POLICY RESEARCH WORKING PAPER 4400

Help or Hindrance?

The Impact of Harmonized Standards on African Exports

Witold Czubala
Ben Shepherd
John S. Wilson

The World Bank
Development Research Group
Trade Team
November 2007

Policy Research Working Paper 4400

Abstract

The authors test the hypothesis that product standards harmonized to de facto international standards are less trade restrictive than ones that are not. To do this, the authors construct a new database of European Union (EU) product standards. The authors identify standards that are aligned with ISO standards (as a proxy for de facto international norms). The authors use a sample-selection gravity model to examine the impact of EU standards on African textiles and clothing exports, a sector of particular development interest. The authors find robust evidence that non-harmonized standards reduce African exports of these products. EU standards which are harmonized to ISO standards are less trade restricting. Our results suggest that efforts to promote African exports of manufactures may need to be complemented by measures to reduce the cost impacts of product standards, including international harmonization. In addition, efforts to harmonize national standards with international norms, including through the World Trade Organization Technical Barriers to Trade Agreement, promise concrete benefits through trade expansion.

This paper—a product of the Trade Team, Development Research Group—is part of .a broader project on trade facilitation and development supported through a Trust Fund of the U.K. Department for International Development. Compilation of the World Bank EU Standards Database (EUSDB) was supported by a Trust Fund of the U.S. Agency for International Development. Policy Research Working Papers are also posted on the Web at http://econ.worldbank.org. The authors may be contacted , witold.czubala@gmail.com, bshepherd@worldbank.org, or jswilson@worldbank.org.

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The Impact of Harmonized Standards on African Exports

Witold Czubala, Ben Shepherd and John S. Wilson[*, †]
The World Bank
1818 H St. NW
Washington D.C. 20433

Keywords: International trade; Technical barriers to trade; Product standards; Economic development; Textiles and clothing.

JEL Codes: F13; F15.

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[*] The first author is with the Bank of America, and second a Consultant and third author a Lead Economist in the Development Research Group—Trade, The World Bank. This work is part of a broader project on trade facilitation and development supported through a Trust Fund of the U.K. Department for International Development. Compilation of the World Bank EU Standards Database (EUSDB) was supported by a Trust Fund of the U.S. Agency for International Development. Sincere thanks to the following for their superb assistance in assembling the World Bank EUSDB: Jérôme Beaufils, Teresa Bianchi, Françoise Blarez, Anne-Claire Hoyaux, Mark-André Saucier-Nadeau, and Mark Troger. We are also grateful to a number of World Bank colleagues for their comments and suggestions: Enrique Aldaz-Carroll, Silja Baller, Paul Brenton, and Bernard Hoekman, as well as participants at a World Bank workshop on Trade Costs on April 30, 2007. Comments to: bshepherd@worldbank.org (corresponding author), jswilson@worldbank.org, or witold.czubala@gmail.com.

[†] The findings, interpretations, and conclusions expressed in this paper are entirely those of the authors. They do not necessarily represent the view of the World Bank, its Executive Directors, or the countries they represent.

1 Introduction

In a world of continued cuts in tariff rates of protection, the trade effects of non-tariff measures—including product standards—assume greater importance in research and policymaking. This is particularly true for African exporting countries, many of which now enjoy, at least in principle, substantially duty-free access to major developed country markets, in particular the European Union (EU).

Many product standards are not protectionist in intent. They may not be developed in regard to trade at all. Instead, they may respond to legitimate concerns of consumers or producers relating to, for example, product quality or fitness for purpose. There is evidence, moreover, that certain standards increase and expand trade opportunities in certain sectors (Moenius, 2004). However, product standards can also impact the marginal and/or fixed costs of foreign exporters, and can thereby advantage domestic industries.

There is reason to believe that this problem is particularly relevant to developing country exporters, in particular in Africa. On the one hand, developing countries have largely not been involved in talks on Mutual Recognition Agreements (MRAs) and other agreements designed to mitigate compliance costs (Baldwin, 2000). In the absence of such measures, compliance costs can be substantial.

Table 1 provides summary data on the investment costs required to comply with product standards, as a percentage of firm sales, taken from the World Bank's Technical Barriers to

Trade Database.[1] In Sub-Saharan Africa—the region that is of primary interest for this paper—the average is 7.65% of sales, but the range reported by firms runs from 0.01% to 124%. In Latin America, by contrast, the average is only about one-third as high (2.56%) and the range is much narrower (0.01% to 13.36%). A similar pattern is apparent in the last row of Table 1, which summarizes the data for textiles and clothing producers in all sample regions. The average cost is 2.73% of sales, but the range is once again very wide: 0.01% to 44.1%. It seems reasonable to expect that part of this variation is due to differences in firm size and productivity—with the largest impacts being felt by the smallest and least productive.[2] Foreign product standards are therefore likely to be a particular constraint on small and medium-sized businesses, which makes this issue a vital one for developing countries seeking to stimulate that part of the economy via increased contact with world markets.

Even in the presence of significant compliance costs for exporters, however, the trade policy question in this area cannot simply be one of "rolling back" product standards, as if they were protectionist tariffs or quotas. Rather, the emphasis should be on limiting—where present—the negative spillovers that legitimate product standards can have for exporters in other countries. This is the difficult line that the WTO *Agreement on Technical Barriers to Trade* traces. One way the Agreement attempts to do so is by encouraging the use of de facto international standards: Article 2.5, for example, creates a rebuttable presumption that technical regulations aligned with international standards do not constitute "unnecessary obstacles to international trade". The idea is relatively simple: complying with one "international" standard—and there can

[1] This firm-level survey database is described in detail by Wilson and Otsuki (2004), and is publicly available at http://www1.worldbank.org/wbiep/st-db/Criteria.asp. For an econometric analysis using these data, see Maskus et al. (2005) and Chen et al. (2006).

[2] Jaffee and Henson (2005) show through detailed case studies that management capacity and strategic choices also play an important role.

be any number of de facto "international" standards—should be less costly for all concerned than complying with multiple national or regional standards, and help promote a relatively level playing field for exporters.

This paper presents the first empirical evidence to indicate the potential benefit in the approach taken by the WTO *Agreement on TBTs*. We show that EU product standards harmonized with international standards restrict African textiles and clothing exports far less than do European Union standards not aligned with international norms. Thus, international harmonization of product standards could be seen as an important complementary policy in support of recent efforts to extend more generous and easily accessible preferences to the developing world (see e.g., Collier and Venables, 2007). As Brenton and Hoppe (2007) argue, expanding African exports of manufactured goods in traditional development sectors, such as clothing, is much more than just a question of preferential rates of duty.

Our results are consistent with a framework in which standards impact trade through at least two channels. Compliance with standards increases the marginal costs of exporting and thereby can reduce export flows (the intensive margin of trade). At the same time, exporters must also pay a fixed cost to adapt products to suit foreign standards. This can reduce the probability that a country will export at all (the extensive margin). Our results provide support for the proposition that it is possible to reduce the fixed and marginal costs associated with product standards by using de facto international standards as the basis for harmonization.

Our results build on and extend the existing literature in three ways.[3] First, we use the Perinorm database (Swann et al., 1999; Moenius, 2000, 2004, 2006) and the online catalogue of the

[3] For a general review of the empirical literature, see WTO (2005). On the theoretical side, see, for example, Fischer and Serra (2000), Casella (2001), Gandal and Shy (2001), and Ganslandt and Markusen (2001).

European Committee for Standardization (CEN) to create an original database of EU product standards applied to textiles and clothing. Our data distinguish between standards that are equivalent to ISO standards—a proxy for international harmonization—and those that are not. This allows us to address a different policy question from the one examined by, for example, Moenius (2004, 2006). In these papers, the author focuses on the extent to which bilaterally-shared standards promote trade.

