STANDARDS HARMONIZATION AS EXPORT PROMOTION[1]

Marion DOVIS[2] Mélise JAUD[3]

June 2014

Abstract

This paper examines the effects of standards harmonization on domestics firms' export performance and dynamics in Morocco. We find that harmonization of domestic Moroccan standards on Northern countries regulations raises firms' export performance indirectly through changes in the level of competition on the domestic market and directly through quality signaling, with the latter effect being the strongest. Importantly, the signaling benefits of harmonization extend across a firm's export portfolio, suggesting that harmonization affects the managerial and production capacity of the firm. Our results uncover a "public-good" dimension of regulatory harmonization and contribute to the political acceptability of costly harmonization in developing countries.

JEL codes: F13, F14, F15

Keywords: Non-tariffs measures, export, harmonization, standards, firms.

[1] We are grateful to Moroccan customs department for sharing with us the customs data. Support from the World Bank MDTF is gratefully acknowledged. The views expressed here are those of the authors and do not represent the views of the World Bank, its executive Board or members countries. All remaining errors are ours.
[2] Aix-Marseille University, CNRS & EHESS; Email : marion.dovis@univ-amu.fr
[3] The World Bank; Email: mjaud@worldbank.org

1. Introduction

While tariffs have continuously declined as a result of multilateral and regional trade liberalization, addressing Non-tariff measures (NTMs) has become a prominent issue in the policy agendas of governments seeking to further integrate their trade into the world economy. Convergence with Northern countries regulation in the context of bilateral or regional agreements has increasingly been used by developing countries as a commitment mechanism to move ahead on often difficult and politically sensitive regulatory reforms. While financial and technical assistance may be provided to help with the convergence process, harmonizing on Northern countries terms implies a substantial loss of sovereignty for developing countries. Priority is often given to sectors that are sensitive ones in Northern markets while sectors more important for Southern countries exports are slow to adjust. One rationale for developing countries to agree on these terms is that harmonization ensures tangible benefits in terms of reduced quality uncertainty and improved market access. Is this really the case in practice? In this paper, using a unique dataset of Moroccan firm transaction data combined with data on product-specific harmonization of Morocco NTMs between 2002 and 2010, we provide direct evidence that harmonization on stricter Northern regulations may indeed serve as a policy instrument to promote domestic firms' exports.[4]

Conceptually, the effect of regulatory harmonization on firms' export performance is complex to analyze and involves several, and at times, competing effects. On the one hand harmonization on stricter regulations can enhance firms' exports directly by reducing artificial barriers to market access and information asymmetries between producers and consumers (Tirole, 1988). In addition, it could also help overcome management failures, by improving information on best practices and modern technology. On the other hand,

[4] Throughout in the document we use the term "Northern" standards. This is a generic term to cover harmonization with international or Northern partner such as the E.U or the USA.

harmonized standards affect domestic firms' export behavior indirectly through changes in the domestic market structure (Augier, Cadot and Dovis, 2014). Harmonization raises the cost of selling domestically, as regulatory compliance costs now apply to domestic-sales as they do to exports to harmonized destinations. This in turn has two opposite effects on the terms of domestic competition. First, it is now relatively more expensive for non-compliant foreign producers (from developing countries) to penetrate the Morocco market. This reduces competition through trade diversion. Second, it is now also relatively more profitable for compliant foreign producers (from high income countries) to service the domestic market. This increases the competition through trade creation.

In this paper, using Morocco as a case study, we set up to isolate two channels through which harmonization may affect firms export performance: (i) the domestic-market competition channel and (ii) the quality signaling channel. The focus on Morocco is dictated by the availability of domestic regulation harmonization data and the fact that over the period covered by our transactions data the country has pursued a vigorous effort to modernize and harmonize its NTM regulations. Our identification strategy exploits the fact that Morocco NTM harmonization proceeded in waves whose timing varied across products. The panel structure of our customs data allows us to track the differential effect of harmonization on firms export performance across product-years while controlling for a host of confounding factors with firm-product, and destination-time effects.

We find that harmonization of domestic Moroccan standards on Northern countries regulations raises export performance of firms indirectly through changes in the level of competition on the domestic market and directly through quality signaling, with the latter effect being the strongest. First, we find suggestive evidence that in sectors with high import penetration by developing countries, harmonization has an anti-competitive effect, forcing firms out of the export market. By contrast, in sectors with high import penetration from high

income OECD countries, harmonization strongly raises firms' exporting probability for harmonized products, consistent with the pro-competitive effect. On net, the data suggest that the pro-competitive effect dominates.

Second, we find strong supporting evidence for a quality signaling effect, whereby regulatory harmonization promotes Moroccan firms competitiveness by reducing informational barriers. We find a positive effect of harmonization on firms' ability to expand their export volumes; exports grew 16 per cent faster for products that underwent harmonization than for other. In addition, firms are more likely to introduce new products when regulation for that given product is harmonized. These positive effects are driven by exports to harmonized destinations where standard compliance conferred firms with a credibility premium.

Finally, the evidence also suggests that the signaling benefits of harmonization extend across a firm's export portfolio. We find that firms are more likely to add products within the same HS2 or HS4 heading of products previously harmonized. These results suggest that harmonization affects the managerial and production capacity of the firm, facilitating expansion of exports beyond the product concerned.

Our results relate to a small but growing empirical literature on the link between standard harmonization and trade. Most papers have examined the effect of standard harmonization at the aggregate level and the evidence suggest that if anything it is the lack of harmonization of standards and technical regulations, that is detrimental to trade (Otsuki, Wilson and Sewadeh, 2001; Gebrehiwet, Ngqangweni and Kirsten, 2007; Fontagné et al., 2005). In the case of China harmonization of domestic food standards on international ones had a positive and significant impact on exports (Mangelsdorf, Portugal-Perez and Wilson, 2012). On the effect of harmonization on domestic market structure, Chen and Mattoo (2004) show that harmonization on regional standards improves market access for out-of-bloc exporters from industrial countries, while reducing it if they were from developing countries. Disdier et al.,

(2012) also show that harmonization of developing countries on developed countries standards as part of regional agreements reinforce hub-and-spoke trade structures at the expense of South-South trade as harmonization raise the cost of domestic producers pricing them out of non-harmonized markets where compliance with the new standard does not confer any competitive advantage.

At the firm-level there is limited evidence of the effect of standard harmonization on firms performance (see Chen, Otsuki and Wilson, 2006; Konings and Vandenbussche, 2005; Chen et al., 2008). Reyes (2012) examined the impact of E.U. harmonization of electronic standards on domestic US firms exports. While harmonization had a positive impact on US firms' ability to enter the EU market, the increase in competition on the destination resulted in a crowding out of developing countries' producers, confirming at the firm-level the trade-diversion effect of harmonization found by Chen and Mattoo (2004). Our paper is closest to the recent paper by Augier, Cadot and Dovis (2014). Combining data on domestic NTM harmonization with data from the industrial census for the period 1985-2004 in Morocco, they explore the effect of harmonization on two key firm-level performance measures, profits and productivity. Their results suggest that the profitability of Moroccan firms (measured by the ratio of operating profits to output) rises when NTM harmonization has trade-diversion effects. That is, in sectors with high import penetration by developing countries, harmonization strongly raises profitability, consistent with the "shutting-the-door" effect discussed earlier. While in sectors with high import penetration from OECD countries, harmonization raises profitability by less or even reduces it.

Our work extends the existing literature in three important ways. First, unlike previous work, an exception being Augier et al (2014), our focus is on domestic rather than third party (e.g. the E.U.) standard harmonization. This allows us to examine not only how changes in the level of competition in the destination markets affect firms' exports, but more importantly

how changes in the domestic-market structure matters for firms trade performance. This latter channel has received little attention so far in the literature mostly because of a lack of data on domestic harmonization. Second, while Augier et al., (2014) also consider domestic standards harmonization, they rely on industrial census data and are unable to examine how these affects firms performance on the export market. Our paper extends their work in this regard. Finally, the very fine level of disaggregation of the customs data, firm-product-destination-year level, allows us to estimate the effect of product-specific standard harmonization across destination including firm-product and destination-year specific effects and isolate the effect of quality signaling on firms export performance.

