	36.67	85.87	90.7	45.88
2000	97.21	52.02	27.35	96.57	36.69	87.44	93.82	45.88
2005	98.03	60.48	31.91	.	30.49	90.29	91	38.83
2008	97.56	43.88	40.73	95.58	40.5	86.57	91.48	36.61
2009	97.62	.	37.7	.	30.78	81.1	88.66	34.13
Change	0.48%	-29.71%	-25.15%	5.44%	-10.18%	-11.27%	-5.63%	-18.07%

Source: Dogruel and Tekce (2011)

The same fact is also confirmed by Figure 2 that presents the number of exported HS6 product. Even though UAE and Saudi Arabia are ranked among the first countries, most of the products are oil products. Countries like Egypt and Tunisia are more diversified with 1868 and 1596 products respectively.

Figure 2: Number of Exported HS6 Digit Products



Source: WITS dataset.

Having a closer look at the Egyptian case, we can notice that most of the firms are multiproduct, remain in the market for more than a year but export to one destination. Indeed, we use trade data from the General Organization for Export and Import Control (GOEIC), the Ministry of Industry and Foreign Trade in Egypt from 2006 to 2010 to examine this. This dataset has four dimensions: exporting firm, year, destination and product (at the HS4 level) for two variables which are value and quantity of exports. However, one drawback of this data is that we cannot explore the link between export behavior and firms' performance measures.

From table 2, we can see that, overall the sample, 30% of the Egyptian firms produce only one product. This ratio is almost constant over years.

Table 2: Multiproduct vs. Single product firms overall the sample

Year	Multiproduct		Single product		Total	
	Number	Ratio	Number	Ratio	Number	Total
2006	2616	66.9	1296	33.1	3912	100
2007	1993	68.5	915	31.5	2908	100
2008	1966	73.6	707	26.4	2673	100
2009	1858	72.2	717	27.8	2575	100
2010	2012	69.8	871	30.2	2883	100
Total	10445	69.9	4506	30.1	14951	100

Source: Constructed by the authors using the customs data.

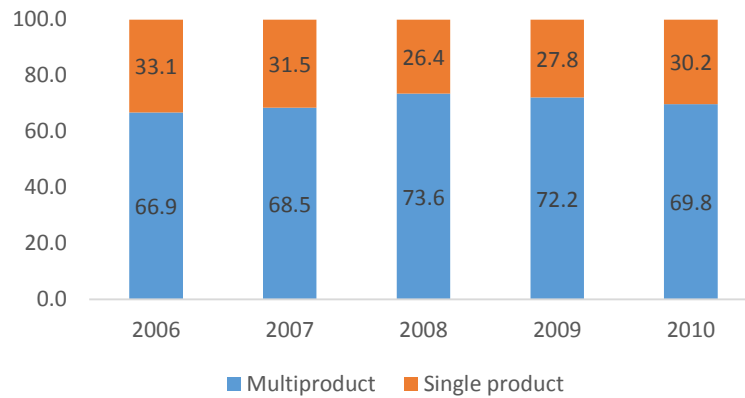
It is clear from Table 3 that the ratio of single product firms increases slightly to reach around 37%. Moreover, year 2007 is characterized by least ratio of multiproduct firms with around 61% of the firms have more than one product. Yet, in 2008 around 64% of the firms are multiproduct. This ratio increases to near 74% if we look at the firms censored during the 4 years.

Table 3: Multiproduct vs. Single product firms (by year) separately

Year	Multiproduct		Single product		Total	
	Number	Ratio	Number	Ratio	Number	Total
2006	5290	62.1	3231	37.9	8521	100
2007	5236	61.3	3308	38.7	8544	100
2008	5293	63.6	3032	36.4	8325	100
2009	5112	62.3	3088	37.7	8200	100
2010	5032	61.9	3102	38.1	8134	100

Source: Constructed by the authors using the customs data.

Figure 3: Multiproduct vs. Single product firms



Source: Constructed by the authors using the customs data.

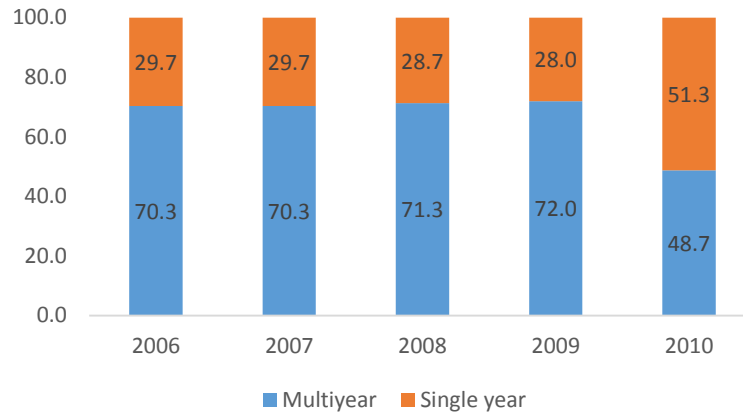
Moreover, on average 68% of the Egyptian firms export for more than one year. This reflects that one third of the firms export for in only one year. This reflects the sustainability of the export status of the firms in the database. From table 4, when we look at each year separately, it is shown that between 2006 and 2009 almost 70% of the firms are multiyear firms that export for more than one year. Nevertheless, 50% of the firms censored in 2010 are single year firms.