Second, we examine the impact of voluntary standards, since they represent an important, but under-analyzed, part of the standards landscape in Europe. Our results are therefore complementary to existing work dealing exclusively with mandatory standards, such as Brenton et al. (2001), Henry de Frahan and Vancauteren (2006), Fontagné et al. (2005), Chen and Mattoo (2004), Disdier et al. (2007), and Baller (2007). These studies generally find some evidence that product standards impact negatively on trade with "outsiders"—i.e., those countries outside the harmonization zone. The effect is not uniform, however, and tends to vary from one sector to another (see also Moenius, 2004).

Third, we examine the trade impacts of product standards both at the extensive and intensive margins. Our results therefore complement existing analyses on mandatory standards (Chen and Mattoo, 2006; Baller, 2007) and firm-level survey data (Chen et al., 2006). Moreover, in specifying an over-identified version of our sample selection gravity model, we also produce evidence corroborating recent theoretical work on the importance of credit constraints in trade models with fixed costs. Our results can be interpreted as supporting the view that standards create fixed product adaptation costs, which need to be financed (e.g., Chaney, 2005; Manova, 2006).

Against this background, our paper proceeds as follows. The next Section describes the EU's approach to product standardization and harmonization, and its interactions with WTO disciplines. We then outline the World Bank EU Standards Database in Section 3, contrast it with previous data collection efforts, and present some descriptive results. Section 4 contains our gravity model specification and empirical results. We draw some policy conclusions in Section 5, and sketch a number of possible directions for future research.

2 Product Standards and Harmonization in the European Union

It is easy to get lost in the terminology that has grown up around product standards. As such, it is important to outline, in brief, the concepts we address here. In this Section, we also outline the legal regime governing product standards and harmonization in the EU, as well as its interactions with WTO disciplines.[4]

The WTO distinguishes between technical regulations (which are mandatory) and product standards (which are voluntary). The principal legal obligations in the *Agreement on Technical Barriers to Trade* (TBTs) do not apply to voluntary standards. They only address mandatory technical regulations. For instance, only draft technical regulations need be notified to the WTO Secretariat under Article 2.9. In addition, Article 2.4 requires that Members generally use "international standards"—which are most often voluntary—as the basis for their mandatory technical regulations. Moreover, Annex 3 of the Agreement sets out a Code of Good Practice in regard to voluntary product standards—which Members need take "reasonable measures" to ensure is accepted by national standard setting bodies. In sum, both mandatory technical

[4] This discussion draws heavily on EC (2000), Trebilcock and Howse (1999, Chapter 6), and Brenton et al. (2001).

regulations and voluntary product standards can be affected, directly or indirectly, by WTO disciplines.

It is not just in the *Agreement on TBTs* that the line between mandatory and voluntary standards blurs. It is also true of the European standards system. Since the start of the "New Approach" to technical harmonization and standardization in 1985, the role of Europe-wide legislation ("Directives") has been to establish "essential requirements" for certain product sectors. These requirements are mandatory and must be met by all products in those sectors.

The European standardization process, however, involves more than EU Directives. While they prescribe "essential requirements", they do not mandate detailed technical specifications that products must meet in order to conform to those requirements. Instead, the European Committee for Standardization (CEN)—a trans-national association established by national standard-setting bodies across Europe—produces harmonized product standards in line with the requirements of each Directive. These standards must be reflected in the national standards of all EU Member States. Conformity with CEN standards—while voluntary—gives rise to a presumption that a product complies with the corresponding "essential requirements".

The New Approach, therefore, combines elements of both technical regulations and product standards. This regulatory framework in Europe applies only to a limited number of sectors, and does not cover textiles and clothing (see Table 2). In sectors without a New Approach Directive, the responsibility for product standards devolves to standard setting bodies across Europe. Those bodies include both pan-European ones (like CEN) and national standards bodies (such as AFNOR in France, BSI in the UK, and DIN in Germany). CEN issues European standards after a consensus-based process, concluded by a vote of adoption. National standard setting bodies are required to implement CEN standards in their respective countries, and to ensure that any

conflicting national standards are withdrawn. CEN had issued 12,357 standards and approved documents by the end of 2006, with another 3,510 in preparation (see http://www.cen.eu/cenorm/aboutus/information/statistics/index.asp, accessed on 2 February 2007). By contrast, the European Commission has issued to date less than *two dozen* New Approach Directives (see Table 2).

What are the key points that emerge from the complexities of standards at the WTO and in the EU? For present purposes, there are at least two. First, it is not just technical regulations that potentially matter for trade. As we have shown, both technical regulations and product standards play a simultaneous and sometimes symbiotic role in the EU standardization context. Thus, both are relevant to African manufacturers interested in exporting to the EU. Both are also connected, though in very different ways, with the WTO *Agreement on TBTs*.

Second, standardization in Europe is not limited to New Approach sectors. CEN's own work—independently of EU Directives—leads to EU standards in other areas. And as the figures in the previous paragraph suggest, CEN has been most active in performing this role. It is therefore important to have an idea of the economic impact of CEN's standards, in particular from a development point of view.

3 The World Bank EU Standards Database

The empirical literature referred to in Section 1 makes clear the difficulty of assembling reliable and consistent data on product standards. (See WTO, 2005, for a review of the various data sources that are available.) In order to investigate the impact of EU standards on African textiles and clothing exports, we have collected original data on the extent of European standardization

in that sector over the period 1995-2003.[5] In this Section, we briefly discuss our methodology, compare it with alternative approaches, and present some basic descriptive results from the World Bank EU Standards Database (EUSDB).

As discussed above, there are no New Approach Directives covering the textiles and clothing sector. It is therefore not possible to use dummy variables for the application of Directives, as was done in previous work such as Brenton et al. (2001), Henry de Frahan and Vancauteren (2006), Chen and Mattoo (2004), and Baller (2007).

One alternative would be to use TBT notification data from the WTO, as in Fontagné et al. (2005) and Disdier et al. (2007).[6] However, we do not favor that approach for two reasons. First, WTO rules only require Members to notify technical regulations, not product standards (Article 2.9 of the *Agreement on TBTs*). Given the importance of voluntary product standards in Europe, it seems unduly restrictive to focus only on mandatory measures. Second, it is far from clear that individual Members interpret Article 2.9 in the same way, thereby raising concerns of data consistency. For instance, Belgium has lodged 207 TBT notifications since 1995, whereas Ireland has apparently not submitted any.[7] It seems unlikely that such a large discrepancy can be fully explained by substantive differences in standardization practices between the two countries. As a result, we are not convinced that WTO notifications data always provide an accurate picture of the standards environment in all Members.

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[5] The World Bank EUSDB will be made freely available through the website http://econ.worldbank.org/projects/trade_costs.

[6] The non-tariff measures section of UNCTAD's TRAINS database only has EU data for the year 1999.

[7] See the online search feature available through http://www.wto.org/english/tratop_e/tbt_e/tbt_e.htm, accessed on 31 January 2007.

In assembling the World Bank EU Standards Database), we follow the approach of Swann et al. (1996) and Moenius (2000, 2004, 2006). We rely primarily on Perinorm (www.perinorm.com), an extremely rich bibliographic database maintained by the British, French, and German standard-setting bodies. It contains over 1.1 million records from 22 (mostly OECD) countries. Each record corresponds to a single national, regional, or international standard. It provides a short verbal description, from which it is usually possible to identify the product or sector to which the standard applies. Perinorm also indicates when links exist to equivalent standards in other jurisdictions, including at the regional (CEN) and international (ISO) levels. It is therefore possible to identify with precision both the stock of EU standards, and the subset of them that translate ISO norms into local practice. We refer to this second category of European standards as being "harmonized with ISO standards" or "internationally harmonized".[8]

It is important to highlight that Perinorm is not primarily intended as a tool for research. On the one hand, this is a strength: Perinorm is designed to facilitate industry access to—and purchase of—product standards, which suggests that there is a commercial incentive to ensure completeness.[9] This end-user focus makes Perinorm somewhat unwieldy for doing applied international trade work. In particular, Perinorm classifies standards according to the International Classification for Standards (ICS), for which there is no concordance to the product

[8] We are using equivalency with ISO standards as a proxy for harmonization with de facto international standards. Due to lack of data, our analysis excludes private standards, or norms issued by other bodies, which might also fulfill a similar role. However, we are confident that we are capturing an important part of international standardization activity in this area, since ISO has issued over 300 standards affecting the textiles and clothing industry. These standards focus on test methods and specifications that help promote product consistency and conformity to expectations (ISO, 2004). ISO's work in this area involves 25 participating countries and 52 observers (http://www.iso.org/iso/en/stdsdevelopment/tc/tclist/TechnicalCommitteeDetailPage.TechnicalCommitteeDetail?COMMID=1479, consulted on 26 February 2007).