The next section discusses the expected effects of NTM harmonization on firms export performance. Section 3 presents the data set and the empirical strategy. Section 4 presents the main results and section 5 performs robustness checks. Finally, the last section concludes.

2. NTM harmonization and firms export performance

Conceptually, NTM harmonization impact on firms' export performance is complex. In this section we detail three important effects which we test empirically using NTM harmonization data combined with firm level customs data for Morocco.

2.1. Market access

In a heterogeneous firm model the effect of NTM harmonization rest on the evolution of domestics versus international trade cost (see Augier et al., 2014 for a formalization of the intuition using a heterogeneous-firm model). First, NTM harmonization affect Moroccan firms export behavior directly through a reduction of the relative cost of exporting. Harmonization on stricter Northern standards extends the cost of compliance to domestic-market sales, whereby firms selling domestically must now incur the same regulatory

compliance costs as when they export to a harmonized destination. The variable cost of selling domestically goes up as only complying high-quality products can be sold after harmonization. In contrast, the cost of exporting to a harmonized destination is unchanged, as with or without harmonization exporting to a harmonized market means complying with the standard. Thus, while the absolute costs of exporting from Morocco to a harmonized market do not change, the relative costs shrink. For Moroccan firms that did not already meet the standard before harmonization—purely domestic sellers or exporters to non-harmonized destinations—the variable domestic costs rise. In addition, harmonization involves sunk and fixed costs associated with adapting production lines to the new regulations.[5] The higher fixed costs will induce exit of least productive firms from the domestic market. Conditional on survival, it is now relatively cheaper to export to a harmonized destination.

Thus, one would expect a positive effect of harmonization waves on exporter expansion at the extensive margin whereby new or existing firms' starts exporting newly harmonized products. The effect at the intensive margin is more ambiguous. On the one hand, the reduction in relative variable trade cost would increase firms' exports sales. On the other hand, new entrants increase the competition in the destination market which may drive down firms' prices and sales. We expect these effects to be stronger for export flows to harmonized destination markets, where standard compliance conferred firms with a competitive advantage.

2.2. Domestic market structure

Second, NTM harmonization affect firms export behavior indirectly through changes in the level of competition on the domestic market. On the one hand, the stricter standard now in force raises the cost of accessing the Moroccan market for foreign producers form developing

[5] Firms that were already exporting to a harmonized market are not affected directly, as they already had to comply with the standards.

non-harmonized countries—producers that previously exported to Morocco and non-harmonized destination markets. This reduces competition on the domestic market through trade-diversion. On the other hand, firms that already met the standards—both domestic and foreign producers previously exporting to harmonized markets—are no longer at a competitive disadvantage when selling on the domestic market. Complying domestic exporters can now spread the fixed cost over exports and domestic sales; while foreign producers form Northern harmonized countries can now sell high-end products in Morocco without the competition of low-end, non-compliers. This raises competition on the domestic market through trade-creation.

The anti-competitive effect would induce firms to enter the domestic market pushing down productivity and forcing firms to exit the export market. At the intensive margin, existing compliant Moroccan exporters may redeploy themselves to the domestic market; with a nonzero elasticity of transformation, this would reduce their export sales of harmonized products to harmonized markets. However, in the presence of economies of scale, their unit costs would be reduced and their export sales could rise. The pro-competitive effect would have the opposite effect. The net effect on the probability of firms to start exporting a product or the volume of exports will depend on which effect dominates. This is likely to vary across products, with the former dominating for products initially attractive to Northern producers and the latter for products initially attractive to Southern producers.

2.3. Quality signaling

In addition to these mechanical effects, NTM harmonization can positively impact existing and potential exporters through the reduction of informational market failures. In presence of asymmetries of information and consumers with bounded rationality, firms in developing countries may face difficulties in credibly signaling their quality. Buyers in developed

countries tend to infer the quality of sellers partly from the reputation of the country where these sellers are located (Hudson and Jones, 2003; Maheswaran 1994; Han, 1989). Research shows that buyers associate production of quality goods with countries higher quality of institution, better educated labor force, and ultimately higher per capita income (Verlegh and Steenkamp, 1999; Linder, 1961). Thus, firms in developing countries may have difficulties in entering foreign market for products for which quality maters and persuade buyers that their products are of similar quality as those from higher income countries. Standards harmonization by improving the signaling of product quality reduces the transaction costs of buyers' evaluation (Holler and Thisse, 1996). Suppose that a Moroccan producer of food containers privately adopts the stringent E.U. standards and tries to penetrate the E.U. market claiming that his products are compliant. Given the market's sensitivity, E.U. packaged food producers are likely to take this claim with skepticism. Now, if the same stringent standards are designed and rigorously enforced in Morocco, such a claim becomes more credible.

If this effect is substantial, one would expect a positive effect of harmonization on firms' ability to expand their export at the intensive margin and perhaps even at the extensive margin facilitating the introduction of new products. Again, these effects are likely to be stronger on harmonized destination markets, where demand for quality products is stronger.

3. Data and empirical strategy

3.1. Data

Our dataset combines two main types of information for Morocco: (i) product-specific NTMs harmonization data and (ii) firm-level data on trade flows.

NTM data: The NTM data was collected as part of a joint effort of the World Bank, UNCTAD, and the African Development Bank (see Cadot and Malouche 2012 for details).[6] The data includes all products traded in Morocco for which an NTM applies as of 2012. The dataset records the product code (HS 6-digit), the type of regulation, including product standards, quantitative restrictions, import prohibitions, and customs regulations, the date the regulatory text for the measure was adopted and whether the measure is harmonized with international standards or adopted in the context of the E.U. or USA trade agreements. [7] NTM measures are classified into 16 categories based on the new UNCTAD classification system introduced in 2009.[8] An issue with the NTM data is that it does not record information on the measure in place prior to harmonization. In principle, the new regulation could either be less, more, or as stringent as the previous regulation. In practice, Morocco has harmonized with international standards what were mostly outdated and unevenly implemented regulations. In addition, harmonization was often accompanied by technical assistance suggesting that even in cases where regulatory texts looked similar to older ones, they were likely to be more constraining. It is thus reasonable to assume that harmonization translated into implementation of stricter standard relative the one previously in place.

Table 1 reports the number of domestic (non-harmonized) and harmonized standards broken down by type of NTM in place in Morocco between 2002-2012. Harmonized standards account for 14 per cent of regulations in place in Morocco on average over the period. Table 1 illustrate how harmonization took place in waves, with 2003, 2006 and 2012 being the years with largest number of measures harmonized. The bulk of harmonization is

[6] Data on 45 countries have been collected. For MENA countries including Morocco, the NTMs data have been collected in collaboration with FEMISE (Forum Euroméditerannéen des Instituts de Sciences Economiques). The data is published as part of UNCTAD's TRAINS database, publicly accessible through the World Bank's WITS portal.

[7] Most NTMs are reported in the Harmonized System (HS) at the 8 or 10-digit level, we aggregate the data at the HS 6-digit level to match it with the customs data. When a NTM is notified at 8 or 10-digit level we apply it to the corresponding HS 6-digit product. When a NTM is notified at 2 or 4 HS-digit we assume it will affect all HS-6 products in that group.

[8] This new classification system for NTMs is available on the UNCTAD site at: http://ntb.unctad.org/(A(eSPX7jyImZ7LU3_88-AJjA4q9Skunx9T4GWXA7R65JlWhz9VXTixwQo9k-7ODt5zvu81BaCr4dhz4Mk04ojZm3MI-XTl0kHOdbxazwcLw1w1))/about.aspx.

concentrated in four types of measures: Technical barriers to trade (B), Sanitary and phytosanitary measures (A), and to a lesser extent Export-related measures (P) and Licences, quotas, prohibitions and others quantity control measures (E).