Table 4: Multiyear vs. Single year firms

Year	Multiyear		Single year		Total	
	Number	Ratio	Number	Ratio	Number	Ratio
2006	3763	70.3	1588	29.7	5351	100
2007	2044	70.3	862	29.7	2906	100
2008	1656	71.3	668	28.7	2324	100
2009	1632	72.0	635	28.0	2267	100
2010	1025	48.7	1078	51.3	2103	100
Total	10120	67.7	4831	32.3	14951	100

Source: Constructed by the authors using the customs data.

Figure 4: Multiyear vs. Single year firms



Source: Constructed by the authors using the customs data.

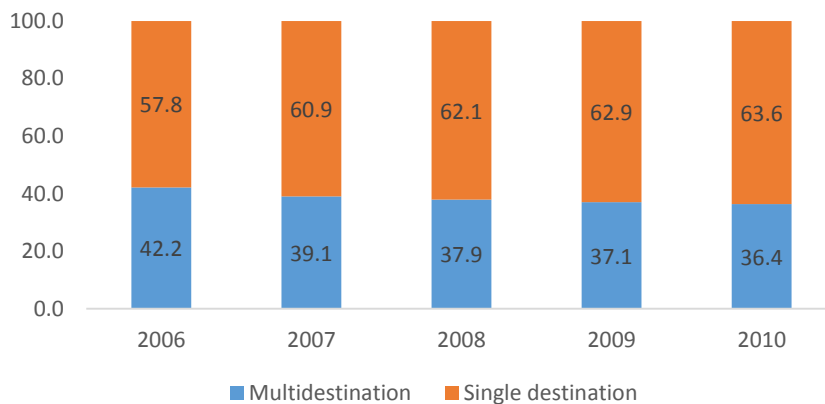
When we look at the destination dimension, in 2006 only 42% of the firms export to more than one country. This percentage decreases over the years and reaches 36.4% in 2010. From Table 5, we find that the majority of the Egyptian firms (almost 62%) export to only one destination.

Table 5: Multi-destination vs. Single destination firms

Year	Multi-destination		Single destination		Total	
	Number	Ratio	Number	Ratio	Number	Ratio
2006	3596	42.2	4925	57.8	8521	100
2007	3337	39.1	5207	60.9	8544	100
2008	3159	37.9	5166	62.1	8325	100
2009	3041	37.1	5159	62.9	8200	100
2010	2958	36.4	5176	63.6	8134	100

Source: Constructed by the authors using the customs data.

Figure 5: Multi-destination vs. Single destination firms



Source: Constructed by the authors using the customs data.

From the above, on average, Egyptian exporters are multiproduct firms, they continue to export for more than one year. Yet, many of the forms export to one destination country.

4. Model Specification

In order to examine the nexus between trade and competition, we construct a Herfindahl-Hirschman index (HHI_{kjt}) to account for the diversification/concentration in the destination market for each product and then regressing this index on several variables measuring the market characteristics at the destination. We also include bilateral trade barriers between Egypt and the destination country as follows:

$$\begin{aligned} \ln HHI_{kjt} = & \alpha_0 + \alpha_1 \ln GDP_{jt} + \alpha_2 \ln dist_{jt} + \alpha_3 \ln imp_{jt} \\ & + \alpha_4 commonlang_j + \alpha_5 PTA_{jt} + \alpha_6 \ln tariff_{jkt} + \alpha_7 INS_{jt} + \varepsilon_{kjt} \end{aligned} \quad (1)$$

where GDP_j is the Gross Domestic Product at the destination, $dist_{ij}$ is distance between Egypt and country j , imp_{jt} measures imports penetration in country j , $commonlang_j$ dummy Egypt shares a common language with country j , PTA_j a dummy for trade agreement between Egypt and country j , $tariff_{jkt}$ bilateral tariff between Egypt and country j in year t for product k and INS_j the quality of institutions at the destination j . Indeed, Araujo et al. (2011) showed that institutions play an important role on the probability of remaining exporters for many years to the same destination. Finally, we also include a dummy whether the firm is single or multi-product.