[9] It can be argued that the incentive structure in place for TBT notifications works in the opposite direction, since Members do not want to "invite" WTO disputes by providing information on changes in their technical regulations.

classifications commonly used in trade analysis. For textiles and clothing, the ICS is relatively imprecise in its classifications: heading 61.020 “clothes” is distinguished from 61.040 “headgear” and 61.060 “footwear”, but it is not possible to drill down to any lower level of disaggregation. We therefore have to rely both on the ICS classification and on verbal descriptions to manually map standards to Harmonized System products.

The data collection process for the World Bank database works as follows. First, Perinorm is searched for EU standards (coded as “EN”), and basic information is extracted manually from individual records. We limit attention to those documents identified as “standards” by Perinorm, and exclude all other document types included in the database. (Moenius, 2000, identifies 39 partially overlapping document types in Perinorm.) Data captured for each standard include the dates of entry into force and withdrawal, and a 1-0 dummy variable indicating harmonization with an ISO standard. That variable is coded according to whether or not Perinorm includes an ISO standard in its list of linked standards within each record, along with a code indicating that it is “equivalent” or “identical”. In the second stage, each standard is mapped to one or more HS 4-digit products using the short, verbal description provided by Perinorm, as well as its ICS code. Next, we cross-check all of the above information against CEN’s online standards catalogue (http://www.cen.eu/catweb/cwsen.htm). Then finally, we produce simple counts of the number of standards affecting each HS 2- and 4-digit product category over the period 1995-2003. A standard is considered to be in force for a given year if it came into force before or during that year. If it is withdrawn at some point during the year, it is still assumed to be in force for the entire year. Amendments to existing standards are counted as additional standards.

It is useful to provide a simple example of the above process. Standard number EN 20105 provides a series of tests for determining the color fastness to washing of textiles. It is typical of

the type of standards the World Bank database captures, since they mostly relate to testing and product specifications. CEN introduced EN 20105 in 1992, and amended some parts of it in 1994. It is therefore considered to be in force at all times during the database sample period (1995-2003). Since EN 20105 implements ISO standard 105, it is coded as being harmonized with ISO standards. The standard applies to all textiles, and is therefore mapped to all HS 2- and 4-digit codes that cover that product category, namely Chapters 50-63. As this example makes clear, individual standards often have very wide product coverage.[10] It is for this reason that in what follows, we aggregate the data so as to distinguish amongst three "sub-sectors" rather than 14 HS Chapters. Those sub-sectors are clothing (HS 61-63), fabrics (HS 56-60), and fibers (HS 50-55).

Tables 3-7 and Figures 1-5 contain some basic descriptive results from World Bank database. A number of trends are apparent over the sample period (1995-2003). First, EU standards are distributed unevenly across sub-sectors (Table 3 and Figure 1). Clothing accounts for only a modest fraction of the overall number of harmonized standards, a little over 10%. The main standardization activity has been in relation to fibers and fabrics, each of which account for around 45% of the total number of harmonized standards. This division is reasonably constant throughout the sample period.

Meanwhile, Table 4 and Figure 2 show that aggregating across sub-sectors, the share of internationally harmonized EU standards increased between 1995 and 1999, before falling for the remainder of the period. The overall movement involved is not large, however: the extreme shares are 45% and 56%. A more stark contrast appears when we compare the experiences of the

[10] The correspondence table in Moenius (2000) between ICS and SITC categories discloses the same dynamic.

three sub-sectors. The share of harmonized standards for both clothes and fabrics increases markedly over the sample period, from an admittedly low baseline in both cases (Tables 5-6 and Figures 3-4). However, the opposite dynamic is apparent for fibers: the share of harmonized standards rises slightly between 1995 and 1998, but then falls markedly for the remainder of the period (Table 6 and Figure 5). The contrast between the three sub-sectors at the end of the sample period is also interesting: for fibers, over 80% of standards are harmonized with ISO standards, while the figure is just 20% for clothes and a little under 30% for fabrics.

It is important to stress that at this stage, the World Bank data covers Community-level standards only. Since the standard setting body in each EU Member State is required to translate such norms into local standards, our data therefore also capture part of the standardization activity of each individual country. However, we do not currently have data on country-specific standards in EU Member States. There are two main reasons for this. First, data availability in Perinorm varies considerably from country to country. Without any simple cross-check, such as the CEN online catalog, it is difficult to be sure that a dataset of national standards is in fact capturing all relevant information. Second, standardization at the country level has been ongoing for a much longer time span that at the regional level. As a result, it is necessary to go much further back in history in order to make a reliable assessment of the total stock of standards in force at any given time. Not unexpectedly, Perinorm's coverage becomes more patchy the further back one goes (Moenius, 2000), thus rendering it particularly difficult to obtain accurate stock information for those countries with a long history of standardization.

4 Model and Estimation Results

In this Section, we provide some basic intuition for the empirical question we are examining in this paper. We then present our empirical model and estimation results. We keep the theoretical presentation highly stylized in order to make the basic mechanisms as clear as possible.

Starting from a benchmark of free and standard-less trade, the introduction of foreign product standards imposes two sorts of costs on exporters. On the one hand, there is a fixed cost of product adaptation to meet the foreign standard. In addition, there is the marginal cost of demonstrating conformity, in addition to any higher per unit production costs the standard itself may imply. Tables 8-10 present some firm-level evidence on the extent of these effects, taken from the World Bank's Technical Barriers to Trade Database. Design costs and testing/certification costs play a significant role in firm decisions whether or not to export, and how much. Technical regulations are an important factor in expanding exports for most surveyed firms.

For simplicity, we assume that the costs of compliance are uniform across countries.[11] Intuitively, there are two main channels through which standards can affect trade flows.[12] On the one hand, higher variable costs mean that exporting firms tend to export less due to the presence of increased trade frictions. But in addition, higher fixed costs make it harder for producers to export at all, since the hurdle they must jump in order to gain access to a foreign market is

[11] Relaxing this assumption could be a promising avenue for future research. Intuitively, differential compliance costs would provide an additional mechanism whereby the effects on standards "insiders" would differ from those on "outsiders"—including developing countries.

[12] For simplicity, we leave to one side the kinds of information benefits posited by Swann et al. (1996), and Moenius (2004, 2006). Due to data constraints in the empirical part of the paper, we also exclude the possibility of cumulative effects, whereby standards relating to intermediate inputs indirectly impact the fixed and variable production costs of final products.

higher. In other words, standards can plausibly be linked both to effects on export volume and the propensity to export (Chen et al., 2006; Baller, 2007; Chen and Mattoo, 2006).

Next, we consider introduction of an internationally harmonized standard in one potential export market.[13] This means that the same standard applies in that market as in a composite "rest of the world" region. By comparison with a standard-less benchmark, this scenario will still tend to reduce trade through the two mechanisms discussed in the previous paragraph. That effect will generally be weaker than if each harmonizing country implemented its own distinct standard: instead of paying one fixed and variable market access cost for the whole region, an exporter would have to pay multiple costs.