Table 1 Domestic and Harmonized Non-tariff Measures, Morocco 2002-2012

Year	# NTM domestic	# NTM harmonized	Type NTM					
			A	B	D	E	F	P
2002	1024	31	537	506	12			
2003	154	91		60		91		94
2004	313	0		313				
2005	164	25		189				
2006	250	147	91	161		69		76
2007	67	5		72				
2008	11	15		11				15
2009	38	32		11		30		29
2010	17	2	4	12				3
2011	1024	31	817	241		1		80
2012	154	91		30	14		10	3

Note: Simple annual count of domestic and harmonized NTM.

In terms of products concerned, NTMs are concentrated in few sectors (see Table 2). The top twenty sectors account for 76 and 92 per cent of the total number of domestic and harmonized NTMs respectively over the period 2002-2012. Domestic NTMs have mostly been adopted for “electrical and machinery equipment” (HS 85), “fishery products” (HS 03) and “pharmaceutical products” (HS 30), while harmonized NTMs have mostly been adopted for, “meat & edible meat offal” (HS 02), “edible vegetables” (HS 07) and “pharmaceutical products” (HS 30).

Table 2 Domestic and Harmonized NTMs by sectors, Morocco 2002-2010

	Domestic NTM			Harmonized NTM		
Rank	2-digit HS	# domestic NTMs	Share in total domestic NTMs	2-digit HS	# harmonized NTMs	Share in total harmonized NTMs
1	85	284	13.90%	2	44	12.70%
2	3	172	8.40%	30	40	11.50%
3	30	162	7.90%	7	37	10.70%
4	84	125	6.10%	20	23	6.60%
5	40	117	5.70%	29	20	5.80%
6	29	105	5.20%	84	19	5.50%
7	44	66	3.20%	81	17	4.90%
8	73	63	3.10%	69	14	4.00%
9	82	54	2.60%	10	13	3.70%
10	69	46	2.30%	95	12	3.50%
11	2	42	2.10%	8	12	3.50%
12	20	42	2.10%	11	12	3.50%
13	39	41	2.00%	70	11	3.20%
14	95	37	1.80%	96	10	2.90%
15	9	36	1.80%	76	10	2.90%
16	72	35	1.70%	4	9	2.60%
17	8	32	1.60%	6	5	1.40%
18	70	30	1.50%	12	4	1.20%
19	7	29	1.40%	9	3	0.90%
20	15	29	1.40%	19	3	0.90%
Total		1547	75.90%		318	91.60%

Firm-level customs data: We use firm-level dataset obtained from the Moroccan Customs administrations. The data includes all import and export transactions for the universe of Moroccan firms between 2002 and 2010 with, for each transaction, a firm identifier, the year, the transaction destination country, the product HS code (HS6- levels in the 2002 HS classification), the transaction value in US thousand dollars and the transaction quantity in kilograms. For each firm-destination-product-year, unit values are computed as the ratio of export value to quantity. The dataset is very large (several million observations) but poor in covariates. All we know about firms is their import and export transactions; other firm characteristics like overall sales, employment, and balance-sheet information are not available. We clean the data in a number of ways. We exclude mineral products (categories HS 25 to 27) from the analysis. We drop trade flows (firm-product-destination-year) which

only appear once in the dataset. Finally, we only keep flows which value is greater than a thousand USD. The resulting dataset is a four-dimension panel with between 2002 and 2010 7,423 distinct firms exporting 2,678 products (HS 6-digits) of which 225 underwent harmonization over the period to 88 destination countries (see Table 3). An average firm in our sample exports 4.6 products to 2.6 destinations. Over time the number of harmonized products in firms' portfolio grew from (0.4 to 8 per cent).

Table 3 Descriptive statistics

Year	# firms	# destinations	# products	# harmonized products	Average firm			
					Export (thousand USD)	# destinations	# products	# harmonized products
2002	3 242	60	1588	10	2 031	2.6	4.6	0.02
2003	3 549	64	1663	50	2 160	2.6	4.7	0.10
2004	3 627	63	1709	53	2 319	2.5	4.6	0.11
2005	3 663	66	1729	63	2 439	2.5	4.5	0.14
2006	3 715	66	1820	160	2 682	2.6	4.6	0.29
2007	3 779	72	1908	171	3 099	2.6	4.8	0.32
2008	3 844	70	1953	171	3 733	2.6	4.6	0.32
2009	3 657	71	1898	183	2 894	2.6	4.4	0.35
2010	3 329	73	1805	178	3 832	2.8	4.2	0.35
All years	7 423	88	2 678	225				

3.2. Empirical strategy

The unit of analysis is a firm-product-destination-year observation. Let *t* index years, *f* firms, *p* products and *d* destinations. Let $t_{p(f)}$ designates the year in which a harmonized NTM is adopted for product *p* exported by firm *f*. We define a harmonization treatment variable $H_{p(f),t}$ equal to 1 the year and all years following any NTM harmonization of product *p* exported by firm *f*, 0 otherwise. Specifically,

$$H_{p(f),t} = \begin{cases} 1 & \text{if } t \geq t_{p(f)} \\ 0 & \text{otherwise} \end{cases}$$

Similarly, we define $D_{p(f),t}$ a treatment variable taking value 1 the year and all years following the adoption of a domestic (non-harmonized) NTM for product *p* exported by firm *f*.

Baseline specifications: The four-dimensional panel nature of our data allows us to estimate the effect of product-specific harmonization on firms' export performance and dynamics using a difference-in-difference framework. We relate the log annual export volume of product *p* from firm *f* to destination *d* at time *t* ($\log y_{fpd,t}$) to a firm-product specific effect (φ_{fp}), a destination-year specific effect (φ_{dt}), a product specific harmonized NTM dummy ($H_{p(f),t}$), a product-specific domestic NTM dummy ($D_{p(f),t}$), a vector of controls ($\mathbf{x}_{fpdt}$). Our basic estimating equation is as follows,

$$\log y_{fpd,t} = \beta_0 + \beta_1 H_{p(f),t} + D_{p(f),t}\gamma + \mathbf{x}_{fpdt}\eta + \varphi_{fp} + \varphi_{dt} + \varepsilon_{fpdt} \quad (1)$$

where ε is a disturbance term. We estimate equation (1) by OLS using all export flows and years in the data, including flows that are not affected by domestic nor harmonized NTMs as this helps estimate the time effects. Robust standard errors are clustered at the product-year level. The parameter β_1 captures the contemporaneous effect of product specific standards harmonization with international standards on firms' exports volume. The fixed firm-product effects (φ_{fp}) allows us to estimate the within firm-product effect of NTM harmonization on exports. Destination-year fixed effect account for destination specific shocks such as variation in the exchange rate or sluggish aggregate demand in the euro-zone. We also estimate the effect of standard harmonization on export price, firms' ability to enter the export market as well as on firms' ability to start exporting new products.