Second, in order to see how a firm responds to greater competition through variation in its product mix, we use the same methodology as in Melitz et al. (2014) and test how the export sales for firms vary across destinations (the intensive margin). We may limit our analysis to the multi-products firms⁵, and rank the different products of the firms according to their sales to analyze the firm's product scope. Moreover, we would take the extensive margin⁶ of new destinations into account. Therefore, the dependent variable will be a variable that accounts for the concentration of the firms' products where we will construct a within firm *herfindahl* index. It is worthy to note that while the HHI in the previous part was an indicator for the export market concentration per product k per destination j , this one measures the concentration within the same firm i . The latter will be regressed on the same set of independent variables mentioned in equation (1) as follows:

$$\begin{aligned} \ln HHI_{ikjt} = & \alpha_0 + \alpha_1 \ln GDP_{jt} + \alpha_2 \ln dist_{jt} + \alpha_3 \ln imp_{jt} \\ & + \alpha_4 commonlang_j + \alpha_5 PTA_{jt} + \alpha_6 \ln tariff_{kjt} + \alpha_7 INS_{jt} + \varepsilon_{jt} \end{aligned} \quad (2)$$

⁵ Due to the level of aggregation of the products HS-4, we should be careful in interpreting the results as a single product firm might be in reality multi-product one.

⁶ Melitz et al. (2014) were mainly interested in the intensive margin, but we would like to include the extensive one as there are many single products in our database, so the extensive margin of new markets served would reflect whether this product is the best performing one or not.

Obviously, in the case of a single product firm, the HHI will take the value of 100%. For the multiproduct firms the dependent variable will be the index for its core competency which is the product having the highest index value. For robustness check, we construct a ratio for the firm's export sales for its best performing product relative to its second best⁷, this ratio will be our dependent variable.

Trade data comes from the General Organization for Export and Import Control (GOEIC), the Ministry of Industry and Foreign Trade in Egypt from 2006 to 2010. This dataset has four dimensions: exporting firm, year, destination and product (at the HS4 level) for two variables which are value and quantity of exports. Other variables come from the Doing Business dataset, the World Development Indicators and the CEPII gravity dataset.

5. Empirical Results

Our results are shown in Tables 6 and 7. First of all, regarding the effect on HHI index per destination (Table 6), we found that the coefficient on country size (measured by the destination GDP) is positive and significant. Clearly, a greater market make firms re-allocate their exports from smaller destinations to larger ones. We also found that imports exert a negative effect on the concentration index pointing out the fact that more imports lead to a tougher competition and consequently lower concentration. Yet, once we control for institutions measured by time to enforce contracts, both of these variables become insignificant.

As per Table 7, it is obvious that the positive impact of GDP on the HHI product mix is significant in different specification showing that an increase in destination GDP would induce firms to increase their exports of their best product leading to a higher concentration index per destination. Second, more openness (measured by imports, merchandise trade or manufactured goods) implies a higher concentration. This is in line with the fact that tougher competition in an export market induces a firm to skew its export sales towards its best performing products. We find very strong confirmation of this competitive effect for Egyptian firms since all trade openness variables are positive and significant. Finally, it is worthy to mention that worse institutions (measured by the number of days to enforce contracts) increase the likelihood of product mix concentration.

⁷ We may also use this for robustness check if the observations are not sufficient

Table 6: Empirical Results for HHI using Fixed Effects

	HHI	HHI	HHI	HHI	HHI	HHI
Ln(GDP)		0.0671*** (0.0191)	0.0344 (0.0239)	0.0136 (0.0202)	0.0269 (0.0218)	0.0269 (0.0218)
Ln(Time Enfo)			0.0264 (0.0644)	0.0211 (0.0689)	0.0102 (0.0554)	0.0102 (0.0554)
Ln(Imp)	-0.00829 (0.00940)	-0.0349*** (0.0121)	-0.00987 (0.0140)			
Ln(Tar)				-0.00114 (0.0183)		
Ln(Merch Exp)					-0.00364 (0.00856)	
Ln(Manuf)						-0.00364 (0.00856)
Constant	0.464* (0.238)	-0.625 (0.391)	-0.551 (0.602)	-0.228 (0.678)	-0.398 (0.567)	-0.415 (0.580)
Observations	169725	169725	95751	102277	128451	128451
R-squared	0.000	0.000	0.000	0.000	0.000	0.000
Nbre of id	43163	43163	24762	26229	31688	31688