Consolidating the foregoing, we expect that standards will generally exhibit a negative impact on trade, but that such effects will be mitigated when these standards are aligned with de facto international standards. Given the data we have available, our working hypothesis is therefore the following: EU standards that are harmonized with international standards (proxied here by ISO standards) exert a less negative impact on African export volumes and propensity than those standards which are not.[14]

4.1 Empirical Model

To examine this hypothesis, we use a standard gravity model of international trade applied to data on EU-15 imports of textiles and clothing from Sub-Saharan Africa (see Table 11 for

[13] We assume that the fixed and variable costs of compliance do not vary too much across standards. We are therefore in the "horizontal" standards paradigm, in which differing norms reflect culturally influenced preferences and traditions rather than objective restrictiveness (Baldwin, 2000).

[14] Since the policy question that motivates our research relates to the differential effect of harmonized versus non-harmonized standards, it is not strictly necessary for us to make any particular hypothesis as to the sign of the individual coefficients. It should still be possible to test our hypothesis even in the presence of the type of positive information effects found by Moenius (2004).

variable definitions and sources, and Table 12 for countries included in the sample). Our sample period is 1995-2003. As previously noted, individual EU standards in this area often tend to cut across numerous HS product lines, which makes it desirable to aggregate the trade data to a higher level of generality. We therefore retain the distinction between clothes (HS 61-63), fabrics (HS 56-60), and fibers (HS 50-55) that was used above, and we aggregate all data to those categories.

We take the micro-founded gravity model formulation of Anderson and Van Wincoop (2003, 2004) as our starting point:

$$\log\left(X_{ijt}^{k}\right)=\log\left(E_{jt}^{k}\right)+\log\left(Y_{it}^{k}\right)-\log\left(Y_{t}^{k}\right)+\left(1-\sigma_{k}\right)\log\left(t_{ijt}^{k}\right)-\left(1-\sigma_{k}\right)\log\left(P_{jt}^{k}\right)-\left(1-\sigma_{k}\right)\log\left(\Pi_{it}^{k}\right)+\varepsilon_{ijt}^{k} \qquad (1)$$

Where: X_{ijt}^{k} = Exports from country i to country j in sector k for year t; Y_{it}^{k} = Output of country i in sector k for year t; E_{jt}^{k} = Expenditure of country j in sector k for year t; Y_{t}^{k} = Aggregate (world) output in sector k for year t; σ_{k} = Elasticity of substitution in sector k; t_{ijt}^{k} = Trade costs facing exports from country i to country j in sector k for year t; ; ω_{it}^{k} = Country i's output share in sector k for year t; ω_{jt}^{k} = Country j's expenditure share in sector k for year t; and ε_{ijt}^{k} = Random error term, satisfying the usual assumptions. Inward resistance $\left(P_{jt}^{k}\right)^{1-\sigma_{k}}=\sum_{i=1}^{N}\Pi_{it}^{\sigma_{k}-1}\omega_{it}^{k}\left(t_{ijt}^{k}\right)^{1-\sigma_{k}}$ captures the fact that j's imports from i depend on trade costs across all suppliers. Outward resistance $\left(\Pi_{it}^{k}\right)^{1-\sigma_{k}}=\sum_{j=1}^{N}P_{jt}^{\sigma_{k}-1}\omega_{jt}^{k}\left(t_{ijt}^{k}\right)^{1-\sigma_{k}}$, by contrast, captures the dependence of exports from i to j on trade costs across all importers.

We modify the bilateral trade costs component of the standard model so as to explicitly include our standards counts, differentiating between the number of EU standards that are harmonized

with ISO standards (*stds_iso*) and the number that are not (*stds_non*). The trade cost function also includes, as is usual in this literature, the distance between pairs of trading countries (*dist*), and dummy variables to take account of important geographical and cultural links such as a common border (*contig*), colonial links (*colony*) and a common official language (*comlang_off*).[15] We therefore specify:

$$\log\left(t_{ijt}^{k}\right) = \gamma_1 \log(stds\_iso_t^k) + \gamma_2 \log(stds\_non_t^k) + \beta_1 \log\left(dist_{ij}\right) + \beta_2 colony_{ij} + \beta_3 comlang\_off_{ij} \quad (2)$$

As Anderson and Van Wincoop (2003, 2004) suggest, estimation of their model can be simplified by replacing the "multilateral resistance" terms with appropriate fixed effects. In this case, a strict interpretation of their structural model requires fixed effects in the importer-sector-time, exporter-sector-time, and sector-time dimensions (compare Baldwin and Taglioni, 2006, on this point). In principle, it would also be necessary for the trade costs coefficients to vary across sectors due to differences in the intra-sectoral elasticity of substitution. However, this approach necessitates estimation of a large number of parameters. In order to obtain useful results, it requires substantial variation at a very fine level in the independent variables. For our baseline model (3), we therefore prefer a simpler formulation using fixed effects only in the exporter (θ_j), importer (δ_i), product (ψ_k), and year (τ_t) dimensions. These fixed effects control for country-specific, time-invariant factors, along with time-varying factors that affect all exporting countries. This last category includes reform of the EU quota system—for which we do not have direct data—during implementation of the WTO *Agreement on Textiles and Clothing*. It also

[15] There are two reasons why we do not include applied tariffs in the trade costs function. First, most African countries have had access over the sample period to very low or zero duty access to the European market in this sector. Second, the most significant set of trade policy measures affecting textiles and clothing over this period was the ATC quota system, not tariffs.

captures the general effects of rules of origin, another relevant factor for which we do not have direct data.

$$\log\left(imports_{ijt}^{k}\right) = \delta_i + \theta_j + \psi_k + \tau_t + \gamma_1 \log(stds\_iso_t^k) + \gamma_2 \log(stds\_non_t^k) + ... \\ ... + \beta_1 \log\left(dist_{ij}\right) + \beta_2 colony_{ij} + \beta_3 comlang\_off_{ij} + \varepsilon_{ijt}^{k} \quad (3)$$

The above formulation captures the impact of trade costs on bilateral trade volumes. In terms of our working hypothesis, therefore, we expect $\gamma_2 < \gamma_1 < 0$. However, the impact that we are capturing is conditional on trade taking place between the two countries, i.e. on $imports_{ijt}^{k} > 0$. Zero or missing trade flows are excluded from the effective sample in (3), which has been shown to bias the resulting coefficient estimates (e.g., Helpman et al., 2007). Moreover, (3) on its own does not allow us to say anything about the second part of our working hypothesis, which has to do with export propensity.

To address these two problems together, we use a Heckman (1979) sample selection model.[16] It postulates two equations, namely an outcome equation which takes the form of (3), and a selection equation. The selection equation determines the probability that a given observation is included in the effective sample for the outcome equation. The two equations are linked by a correlation ρ, which compensates for the sample selection bias that would otherwise pertain. For the time being, we assume that the same explanatory variables appear in both equations. The model is therefore just-identified, and parameter estimates can be obtained by maximum likelihood estimation of the two equations jointly. (Davidson and MacKinnon, 2004, argue that it is desirable for the model to be over-identified, and we return to this point below.)

[16] For other examples in the standards context, see Baller (2007) and Chen and Mattoo (2004). Heckman (1979) models have also been used in the wider gravity model literature: e.g., Helpman et al. (2007), Francois and Manchin (2007), and Brenton and Hoppe (2007).

Before moving to our empirical results, it is important to address the question of possible endogeneity of our standards count variables *stds_iso*, and *stds_non*. The number of standards in a particular sector could, in a general sense, be endogenous to imports through a political economy process. However, none of the African countries we are dealing with here has a large European market share. It is therefore unlikely that sector-wide standards—which apply to both domestic production and imports from all sources—are set in response to unexpectedly large imports from a single African country in a single year. Although we do not expect major endogeneity problems in this case, we ensure the robustness of our results by using alternately current and lagged standards counts (one, two, and five years).

4.2 Baseline Results

We now move on to our results (Table 13). OLS estimates (Column 1) have coefficients with the expected signs and reasonable magnitudes. Amongst the standard gravity variables, distance is negative and statistically significant, while a colonial relationship (statistically significant) and common official language (statistically insignificant) are both positive. We find that both of our standards counts *lstds_iso* and *lstds_non* are negative. However, only the coefficient on *lstds_non* is statistically significant. It is also of far greater magnitude than the coefficient on *lstds_iso*—the two differ by a factor of around five—which suggests that in terms of both economic and statistical significance, it is primarily non-harmonized EU standards which exert a negative impact on African textiles and clothing exports. While there is evidence of a negative effect also for harmonized standards, it is much weaker. A formal hypothesis test of equality between the two coefficients confirms this view (rejection at the 5% level).