We estimate the equivalent of equation (1) replacing the left-hand side variable by (i) the log of the unit value of firm *f* export of product *p* to destination market *d* in time *t*, (ii) a dummy variable coding firm-product entry and equal to 1 if firm *f* enters the export market with

product *p* in year *t*, 0 otherwise and (iii) a dummy variable coding firm-product creation and equal to 1 if firm *f* exports a new product *p* in year *t*, 0 otherwise. When the dependent is a binary variable we run a linear probability model rather than a logistic or probit regression.[9]

Domestic market competition effect: the first important contribution of our work is to examine how harmonization affects firms' export performance through changes in the level of competition on the domestic market. Two effects are at play on the Moroccan market: (i) an anti-competitive effect akin to trade diversion whereby low-end exporters from developing countries face higher costs to access the Moroccan market, and (ii) a pro-competitive effect akin to trade creation whereby foreign producers from Northern compliant countries get de facto improved access to the Moroccan market. We try to identify these effects by separating products defined at the HS 6-digit between those initially attractive to Southern producers vs. those products initially attractive to Northern producers. We define a time-invariant dummy variable marking products with a high initial share of imports from developing countries, this share proxying for products in which developing countries have a comparative advantage and where the competitive pressure from them is strongest:

$$\delta_{p(f)}^{DC} = \begin{cases} 1 & \text{if } \mu_{p(f)}^{DC} \equiv M_{p(f),t_0}^{DC} / M_{p(f),t_0} \geq \lambda \\ 0 & \text{otherwise} \end{cases}$$

where $M_{p(f),t_0}^{DC}$ is the value of imports from developing countries in firm *f*'s product in the first year the product is exported in our sample t_0, and $M_{p(f),t_o}$ is the total value of firm *f* imports.

We set λ at the 75th percentile of the cross-sectoral distribution of $\mu_{p(f)}^{DC}$.[10]

[9] With a large number of fixed effects the linear probability model is more consistent than the fixed effects probit and logit estimators which suffer from incidental parameters problem (Bastos and Silva,2012; Baldwin and Harrigan, 2011; Bustos, 2011).

[10] Developing countries are defined here as all but high-income (OECD and non-OECD) using the World Bank's classification.

Our estimating equation is now

$$\log y_{fpd,t} = \beta_0 + \beta_1 H_{p(f),t} + \beta_2 \left(H_{p(f),t} \times \delta_{p(f)}^{DC} \right) + D_{p(f),t}\gamma + \mathbf{x}_{fpdt}\eta + \varphi_{fp} + \varphi_{dt} + \varepsilon_{fpdt} \qquad (2)$$

Similarly, we define the dummy $\delta_{p(f)}^{OECD}$ marking products with a high initial share of imports from high income OECD countries, i.e. where industrial countries have a comparative advantage and re-estimate the equivalent of equation (2) using $\delta_{p(f)}^{OECD}$.

Quality signaling effect: the second important contribution of our work is to examine how harmonization affects firms' export performance through a reduction in informational barriers between sellers and buyers. The effect of harmonization on firms export performance in equation (1) may come from a reduction in market access cost, firm productivity improvement or the effect of improved signaling of quality to buyers in destination markets.[11] In order to filter out the effect of improved market access and better isolate this quality signaling effect, we define a dummy variable identifying firm-product export flows that are active throughout the sample period. We denote such flows as "sustained". The dummy variable identifies flows for which the cost of exporting did not change after harmonization, as with or without harmonization the firms had to comply with the destination market standards for its product.

We include in (1) an interaction term between our dummy θ_{fp} marking sustained firm-product flows and the harmonization treatment variable and estimate the following equation:

$$\log y_{fpd,t} = \beta_0 + \beta_1 H_{p(f),t} + \beta_2 \left(H_{p(f),t} \times \theta_{fp} \right) + D_{p(f),t}\gamma + \mathbf{x}_{fpdt}\eta + \varphi_{fp} + \varphi_{dt} + \varepsilon_{fpdt} \qquad (3)$$

[11] In robustness we control for firms potential improvement in productivity by including quintile dummies in equation (3). Results are robust and shown in the robustness section.

The parameter β_2 in equation (3) captures the effect of harmonization through a reduction in credibility barriers in destination markets net of the positive impact of improved market access. In addition, we may expect established firms with experience in exporting a given product, to benefit relatively more from harmonization, as it may be less costly and easier for those firms to signal quality to their established network of distributors.

3.3. Estimation issues

Examining the impact of NTM harmonization on firms export performance using a difference-in-difference approach raises several identification issues. First, harmonization episodes may be endogenous to firms' performance. In practice, in the case of harmonization with the E.U., the sequencing of harmonization at the product level was influenced by the E.U. Commission. Priority was given to sectors sensitive in the E.U. such as the food sector, while sectors more important for Moroccan exports (e.g. garments) were slow to adjust. This justifies treating harmonization as exogenous to Moroccan firms rather than determined by internal Moroccan political-economy factors. As for omitted variable bias, it may be that better managed firms or more experience in producing a given product are likely to have both more capacity complying and adjusting to new regulations and more efficient export strategies. In order to establish causation from harmonization to better export performance, we use firm-product fixed effects to control for time-invariant firm-product specificities. We also control for a vector $\mathbf{x}$ of time variant characteristics, including the number of firms, excluding the firm itself, exporting product *p* to destination *d* in time *t*. This serves as a proxy for the level of competition in a given product-destination cell. We also control for firms pass-on-trade including a dummy variable if the firm both import and export the same product *p* in year t. Finally, difference-in-difference estimators exacerbate the downward bias in the standard errors arising from positive residual serial correlation. In all regressions, as

per Bertrand et al. (2004), we cluster standard errors at the product-level, the unit of definition of our treatment variable.

4. Empirical results

4.1. Standard harmonization as export promotion: baseline results

Table 4 reports baseline estimates of the effect of NTMs harmonization on firms' exports performance and dynamics using equation (1). All our results refer to the 2002-2010 period. We report least squares estimates and robust standard errors clustered at the product-year level (in parentheses). In all specifications we include firm-product and destination-year effects to account for destination specific shocks such as variation in the exchange rate or sluggish aggregate demand in the euro-zone. The results suggest that harmonization has a positive effect on firms' ability to expand their export at the intensive margin but also that it facilitates firms' introduction of newly harmonized products into their export basket. The effect is economically significant, as the coefficient on the harmonization dummy in column (1) suggest that exports grew 7 per cent faster for products that underwent harmonization than for others.

In all specifications, we control for the effect of non-harmonized domestic regulations. One concern is that the modernization of regulations rather than their harmonization may drive the improved firms export performance. The point estimates on the domestic dummy variable suggest that this is not the case. We also control for instances of re-export by including a dummy variable equal to one if the firm both imports and exports the same product *p* simultaneously and zero otherwise. The number of firms in a given product destination cell controls for changes in the level of competition in the foreign market. The positive and significant coefficient on quantity suggest positive network effects among firms (Koenig, 2009, Cassey and Schmeiser, 2010, Cadot and al, 2013) while at the extensive margin it is

disproportionately more difficult to penetrate a market where a large number of competitors are already active.

Table 4 Standards harmonization and firm export promotion

Dep. Var.	ln export volume	ln unit value	firm-product	product creation
	(1)	(2)	(3)	(4)
harmonization	0.0675*	-0.0245	-0.0002	0.0234**
	(0.0345)	(0.0168)	(0.0162)	(0.0098)
domestic NTM	-0.0527	0.0151	-0.0179	-0.0034
	(0.0354)	(0.0184)	(0.0138)	(0.0098)
re-export	0.2436***	0.0012	-0.0065	0.0033
	(0.0165)	(0.0064)	(0.0040)	(0.0031)
nb exporters	0.4148***	-0.0133***	-0.0044***	-0.0069***
	(0.0095)	(0.0029)	(0.0013)	(0.0010)
Fixed Effects		firm-product, destination-year		
Observations	232,208	232,208	232,208	232,208
Adj R-squared	0.777	0.904	0.478	0.484

The constant is not reported. *, **, and *** denote statistical significance at the 10 per cent, 5 per cent, and 1 per cent levels, respectively. The method of estimation is least squares. Robust standard errors (in parentheses) are clustered at the product-year level. All estimations include destination-year dummies and firm-product fixed effects.

4.2. Standard harmonization across sectors and NTM types

Before we move to an examination of the two main channels through which NTM harmonization may affect firms export performance we present some evidence on the heterogeneity of the effect of harmonization across sectors and types of measures.