Table 7: Empirical Results for HHI product mix using Fixed Effects

	HHI product mix	HHI product mix	HHI product mix	HHI product mix	HHI product mix	HHI product mix
Ln(GDP)		0.128*** (0.0190)	0.143*** (0.0239)	0.202*** (0.0195)	0.136*** (0.0212)	0.136*** (0.0212)
Ln(Time Enfo)			0.101 (0.0646)	0.0873 (0.0664)	0.0999* (0.0538)	0.0999* (0.0538)
Ln(Imp)	0.0577*** (0.00937)	0.00688 (0.0120)	0.0406*** (0.0140)			
Ln(Tar)				-0.000506 (0.0176)		
Ln(Merch Exp)					0.0396*** (0.00830)	
Ln(Manuf)						0.0396*** (0.00830)
Constant	-1.045*** (0.237)	-3.121*** (0.390)	-4.836*** (0.604)	-5.239*** (0.653)	-4.600*** (0.550)	-4.418*** (0.562)
Observations	169725	169725	95751	102277	128451	128451
R-squared	0.000	0.001	0.002	0.002	0.002	0.002
Number of id	43163	43163	24762	26229	31688	31688

Source: Constructed by the authors

Note: Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Those results show that concentration by product and destination is more affected than the concentration index by destination by the country size, by trade openness and by institutions. Those findings are in line with those of Melitz et al (2011).

Following Melitz et al (2011), in order to show that our results are not driven by quality differences between the products shipped to developed and developing countries, we restrict our sample of country destinations to those above the median country income (column 1), below the median (column 2) and the lowest 25 percent markets as shown in Table 8. Country size remains positive and significant for both regressions.

Table 8: Empirical Results for HHI product mix per market size

	HHI product mix Greater than median markets	HHI product mix Lower than median markets	HHI product mix Lower 25% markets
Ln(GDP)	0.0929* (0.0549)	0.176*** (0.0277)	0.262*** (0.0358)
Ln(Time Enfo)	0.192 (0.141)	0.0755 (0.0732)	0.185** (0.0899)
Ln(Imp)	0.0556* (0.0325)	0.0170 (0.0182)	-0.0477* (0.0252)
Constant	-4.778*** (1.262)	-4.710*** (0.700)	-5.840*** (0.830)
Observations	40015	55851	35253
R-squared	0.001	0.002	0.003
Number of id	8898	17016	10580

Source: Constructed by the authors

Note: Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

6. Conclusion and Policy Implications

In this paper, we tried to assess how tougher competition induced by market size and decline in trade costs affects Egyptian firms' product mix. Using firm level data for the Egyptian exporters, we found clear evidence that more competition encourages the firms to skew their product mix towards their best performing products. Egyptian exporters concentrate more their exports towards their core product in destinations with higher market size and where there is more competition from firms around the world (higher value of imports, merchandise trade or manufactured goods).

Moreover, we found that the concentration index per destination market is positively correlated with the market size, reflecting that firms re-allocate their exports from smaller destinations to larger ones.

References

- [1] Altomonte, C., and Barattieri, A. (2014). Endogenous Markups, International Trade, and the Product Mix. *Journal of Industry, Competition and Trade*, 1-17.
- [2] Altomonte, C., and Ogliari, L. (2010). International trade and the competition dynamics of multi-product firms. *MICRO-DYN Working Paper*, 7(11).
- [3] Araujo, L., Mion, G., and Ornelas, E. (2014). Institutions and Export Dynamics.
- [4] Bernard, A. B., Jensen, J. B., and Lawrence, R. Z. (1995). Exporters, jobs, and wages in US manufacturing: 1976–1987. *Brookings Papers on Economic Activity. Microeconomics*, 67-119.
- [5] Bernard, A. B., Jensen, J. B., Redding, S. J., and Schott, P. K. (2012). The Empirics of Firm Heterogeneity and International Trade. *Annu. Rev. Econ*, 4, 283–313.
- [6] Cadot, O., Iacovone, L., Pierola, M. D., and Rauch, F. (2013). Success and failure of African exporters. *Journal of Development Economics*, 101, 284–296.
- [7] Chen, N., Imbs, J., and Scott, A. (2009). The dynamics of trade and competition. *Journal of International Economics*, 77(1), 50-62.
- [8] Dogruel, S., & Tekce, M. (2011). Trade liberalization and export diversification in selected MENA countries. *Topics in Middle Eastern and African Economies*, 13.
- [9] Eckel, C., and Neary, J. P. (2010). Multi-product firms and flexible manufacturing in the global economy. *The Review of Economic Studies*, 77(1), 188-217.
- [10] Mayer, T., Melitz, M. J., and Ottaviano, G. I. (2014). Market Size, Competition, and the Product Mix of Exporters. *The American Economic Review*, 104(2), 495–536.
- [11] Melitz, M. J. (2003). The impact of trade on intra-industry reallocations and aggregate industry productivity. *Econometrica*, 71(6), 1695-1725.
- [12] Mayer, T., and Ottaviano, G. I. (2008). The happy few: The internationalization of european firms. *Intereconomics*, 43(3), 135–148.
- [13] Melitz, M. J., and Ottaviano, G. I. (2008). Market size, trade, and productivity. *The review of economic studies*, 75(1), 295–316.