Columns 2-3 of Table 13 present results for the baseline Heckman (1979) model, in which the selection and outcome equations both have the same set of explanatory variables (i.e., the model

is just-identified). Coefficient estimates in the outcome equation are broadly comparable with the OLS case, but there are some important differences in terms of economic and statistical significance. The distance elasticity increases (in absolute value terms) from -1.5 to -2.5, and is significant at the 1% level. Both the colonial link and common official language dummies are now significant at the 1% and 5% levels respectively, and the coefficient for the latter is considerably larger. We take these changes as evidence that, in the present context, the presence of zero trade flows in our dataset can lead to noticeable bias if OLS estimates are not corrected. This is supported by the relatively high estimated correlation between the error terms in the selection and outcome equations (Rho=0.66).

In terms of our variables of primary interest, namely *lstds_iso* and *lstds_non*, we find that Heckman estimation makes a significant change to the latter only: its coefficient is now larger in absolute value than under OLS, -0.8 versus -0.5. The coefficient on internationally harmonized EU standards remains negative but statistically insignificant, and is now smaller in absolute value than the coefficient on non-harmonized standards by a factor of nearly ten. Again, a formal hypothesis test confirms the significance of the difference between the two coefficients at the 1% level.

In addition to correcting some apparent bias in the OLS estimates, the Heckman results also contain some useful information in their own right. We interpret the estimated coefficients of the selection equation as summarizing the impact of different variables not directly on trade flows, but on the propensity to export. Following Helpman et al. (2007), we can go further and relate the selection equation to fixed cost effects, and the outcome equation to marginal cost effects. With this interpretation in mind, we can see that the results in column 3 of Table 13 are consistent with sensible analytical priors as to coefficient sign: distance is negative and

statistically significant, while colonial links and a common official language are both positive and statistically significant.

Interestingly, we find that non-harmonized European standards exert a negative and statistically significant influence on export propensity. However, standards that are aligned with ISO standards carry a statistically insignificant and (slightly) positive coefficient. These standards impact export propensity only very weakly, but to the extent that we can measure such an impact, it would appear that these types of EU standards actually increase export propensity (cf. Moenius, 2004).

The combined results from the selection and outcome equations therefore suggest that EU standards not harmonized to international norms tend to impose significant added costs on exporters, both fixed and variable. In both the selection and outcome equations, the difference in impact between ISO and non-ISO standards is statistically significant at the 1% level.

4.3 Robustness Checks

The above discussion is subject to a well-known caveat: the estimated coefficients from a just-identified Heckman model like the one presented in Columns 2-3 of Table 13 tend to exhibit considerable instability (Davidson and MacKinnon, 2004). It is preferable to specify an over-identified form of the same model, which can be achieved by including at least one variable in the selection equation that does not appear in the outcome equation. However, the existing literature has highlighted the difficulty of finding such a variable in practice. On empirical grounds, Baller (2007) uses WTO membership. Helpman et al. (2007) use (alternately) common religion, and a measure of the cost of starting a business taken from the World Bank's *Doing Business Report*. The disadvantage of using data from *Doing Business* is that they are only

available for the years 2003-2006. Given that our sample runs between 1995 and 2003, it is not feasible in our case to take the same approach as Helpman et al. (2007).

We therefore propose an alternative. In developing countries, and particularly in Africa, firms' ability to cover the fixed costs of complying with foreign standards is influenced by the level of financial development in the exporting country. If credit is expensive and/or hard to come by, then it will be more difficult for firms to pay the fixed costs of exporting. We therefore expect a measure of exporter financial development to be directly correlated with export propensity.[17] Even though such a measure could conceivably be correlated with export-conditional trade flows as well—since firms might need credit to support ongoing costs in addition to the fixed costs of startup—we expect that the connection will be much weaker, thereby justifying inclusion of financial development in the selection equation but not in the outcome equation.[18] (For recent theoretical work in this vein, see Chaney, 2005, and Manova, 2006.)

Results from this approach are presented in Columns 4-5 of Table 13. As expected, financial development—as measured by domestic credit to the private sector as a percentage of GDP—is positively and significantly (5%) associated with export propensity.[19] We interpret this as indicating that credit constraints can exert a significant impact on African textiles and clothing exporters. All other estimated coefficients have the same signs and very similar magnitudes to

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[17] We leave it to future research to examine the possible role of foreign direct investment in loosening the credit constraint postulated here.

[18] We check this assumption empirically by conducting an additional regression (not reported) that includes financial development in both the selection and outcome equations. We find, as expected, that the coefficient is positive and 5% significant in the former, but positive and insignificant at the 10% level in the latter. In all other respects, results are very similar to those reported in Columns 4-5 of Table 13. (Cf. Manova, 2006, who finds evidence that financial development is significant in both the selection and outcome equations.)

[19] Note that domestic credit as a percentage of GDP enters the equation in levels, not logarithms. Hence, the estimated coefficient can be interpreted as an elasticity.

those obtained using the just-identified Heckman model discussed above. That our results are consistent in this way suggests that our conclusions are robust to the parameter instability that is often a feature of just-identified Heckman models.

As noted above, another potential difficulty with our results is the possible endogeneity of our standards measures. To deal with this issue, we re-run the model in columns 4-5 of Table 13 using one, two, and five period lags of *lstds_iso* and *lstds_non*. Table 14 presents our results. Qualitatively, they are identical to those from our baseline model: non-ISO standards exert a negative impact on trade values and export propensity, although the latter relationship is only statistically significant at the 10% level in one of the three formulations. The estimated coefficients on harmonized standards, on the other hand, are uniformly positive. With two lags, the effect is statistically significant at the 1% level in the selection equation, while with five lags it is 5% significant in the outcome equation. In all cases except one—the selection equation for the model using five lags—the difference between the estimated coefficients on harmonized and non-harmonized standards is statistically significant at the 1% level. If anything, accounting for endogeneity by using lags tends to strengthen our initial results.

As a final robustness check, we re-estimate the baseline model using the Poisson estimator advocated by Santos Silva and Tenreyro (2006). Those authors show that Poisson produces consistent estimates in the presence of zero trade values. Moreover, the estimator is known to be consistent under relatively weak assumptions (i.e., the data need not follow a Poisson process at all), and it does not suffer from the incidental parameters problem which generally gives rise to inconsistency and bias concerns in nonlinear fixed effects models (including the Heckman

model).[20] It therefore represents a flexible and increasingly common alternative to the Heckman estimator in a gravity context, even though it comes at the price of losing direct information on export propensity.

Poisson results are presented in column 6 of Table 13. With the exception of the colony dummy, all estimated coefficients have the expected signs and economically sensible magnitudes. (The colony coefficient, though negative, is not statistically significant at the 10% level.) The distance and language effects are noticeably stronger in the Poisson estimates than in other formulations. Most importantly, we find that non-harmonized standards have an estimated coefficient which is negative and 1% significant, while the coefficient on harmonized standards is slightly positive but statistically insignificant. Once again, a formal test rejects the null hypothesis of equality between the two coefficients at the 1% level. We can be confident, therefore, that our results are robust to the use of this common alternative estimator.

5 Conclusion

We have shown that there is empirical evidence to support the hypothesis that EU standards harmonized with international norms (proxied here by ISO standards) exert a less negative impact on African export volumes and propensity than standards which are not harmonized. While previous empirical work has supported the existence of an insider-outsider dynamic in terms of the trade effects of standardization, this paper is, to our knowledge, the first to consider explicitly the impact of international harmonization.

[20] On these points, see Greene (2004) and Wooldridge (1997).