Table 5 decomposes the effect of harmonization by broad sectors. We interact our dummy variable harmonization with HS-2 sector dummies. Note that the number of harmonized NTM varies widely across sectors. To conserve space we only report the coefficients on our variable of interest. Thus, we report the coefficients for the ten sectors that experienced the largest number of harmonization over the sample period. The effect of harmonization on firms' unit value, product entry and product creation are roughly similar across sectors while the effects on export volume are very heterogeneous.

Table 5 Effect of standard harmonization across main sectors

Dep. Var.	ln export	ln unit value	firm-product	product
	(1)	(2)	(3)	(4)
Edible vegetables (HS 07)	0.1349**	-0.1090***	0.0296	0.0692***
Edible fruits and nuts (HS 08)	-0.0081	-0.1217***	-0.0502	-0.0444
Cereals (HS 10)	0.9061***	-0.2541***	0.2267***	0.1757***
Product of the milling industry (HS 11)	0.3719	0.1820***	0.1722***	0.1003***
Prepared of vegetables, fruit, nuts (HS20)	-0.2035**	-0.0149	0.1192***	0.0784***
Pharmaceutical products (HS 30)	0.1810	-0.1219**	0.0773	0.0485*
Ceramic products (HS 69)	0.0073	-0.1679***	-0.0060	0.0139
Glass and glassware (HS70)	-0.3181***	0.1456***	-0.0259	-0.0488
Base metal (HS 81)	1.5038***	-0.2687	0.1216	0.0315
Toys, games (HS 95)	0.2391	-0.1518	-0.0810	-0.0834
Other HS	0.0755	0.0426*	-0.0475*	-0.0076
Fixed Effects		firm-product, destination-year		
Observations	232,208	232,208	232,208	232,208
Adj R-squared	0.777	0.904	0.479	0.485

*, **, and *** denote statistical significance at the 10 per cent, 5 per cent, and 1 per cent levels, respectively. The method of estimation is least squares. Robust standard errors (not reported) are clustered at the product-year level. All estimations include destination-year dummies and firm-product fixed effects. The constant, the re-export variable and the nb exporters variable are not reported.

As seen in Table 1 the largest number of harmonizations is concentrated on technical barriers to trade (B), sanitary and phytosanitary measures (A), quantity control measures (E) and export-related measures (P). In Table 6, we decompose the harmonization variable in three non-overlapping harmonization dummies, technical measures (NTMs A and B), non-technical measures (NTMs E) and export-related measures (NTMs P). Different type of NTM may affect firms export performance through different channels. Sanitary and phytosanitary standards may improve the information available to consumers in destination market on product safety, increasing their confidence. Alternatively, export related measures will have by design no impact on foreign exporters' access to the Morocco market, and thus no impact on firms export performance through changes in the domestic market structure. In the rest of the analysis we account for this and exclude NTM-P when looking at competition effect of harmonization.

Table 6 Effect of standard harmonization across types of NTM

Dep. Var.	ln export	ln unit value	firm-product	product
	(1)	(2)	(3)	(4)
Technical Measures (A+B)	0.1508*	-0.077*	-0.0428*	-0.0195
Non-technical Measures (E)	0.3427**	-0.1361**	0.1620***	0.1822***
Export measures(P)	0.2072***	-0.0648	0.0348*	0.0676***
Fixed Effects	firm-product, destination-year			
Observations	232,208	232,208	232,208	232,208
Adj. R-squared	0.775	0.904	0.474	0.480

*, **, and *** denote statistical significance at the 10 per cent, 5 per cent, and 1 per cent levels, respectively. The method of estimation is least squares. Robust standard errors (not reported) are clustered at the product-year level. All estimations include destination-year dummies and firm-product fixed effects. The constant, the re-export variable and the nb exporters variable are not reported.

4.3. Standard harmonization and domestic market competition

We now turn to an analysis of the domestic market competition effect of harmonization. The positive effect in column (1) and (4) in Table 4 may come from a reduction in market access cost, firm productivity improvement through changes in the level of competition on the domestic market or the signaling of quality to buyers. Table 7 and Table 8 report results from equation (2). Table 7 report results for export volumes (columns 1 and 2) and unit values (columns 3 and 4). The upper panel focuses on the anti-competitive effect of harmonization looking at products where penetration from developing countries is the strongest and the lower panel examines the pro-competitive effect in sectors where high income OECD countries have a high penetration ratio. Columns (1) and (3) consider harmonization of all types of NTM, while columns (2) to (4) replicate the analysis excluding NTM-P. We find no robust evidence that harmonization affected firms export sales through protection from low-end suppliers nor exposure to high-end competitors. Note that there is no strong a-priori on the sign of these effects. As foreign exporters form developing countries are kept out of the Morocco market (only if temporarily as they eventually may comply with the new regulation), existing compliant Moroccan exporters may redeploy themselves to the domestic

market. Unless firms have the production capacity to now service both the domestic and export market at the same time, this could mean a reduction of their export sales. Yet, in the presence of economies of scale, their unit costs would be reduced and their export sales could rise. The pro-competitive effect would have the opposite effect.

Table 7 Domestic market competition effects: intensive margin

Dep. Var.	ln export volume		ln unit value	
Type NTMs	All NTMs	Excl. NTM-P	All NTMs	Excl. NTM-P
	(1)	(2)	(3)	(4)
Penetration from developing countries				
harmonization * high penetration	0.0525	-0.0033	-0.0114	0.0163
	(0.0379)	(0.0459)	(0.0208)	(0.0213)
harmonization * high penetration	0.0924	-0.0810	-0.0632***	-0.0707
	(0.0738)	(0.2382)	(0.0229)	(0.0628)
Fixed Effects	firm-product, destination-year			
Observations	232,208	221,894	232,208	221,894
Adj. R-squared	0.777	0.766	0.904	0.895
Penetration from high income OECD countries				
harmonization * high penetration	0.2489***	-0.0568	0.0103	0.0292
	(0.0944)	(0.1067)	(0.0511)	(0.0475)
harmonization * low penetration	0.0392	-0.0015	-0.0289	0.0098
	(0.0356)	(0.0494)	(0.0176)	(0.0224)
Fixed Effects	firm-product, destination-year			
Observations	232,208	221,894	232,208	221,894
Adj. R-squared	0.777	0.766	0.904	0.895

*, **, and *** denote statistical significance at the 10 per cent, 5 per cent, and 1 per cent levels, respectively. The method of estimation is least squares. Robust standard errors (in parentheses) are clustered at the product-year level. All estimations include destination-year dummies and firm-product fixed effects. The constant , the re-export variable and the nb exporters variable are not reported.

Table 8 reports results for firms-product entry (columns 1 and 2) and firm product creation (columns 3 and 4). Results suggest that in sectors with high import penetration by developing countries (upper panel), harmonization has an anti-competitive effect, forcing firms out of the export market. By contrast, in sectors with high import penetration from high income OECD countries, harmonization strongly raises firms' probability to start exporting or to add newly harmonized products to their export basket (lower panel). The positive coefficients on both

dependent variables found in Table 4 suggest that on net, the pro-competitive effect of NTM harmonization dominates. In contrast the positive and significant effect found on firms export volume in Table 4 suggests that another channel than changes in the level of domestic competition may be at play there. This is what we will examine in the next section.

Table 8 Domestic market competition effects: extensive margin

Dep. Var.	firm-product entry		product creation	
Type NTMs	All NTMs	Excl. NTM-P	All NTMs	Excl. NTM-P
	(1)	(2)	(3)	(4)
Penetration from developing countries				
harmonization * high penetration	-0.0003	-0.0418*	0.0146	-0.0226*
	(0.0189)	(0.0237)	(0.0113)	(0.0135)
harmonization * high penetration	0.0001	0.0101	0.0494***	0.0030
	(0.0297)	(0.0371)	(0.0167)	(0.0272)
Fixed Effects	firm-product, destination-year			
Observations	232,208	221,894	232,208	221,894
Adj. R-squared	0.478	0.478	0.484	0.484
Penetration from high income OECD countries				
harmonization x high penetration	0.0329	0.0976***	0.0550***	0.0724**
	(0.0262)	(0.0334)	(0.0182)	(0.0283)
harmonization x low penetration	-0.0043	-0.0551**	0.0195*	-0.0322**
	(0.0177)	(0.0239)	(0.0106)	(0.0135)
Fixed Effects	firm-product, destination-year			
Observations	232,208	221,894	232,208	221,894
Adj. R-squared	0.478	0.478	0.484	0.484

*, **, and *** denote statistical significance at the 10 per cent, 5 per cent, and 1 per cent levels, respectively. The method of estimation is least squares. Robust standard errors (in parentheses) are clustered at the product-year level. All estimations include destination-year dummies and firm-product fixed effects. The constant, the re-export variable and the nb exporters variable are not reported.

4.4. Standard harmonization and quality signaling

In this section we examine how standard harmonization may affect exporters' performance through a reduction in informational barriers in destination markets. Table 9 reports results from equation (3) taking export volumes (upper panel) and unit values (lower panel) as

dependent variables. Column (1) presents results when we estimate equation (3) on the whole sample. The coefficient on our interaction term between the harmonization variable and the sustained dummy captures the effect of harmonization for sustained firm-product flows for which the cost of exporting did not change after harmonization, as with or without harmonization the firms had to comply with the destination market standards for its product. In addition, we may expect those firms to benefit disproportionately more from harmonization. It may be easier for established firms with experience in exporting a given product, to signal quality. Finally, destination-year effects in all specifications ensure that destination specific demand shocks do not confound our estimates.

Focusing on sustained flows, our results suggest that exports grew 16 per cent faster for products that underwent harmonization than for other and firms reduced their export prices by over 5%. One concern when estimating the quality signaling effect of product-specific harmonization is the existence of multi-destination firms, exporting the same product to different destinations applying different standards. Following harmonization these firms may redeploy their exports to harmonized destinations, as harmonization raise the cost of domestic producers pricing them out of non-harmonized markets where compliance with the new standard does not confer any competitive advantage. If this effect is substantial, our estimate in column (1) is biased. In order to control for this composition bias we want to distinguish between harmonized and non-harmonized destination markets. In column (2) and (3) we split the sample using the level of per capita income as a proxy for countries harmonization status. If harmonization promotes firms exports through increased demand of quality products from buyers in harmonized market, we expect the coefficient on our interaction term (harmonization x sustained) to be positive and significant only for flows to high-income destinations. This is what we find. The coefficients on our variable of interest on the low-

income sample are never significant suggesting that standard harmonization do not have significantly affect south-south trade.

Finally, in practice among the group of high income countries, countries may still be applying different standards. For instance, since 2008 a maximum residue limit for the food contaminant aflatoxin B1 in nuts has been recommended by the international organization Codex Alimentarius. This limit is higher than the limit currently in force in the EU but lower than the one in force in the USA.

In order to further control for this issue we exploit the fact that some harmonization of Morocco NTM were done in the context of the E.U. association agreement and the US free trade agreement, the two largest export markets for Morocco. We adapt our harmonization dummy, to code only NTMs harmonized in the context of the E.U. and the US agreements respectively, and split the sample in EU-USA markets (column 4) and other markets (column 5). Note that this is a very stringent test as the number of EU and US harmonization available is now substantially reduced. Results show a robust and positive effect on firms export volume. The coefficient is larger in magnitude and significant at the 10 per cent, while the effect on unit values is equivalent in magnitude but not significant anymore. Our results suggest that harmonization helped reduce information costs between producers and buyer, thereby improving firms' competitive advantage on foreign markets.

Overall Table 9 offers robust evidence that harmonization not only helps exporters signal a particular level of quality (the one set by the standard) it also helps reduce the level of uncertainty with which buyers evaluate it, i.e. it improves exporters credibility. While Table 9 focus is on established firm-product flows, in Table 10 we examine how reduction in credibility barriers affects firms' performance at the extensive margin.

Table 9 Standards harmonization and quality signaling: intensive margin

Destination markets	All	High income	Non-high income	EU & USA	Non-EU & non-USA
	(1)	(2)	(3)	(4)	(5)
Dep. Var.: ln export volume					
harmonization x sustained flows	0.1616***	0.1913***	0.0881	0.2369*	0.1157
	(0.0551)	(0.0644)	(0.0994)	(0.1228)	(0.1405)
harmonization x non sustained	-0.0157	-0.0496	0.0457	-0.0463	-0.0350
	(0.0522)	(0.0595)	(0.0959)	(0.1051)	(0.2025)
Fixed Effects	firm-product, destination-year				
Observations	232,208	201,664	30,544	185,906	46,302
Adj R-squared	0.777	0.772	0.859	0.772	0.860
Dep. Var.: ln unit value					
harmonization x sustained flows	-0.0511*	-0.0749**	0.0164	-0.0634	0.0100
	(0.0281)	(0.0322)	(0.0405)	(0.0386)	(0.0429)
harmonization x non sustained	-0.0035	-0.0126	0.0528	-0.0369*	-0.0142
	(0.0181)	(0.0204)	(0.0399)	(0.0221)	(0.0585)
Fixed Effects	firm-product, destination-year				
Observations	232,208	201,664	30,544	185,906	46,302
Adj R-squared	0.904	0.905	0.919	0.910	0.907

*, **, and *** denote statistical significance at the 10 per cent, 5 per cent, and 1 per centlevels, respectively. The method of estimation is least squares. Robust standard errors (in parentheses) are clustered at the product-year level. All estimations include destination-year dummies and firm-product fixed effects. The constant , the re-export variable and the nb exporters variable are s not reported.

Table 10 reports estimates from equation (1) taking firm-product entry (upper panel) and firm product creation (lower panel) as dependent variables. We account for the heterogeneity across destination markets in terms of standards applied and split the sample as in Table 9. In the absence of harmonized standards new entrant firms or firms starting to export a new product would have to engage in expensive signaling to increase buyers' perception of their product quality, harmonization is likely to reduce this asymmetry of information. Our results suggest that this is the case. We find evidence that standard harmonization encouraged firms entry into newly harmonized products. In addition, firms are more likely to introduce new products when regulation for that given product is harmonized.

Table 10 Standards harmonization and quality signaling: extensive margin

Destination market	High income	Non-high income	EU & USA	Non-EU & non-USA
	(1)	(2)	(3)	(4)
Dep. Var. : firm-product entry				
Harmonization	-0.0020	-0.0022	0.0673***	0.0024
	(0.0183)	(0.0266)	(0.0203)	(0.0638)
Fixed Effects		firm-product, destination-year		
Observations	201,664	30,544	185,906	46,302
Adj. R-squared	0.476	0.600	0.474	0.595
Dep. Var. : product creation				
Harmonization	0.0310***	-0.0088	0.0675***	0.0267*
	(0.0114)	(0.0145)	(0.0166)	(0.0155)
Fixed Effects		firm-product, destination-year		
Observations	201,664	30,544	185,906	46,302
Adj R-squared	0.480	0.639	0.479	0.628

*, **, and *** denote statistical significance at the 10 per cent, 5 per cent, and 1 per cent levels, respectively. The method of estimation is least squares. Robust standard errors (in parentheses) are clustered at the product-year level. All estimations include destination-year dummies and firm-product fixed effects. The constant , the re-export variable and the nb exporters variable are not reported.