The policy implications of these results are of significant interest. On the one hand, our analysis suggests that it is indeed appropriate for the WTO *Agreement on TBTs* to champion the use of international standards whenever possible. If Members follow this path, they can help limit the negative effects of standardization and harmonization on outsiders—and in particular, on developing countries. However, our evidence—combined with existing results due to Swann et al. (1996) and Moenius (2004, 2006)—suggests that it is not just mandatory technical regulations that can have significant trade impacts, but voluntary product standards as well. As previously noted, the WTO's treatment of these two groups of norms is asymmetric: technical regulations are subject to relatively stringent requirements that are directly enforceable through WTO dispute settlement proceedings, whereas the position for product standards is considerably more blurred. There may well be a case to be made in the future for redressing this imbalance.

In regard to future research work in this area, we view three areas of particular interest. First, it will be important to test the applicability of our findings to other sectors, in particular those that are of export interest to developing countries. Second—and flowing from the previous point—there is likely to be a high payoff from investing in improved data in this area. Research on non-tariff measures generally, and product standards in particular, suffers from a chronic lack of detailed, reliable, and comprehensive data. Clearly a major effort is required to remedy this situation, in particular if attention is to be paid both to mandatory technical regulations and voluntary product standards.

Finally, the World Bank EU standards database discloses significant cross-sectoral differences in the number and type (harmonized or not) of standards. Future work could usefully investigate the determinants of that variation. Just as political economy has proved a useful tool for analyzing

cross-sectoral variation in trade policy measures, so too do we expect it to play an important role in elucidating similar variation in standard setting behavior.

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Tables

Table 1: Investment costs to comply with technical requirements (% of firm sales). Source: Maskus et al. (2005).

	Mean	Std. Dev.	Min	Max	No. of Obs.
Sub-Saharan Africa	7.65	23.12	0	124	39
Eastern Europe	3.74	8.26	0.03	55.65	38
Latin America	2.56	3.28	0.01	13.36	21
Middle East	6.67	11.59	0.04	44.1	20
South Asia	1.79	3.04	0.02	15.75	41
Textiles and clothing sector (all regions)	2.73	6.8	0.01	44.1	46

Table 2: EU "New Approach" Directives. (Source: http://www.newapproach.org/Directives/DirectiveList.asp, accessed 8 February 2007.)

Directive	Sectors Covered
90/396/EEC	Appliances burning gaseous fuels
00/9/EC	Cableway installations designed to carry persons
89/106/EEC	Construction products
89/336/EEC	Electromagnetic compatibility
94/9/EC	Equipment and protective systems in potentially explosive atmospheres
93/15/EEC	Explosives for civil uses
95/16/EC	Lifts
73/23/EEC	Low voltage equipment
98/37/EC	Machinery safety
2004/22/EEC	Measuring instruments
90/385/EEC	Medical devices: Active implantable
93/42/EEC	Medical devices: General
98/79/EC	Medical devices: In vitro diagnostic
92/42/EEC	New hot-water boilers fired with liquid or gaseous fluids (efficiency requirements)
90/384/EEC	Non-automatic weighing instruments
94/62/EC	Packaging and packaging waste
89/686/EEC	Personal protective equipment
97/23/EC	Pressure equipment
99/5/EC	Radio and telecommunications terminal equipment
94/25/EC	Recreational craft
87/404/EEC	Simple pressure vessels
88/378/EEC	Toys safety

Table 3: Count by sub-sector of EU standards in textiles and clothing, 1995-2003. (Source: World Bank EUSDB.)

	Clothes	Fabrics	Fibers
1995	15	49	53
1996	18	59	66
1997	20	73	91
1998	28	86	101
1999	32	101	122
2000	28	119	130
2001	32	131	137
2002	35	136	145
2003	41	149	154

Table 4: Count by type of EU standards in the textiles and clothing sector, 1995-2003. (Source: World Bank EUSDB.)

Year	ISO Standards	Non-ISO Standards
1995	53	64
1996	70	73
1997	96	88
1998	119	96
1999	145	110
2000	155	122
2001	158	142
2002	168	148
2003	178	166

Table 5: Count by type of EU standards covering clothing (HS 61-63), 1995-2003. (Source: World Bank EUSDB.)

Year	ISO Standards	Non-ISO Standards
1995	1	14
1996	1	17
1997	1	19
1998	5	23
1999	6	26
2000	6	22
2001	7	25
2002	8	27
2003	8	33

Table 6: Count by type of EU standards covering fabrics (HS 56-60), 1995-2003. (Source: World Bank EUSDB.)

Year	ISO Standards	Non-ISO Standards
1995	4	45
1996	9	50
1997	11	62
1998	21	65
1999	31	70

2000	33	86
2001	34	97
2002	37	99
2003	43	106

Table 7: Count by type of EU standards covering fibers (HS 50-55), 1995-2003. (Source: World Bank EUSDB.)

Year	ISO Standards	Non-ISO Standards
1995	48	5
1996	60	6
1997	84	7
1998	93	8
1999	108	14
2000	116	14
2001	117	20
2002	123	22
2003	127	27

Table 8: Reasons for not exporting, % of surveyed firms, broken down by source. (Source: World Bank Technical Barriers to Trade Database.)

	Sub-Saharan Africa	Eastern Europe	Latin America	Middle East	South Asia
Design costs	58	90	67	69	65
Testing/certification costs	59	91	73	64	64

Table 9: Reasons for not exporting, % of surveyed firms, broken down by destination. (Source: World Bank Technical Barriers to Trade Database.)

	EU	Australia	Canada	Japan	USA
Design costs	70	68	66	68	71
Testing/certification costs	73	66	66	67	71

Table 10: Important factors in expanding exports, % of surveyed firms, broken down by source. (Source: World Bank Technical Barriers to Trade Database.)

	Sub-Saharan Africa	Eastern Europe	Latin America	Middle East	South Asia
Technical regulations	69	79	75	50	57

Table 11: Data and sources.

Variable	Description	Year	Source
$Colony_{ij}$	Dummy variable equal to 1 if country i colonized country j at any time, else zero.	NA	Mayer and Zignago (2006)
$Distance_{ij}$	Great circle distance between the largest cities in countries i and j.	NA	Mayer and Zignago (2006)
Domestic $Credit_{jt}$	Domestic credit to the private sector (% of GDP)	1995-2003	World Development Indicators
$Imports_{ijkt}$	Imports of country i from country j in sector k for year t. HS 2-digit data aggregated to three sectors: fibers (50-55), fabrics (56-60), and clothing (61-63).	1995-2003	WITS-COMTRADE
ISO $Standards_{kt}$	Count of ISO-harmonized EU standards in sector k for year t. (One is added prior to conversion to logarithms.)	1995-2003	World Bank EUSDB
$Language_{ij}$	Dummy variable equal to 1 if countries i and j have a common	NA	Mayer and Zignago

	official language, else zero.		(2006)
Non-ISO Standards$_{kt}$	Count of non-ISO-harmonized EU standards in sector k for year t. (One is added prior to conversion to logarithms.)	1995-2003	World Bank EUSDB

Table 12: Countries included in the dataset.

Country Group	Members
Importers (EU-15)	Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, United Kingdom.
Exporters (Sub-Saharan Africa)	Angola, Benin, Botswana, Burkina Faso, Burundi, Cameroon, Cape Verde, Central African Republic, Chad, Comoros, Democratic Republic of Congo, Republic of Congo, Côte d'Ivoire, Equatorial Guinea, Eritrea, Ethiopia, Gabon, The Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritania, Mauritius, Mozambique, Namibia, Niger, Nigeria, Rwanda, Sao Tome and Principe, Senegal, Seychelles, Sierra Leone, Somalia, South Africa, Sudan, Swaziland, Tanzania,, Togo, Uganda, Zambia, Zimbabwe.

Table 13: Baseline regression results.