4.5. Standard harmonization, product or firm effect?

In Table 9 and Table 10 we saw that standards harmonization serve as credible signal of product quality and help Moroccan exporters build a reputation. Then the question is whether this signaling effect is specific to the product harmonized, or whether it applies to the firm and all products it exports. In order to explore these effects let Ω_f be the set of harmonized products exported by firm *f* as of time *t*, and let Ω_{sf} be the set of harmonized products within sector *s* exported by firm *f* as of time *t* where *s* is defined as a 2 or 4-digit HS sector. We define a dummy $H_{s(f),t}$ equal to 1 the year and all years following any harmonization for any product other than *p* in sector *s* exported by firm *f*, 0 otherwise. Specifically,

$$H_{s(f),t} = \begin{cases} 1 & \text{if } \exists\, p' \neq p \text{ s.t. } p' \in \Omega_{s(f)} \text{ and } t \geq t_{p'(f)} \\ 0 & \text{otherwise} \end{cases}$$

where $t_{p'(f)}$ designates the year in which a harmonized NTM is adopted for product *p'* exported by firm *f*. Our estimating equation is now

$$\log y_{fpd,t} = \beta_0 + \beta_1 H_{p(f),t} + \beta_2 H_{s(f),t} + D_{p(f),t}\gamma + \mathbf{x}_{fpdt}\eta + \varphi_{fp} + \varphi_{dt} + \varepsilon_{fpdt} \quad (4)$$

The parameter β_2 in equation (4) captures the effect of harmonization in any product *p'* other than *p* in the same HS-2 or HS4 sector exported by firm *f* on its exports of product *p*.

Similarly, we define the dummy, $H_{f,t}$ equal to 1 the year and all years following any harmonization for any product other than *p* exported by firm *f*, 0 otherwise and re-estimate the equivalent of equation (4) using $H_{f,t}$.

Results are reported in Table 11. The evidence suggests that the credibility effect of harmonization extends across a firm's export portfolio. We find that exporters are more likely to introduce products when similar products (within the same HS4 and HS2 heading) have been harmonized. The coefficient on the firm harmonization dummy is only significant on the whole sample in columns (7). Our results suggest that harmonization affects the managerial and production capacity at the firm level, facilitating expansion of exports beyond the product concerned. The spillover effects are stronger across products with similar production practices. Consider a Moroccan producer that exports tomatoes and tomato juice to the E.U.. Now suppose that the standard for pesticide residues for tomatoes is harmonized on E.U. standards in 2005. While tomato juice is not specifically targeted by the standard, if harmonization helps increase buyers' perception of the quality of tomato, it will also positively affect their perception of tomato juice quality as both products are highly related.

Table 11 Standards harmonization: product or firm effect?

Dependent variable	product creation								
Destination markets	All	High income	Non-high income	All	High income	Non-high income	All	High income	Non-high income
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
harmonization	0.0368***	0.0424***	-0.0082	0.0397***	0.0452***	-0.0062	0.0372***	0.0404***	-0.0058
	(0.0103)	(0.0121)	(0.0144)	(0.0104)	(0.0122)	(0.0145)	(0.0102)	(0.0120)	(0.0145)
harmonization firm-HS4	0.0305*	0.0390**	-0.0451						
	(0.0160)	(0.0167)	(0.0282)						
harmonization firm-HS2				0.0332***	0.0366***	-0.0019			
				(0.0092)	(0.0102)	(0.0128)			
harmonization firm							0.0121**	0.0090	0.0005
							(0.0049)	(0.0055)	(0.0082)
Fixed Effects	firm-product, destination-year								
Observations	232,208	201,664	30,544	232,208	201,664	30,544	232,208	201,664	30,544
Adj. R-squared	0.480	0.477	0.631	0.480	0.477	0.631	0.480	0.477	0.631

*, **, and *** denote statistical significance at the 10 per cent, 5 per cent, and 1 per cent levels, respectively. The method of estimation is least squares. Robust standard errors (in parentheses) are clustered at the product-year level. All estimations include destination-year dummies and firm-product fixed effects. The constant , the re-export variable and the nb exporters variable are not reported.

5. Robustness Checks

In this section we explore the robustness of our main results of the effect of standard harmonization on firms export volume, prices and product entry and creation to a series of tests, allowing for time-varying effects of harmonization, controlling for firm heterogeneity and running a placebo exercise for the harmonization.

5.1. Timing of the effect of harmonization

Table 12 examines how the effect of standard harmonization accrues over time. We estimate equation (2) taking different lags on our harmonization variable. To conserve space, we only report the coefficients for the interaction term between the harmonization dummy and the dummy marking sustained flows. Results suggest that the effect of standard harmonization persist for at least 3 years on volumes while it is maintained for 5 years when considering the effect on prices. The effects at the extensive margin are also maintained for at least 5 years following harmonization.

5.1. Firm heterogeneity and standard harmonization

In order to control for firms heterogeneity we re-estimate equation (2) including quintile dummies. These approximate for time varying firm characteristics such as firm size and productivity. Quintile dummies are defined over the total exports value in US$, lagged one year, where the first quintile represents the 20 per cent smallest exporters and the fifth quintile the top 20 percent. Results are robust to controlling for firm heterogeneity (To be added).

Table 12 Timing of the effect of standard harmonization

Dep. Var.	ln export volume			ln unit value			firm-product entry			product creation		
Destination markets	All	High Income	Non-high income	All	High income	Non-high income	All	High income	Non-high income	All	High income	Non-high income
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
$harmonization_{t-1}$	0.161***	0.191***	0.088	-0.051*	-0.045**	0.016	-0.000	-0.002	-0.002	0.023**	0.031***	-0.008
	(0.055)	(0.064)	(0.099)	(0.028)	(0.032)	(0.040)	(0.016)	(0.018)	(0.026)	(0.009)	(0.011)	(0.014)
$harmonization_{t-2}$	0.088*	0.134**	-0.031	-0.039	-0.057*	0.031	0.003	-0.003	0.027	0.024**	0.031***	0.004
	(0.053)	(0.061)	(0.102)	(0.026)	(0.029)	(0.041)	(0.015)	(0.017)	(0.025)	(0.010)	(0.011)	(0.014)
$harmonization_{t-3}$	0.074	0.114*	0.0007	-0.0689***	-0.0918***	0.010	-0.012	-0.018	0.015	0.027***	0.029***	0.026**
	(0.056)	(0.063)	(0.118)	(0.026)	(0.028)	(0.044)	(0.017)	(0.018)	(0.026)	(0.010)	(0.011)	(0.012)
$harmonization_{t-4}$	0.076	0.099	0.050	-0.0911***	-0.1032***	-0.022	-0.013	-0.024	0.046*	0.027**	0.029**	0.033**
	(0.070)	(0.075)	(0.174)	(0.028)	(0.030)	(0.055)	(0.019)	(0.021)	(0.026)	(0.012)	(0.013)	(0.015)
$harmonization_{t-5}$	0.010	-0.009	0.106	-0.058	-0.040	-0.111	-0.016	-0.015	-0.027	0.047***	0.049***	0.032
	(0.111)	(0.121)	(0.255)	(0.040)	(0.037)	(0.097)	(0.022)	(0.023)	(0.056)	(0.013)	(0.013)	(0.021)
Fixed Effects	firm-product, destination, year											

The coefficient for the interaction term between the harmonization dummy and the dummy marking sustained flows are reported. The constant is not reported.*, **, and *** denote statistical significance at the 10 per cent, 5 per cent, and 1 per cent levels, respectively. The method of estimation is least squares. Robust standard errors (in parentheses) are clustered at the product-year level. All estimations include destination-year dummies and firm-product fixed effects.

5.2. Alternative coding of the harmonization dummy

In our sample an HS 6-digit product may be subject to multiple measures. In order to control for this, as a robustness exercise we re-code our harmonization treatment variable as a count of harmonized measures for a given product-year rather than as a binary variable. Results are qualitatively similar and are in Table 13.