	OLS	Heckman		Heckman		Poisson
		Outcome	Selection	Outcome	Selection	
ISO Standards	-0.099	-0.098	0.006	-0.069	0.017	0.029
	[0.107]	[0.109]	[0.049]	[0.109]	[0.050]	[0.046]
Non-ISO Standards	-0.532**	-0.846***	-0.324***	-0.851***	-0.326***	-0.423***
	[0.211]	[0.232]	[0.091]	[0.231]	[0.093]	[0.121]
Distance	-1.543*	-2.504***	-0.990***	-2.441**	-0.950***	-3.992**
	[0.890]	[0.941]	[0.288]	[0.953]	[0.293]	[1.551]
Colony	0.689***	0.866***	0.337***	0.874***	0.361***	-0.362
	[0.246]	[0.241]	[0.097]	[0.245]	[0.102]	[0.260]
Language	0.15	0.520**	0.427***	0.550**	0.427***	1.911***
	[0.209]	[0.227]	[0.086]	[0.229]	[0.088]	[0.335]
Domestic Credit					0.004**	
					[0.002]	
Constant	16.902**	16.388**	10.190***	18.079**	10.338***	43.414***
	[7.353]	[8.032]	[2.665]	[7.962]	[2.733]	[14.239]
Observations	5026	19035	19035	18270	18270	19035
R-squared	0.49					
H0: ISO=Non	5.49**	13.23***	19.51***	14.49***	20.21***	12.84***
Rho		0.66***		0.65***		

(i) Dependent variable is log(imports) for OLS and Heckman, and imports for Poisson. All independent variables except domestic credit are in logarithms. All models contain fixed effects by exporter, importer, sector, and year (estimates omitted for brevity).

(ii) Robust standard errors corrected for clustering by country pair are in brackets. Statistical significance is indicated using * (10%), ** (5%), and *** (1%).

(iii) H0: ISO=Non is a test of the null hypothesis that the two standards coefficients are equal, using the appropriate F or chi-squared statistic. Rho is the estimated correlation between the selection and outcome equation errors in the Heckman model.

Table 14: Regression results using lagged standards measures.

	Heckman		Heckman		Heckman	
	Outcome	Selection	Outcome	Selection	Outcome	Selection
ISO Standards (t-1)	0.158	0.039				
	[0.121]	[0.052]				
Non-ISO Standards (t-1)	-0.387*	-0.284***				
	[0.224]	[0.097]				
ISO Standards (t-2)			0.089	0.133***		
			[0.114]	[0.050]		
Non-ISO Standards (t-2)			-0.707***	-0.136		
			[0.223]	[0.098]		
ISO Standards (t-5)					0.263**	0.052
					[0.112]	[0.053]
Non-ISO Standards (t-5)					-4.023***	0.086
					[1.304]	[0.610]
Distance	-2.334**	-0.929***	-2.515**	-0.881***	-3.016***	-0.950***
	[0.972]	[0.305]	[0.991]	[0.324]	[1.009]	[0.354]
Colony	0.862***	0.382***	0.842***	0.410***	0.813***	0.482***
	[0.251]	[0.106]	[0.257]	[0.111]	[0.296]	[0.137]
Language	0.540**	0.415***	0.574**	0.423***	0.660**	0.414***
	[0.230]	[0.091]	[0.233]	[0.096]	[0.264]	[0.118]
Domestic Credit		0.007*		0.006		0.008
		[0.004]		[0.005]		[0.007]
Constant	15.173*	9.396***	17.524**	5.651**	28.336***	9.470***
	[8.526]	[2.868]	[8.628]	[2.813]	[8.993]	[3.515]
Observations	16245	16245	14220	14220	8235	8235
H0: ISO=Non	7.17***	15.9***	13.84***	9.51***	10.19***	0
Rho	0.66***		0.66***		0.68***	

(i) Dependent variable is log(imports). All independent variables except domestic credit are in logarithms. All models contain fixed effects by exporter, importer, sector, and year (estimates omitted for brevity).

(ii) Robust standard errors corrected for clustering by country pair are in brackets. Statistical significance is indicated using * (10%), ** (5%), and *** (1%).

(iii) H0: ISO=Non is a test of the null hypothesis that the two standards coefficients are equal, using the appropriate F or chi-squared statistic. Rho is the estimated correlation between the selection and outcome equation errors in the Heckman model.

Figures

Figure 1: Breakdown by sub-sector of EU standards in textiles and clothing, 1995-2003. (Source: EUSDB.)

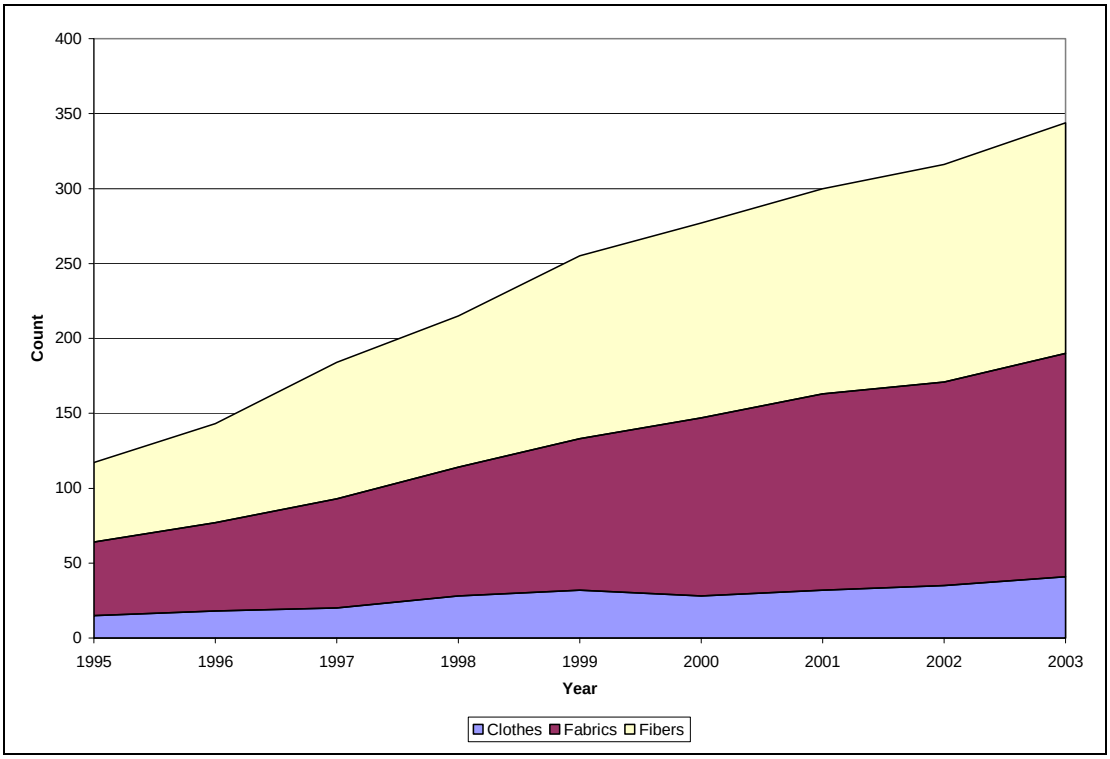

Figure 2: Breakdown by type of EU standards in textiles and clothing, 1995-2003. (Source: World Bank EUSDB.)

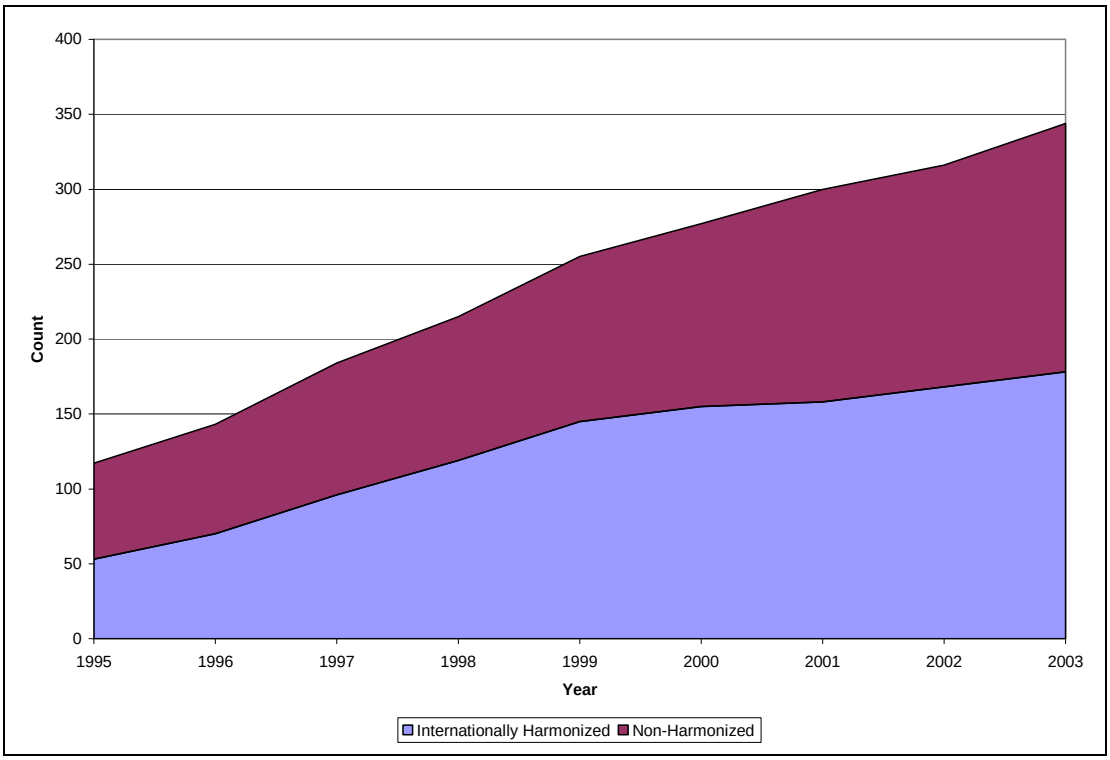

Figure 3: Breakdown by type of EU standards covering clothing (HS 61-63), 1995-2003. (Source: World Bank EUSDB.)

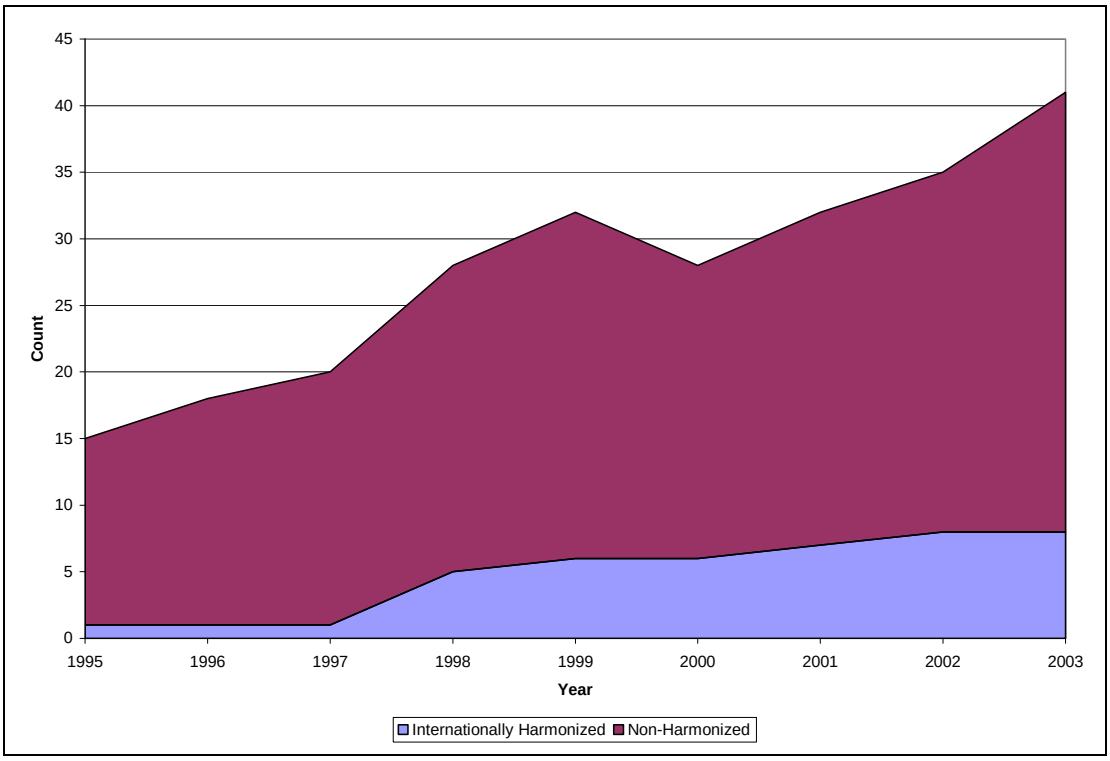

Figure 4: Breakdown by type of EU standards covering fabrics (HS 56-60), 1995-2003. (Source: World Bank EUSDB.)

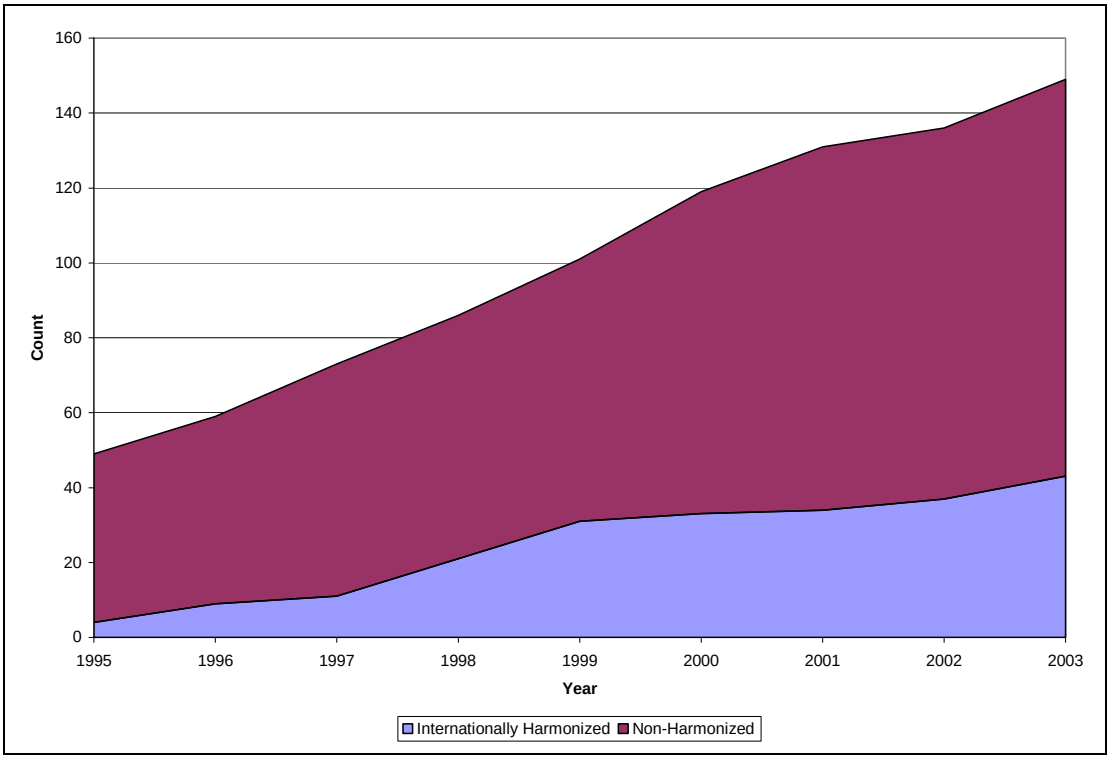

Figure 5: Breakdown by type of EU standards covering fibers (HS 50-55), 1995-2003. (Source: World Bank EUSDB.)