Table 13 Alternative definition of harmonization variable

Dep. Var.	ln export volume			ln unit value		
Destination markets	All	High income	Non-high income	All	High income	Non-high income
	(1)	(2)	(3)	(4)	(5)	(6)
# harmonization x sustained flows	0.1573***	0.2038***	0.0448	-0.0487*	-0.0751**	0.0219
	(0.0562)	(0.0653)	(0.1001)	(0.0291)	(0.0337)	(0.0403)
harmonization x non sustained	0.0164	-0.0212	0.0802	-0.0092	-0.0231	0.0669*
	(0.0527)	(0.0603)	(0.0945)	(0.0185)	(0.0210)	(0.0396)
Fixed Effects	firm-product, destination-year					
Observations	232,208	201,664	30,544	232,208	201,664	30,544
Adj R-squared	0.777	0.772	0.859	0.904	0.905	0.919
Dep. Var.	firm-product entry			product creation		
Destination markets	All	High income	Non-high income	All	High income	Non-high income
	(1)	(2)	(3)	(4)	(5)	(6)
# harmonization	-0.0062	-0.0098	-0.0027	0.0197*	0.0259**	-0.0075
	(0.0166)	(0.0188)	(0.0266)	(0.0102)	(0.0119)	(0.0144)
Fixed Effects	firm-product, destination-year					
Observations	232,208	201,664	30,544	232,208	201,664	30,544
Adj R-squared	0.478	0.476	0.600	0.484	0.480	0.639

*, **, and *** denote statistical significance at the 10 per cent, 5 per cent, and 1 per cent levels, respectively. The method of estimation is least squares. Robust standard errors (in parentheses) are clustered at the product-year level. All estimations include destination-year dummies and firm-product fixed effects. The constant , the re-export variable and the nb exporters variable are not reported.

5.3. Placebo exercise

Finally in order to check that our main results on the effect of standard harmonization of firms export volume, unit prices and product creation are not spurious, we run a placebo exercise, where we generate random times for product-specific harmonization episode and re-

estimate equation (1) and (2) 1000 times using these random harmonization times. We retrieve the coefficient on our variable of interest and standard error for each replication. Table 14 reports the average values. We fail to find a significant effect on any of our variable of interest with those randomly generated harmonization times. This suggests that the effects found in our main tables are indeed driven by the specific harmonization events we are focusing on.

Table 14 Sensitivity Checks: Placebo Exercise

	Mean coefficient	Mean S.E	Mean t-stat	Replication number
Dep. Var.	(1)	(2)	(3)	(4)
Ln export volume				
Baseline	0.025	0.078	0.321	1000
Sustained flows	0.082	0.137	0.599	1000
Sustained flows & high income	0.224	0.182	1.231	1000
Ln unit value				
Baseline	0.043	0.088	0.489	1000
Sustained flows	0.021	0.136	0.154	1000
Sustained flows & high income	0.035	0.149	0.235	1000
Firm-product creation				
Baseline	-0.013	0.020	-0.650	1000
high income sample	-0.050	0.052	-0.961	1000
Non high income sample	0.003	0.059	0.051	1000

6. Concluding remarks

This paper isolates two main channels through which standard harmonization may affect firms export performance. We find that harmonization of domestic Moroccan standards on Northern countries regulations raises export performance of firms indirectly through changes in the level of competition on the domestic market and directly through quality signaling, with the latter effect being the strongest. Importantly, the signaling benefits of harmonization extend across a firm's export portfolio, suggesting that harmonization affects the managerial

and production capacity of the firm. Our results uncover a “public-good” dimension of regulatory harmonization.

In most cases harmonization of regulations is done on developed countries terms, which implies a substantial loss of sovereignty for developing countries. Our results contribute to the political acceptability of costly harmonization. While technical assistance may be provided to help with the convergence process, what really matters is that by harmonizing on stringent standards, Morocco gain some access to the northern markets.

7. References (Incomplete)

Albornoz F., H. F. Calovo Pardo, G. Corcos and E. Ornelas. (2012). Sequencing exporting, Journal of International Economics, 88, pp. 17-31.

Alvarez R., H. Faruq and R. Lopez. (2008). New products in export markets: Learning from experience and Learning from others, Working Paper.

Alvarez R., H. Faruq and R. Lopez. (2010). Is previous exporting experience relevant for new exports?, Working Paper of the Central Bank of Chile, 599.

Arkolakis C. and M.A. Muendler. (2011). The extensive margin of exporting products: A firm-level analysis, mimeo.

Augier, P., O. Cadot, and M. Dovis, (2014), "NTM harmonization, profits, and productivity: Firm-level evidence from Morocco".

Balassa B. (1964). The purchase power parity doctrine – a reappraisal, Journal of Political Economy, 72(6), pp.584-596.

Baldwin R. and J. Harrigan. (2011). Zeros, quality and space: trade theory and trade evidence, American Economic Journal: Microeconomics, 3(2), pp.60-88.

Bastos P. and J. Silva. (2012). Networks, firms and trade, The World Bank Policy Research Working Paper Series, 6279, Washington DC.

Bustos P. (2011). Trade liberalization, exports and technology upgrading: evidence from the impact of MERCOSUR on Argentinean firms, American Economic Review, 101(1), pp.304-340.

Bricongne, J-C., L. Fontagné, G. Gaulier, D. Taglioni and V. Vicard. (2012). Firms and the global crisis: French exports in the turmoil. Journal of International Economics, 87(1).

Cadot O., L. Iacovone, M. D. Pierola and F. Rauch. (2013). Success and failure of african exporters, Journal of Development Economics, 101, pp. 284-296.

Cassey A. and Schmeiser K. (2011). The agglomeration of exporters by destination, FREIT Working Paper.

Chen M., J. S. Wilson and T. Otsuki. (2008). Standards and export decisions: Firm-level evidence from developing countries, Journal of International Trade & Economic Development, 17:4, pp. 501-523.

David S. J., J. Haltiwanger. (1992). Gross Job Creation, Gross Job Destruction, and Employment Reallocation. The Quarterly Journal of Economics, 107(3).

David S. J., J. Haltiwanger and S. Schuh. (1996). *Job Creation and Destruction*, MIT Press.

Disdier A.C., L. Fontagné and O. Cadot. (2012). North-South standards harmonization and international trade, CEPR Discussion Paper, 8767.

Eaton J., M. Eslava, M. Kugler and J. Tybout. (2007). Export dynamics in Colombia: Firm-level evidence, NBER Working Paper.

Eaton J., M. Eslava, D. Jinkins, C.J. Krizan and J. Tybout. (2012). A search and Learning model of export dynamics, mimeo.

Fontagné L., O. Gianluca, R. Piermartini and N. Rocha. (2012). Product standards and margins of trade: Firm level évidence, Working Paper.

Haltiwanger J. , R.S. Jarmin R.S. and J. Miranda. (2010). *Who Creates Jobs? Small vs. Large vs. Young*, NBER Working Papers 16300.

Hausmann R., and B. Klinger. 2007. The structure of the product space and the evolution of comparative advantage, CID Working Paper n°146, Harvard University.

Hidalgo C., B. Klinger, A.L. Barabasi and R. Hausmann. (2007). The product space conditions of the development nations, Science, 317(5837), pp.482-487.

Koenig P. (2009). Agglomeration and the export decisions of French firms. Journal of Urban Economics 66(3), pp.186-195.

Lin J.F. (2012). New structural economics: a framework of rethinking development and policy, The World Bank.

Mayer T. and S. Zignano. (2011). Notes on CEPII's distances measures: The GeoDist database, Document de travail CEPII, 25.

Melitz M. J. (2003). The impact of trade on intra-industry réallocation and aggregate industry productivity, Econometrica, 6, pp. 1695-1725.

Reyes J. D. (2011). International harmonization of product standards and firm heterogeneity in international trade, Policy Research Working Paper, 5677.

Schmeiser K. N. (2012). Learning to export: Export growth and the destination décision of firms, Journal of International Economics, 87, pp. 89-97.

Tornqvist L., P. Vartia and Y. Vartia. (1985). *How Should Relative Change Be Measured*?, American Statistician, February, 39:1, pp. 43-46.