



## The trade-enhancing impact of product standard harmonisation

Product standards are a defining feature of industrial processes and citizens' everyday lives: from A4 paper size to 5G mobile telecommunications, product standards are omnipresent. Though their prevalence is largely unnoticed by consumers, producers have to incorporate the specifications of these standards into their design and production processes. These standardisation efforts are not confined to national borders. Quantifying the effect of cross-country standard harmonisation, we find that it is on average equivalent to a tariff reduction of 2.1 percentage points. Given their large number, these standardisation efforts thus outnumber the effect of conventional trade policy tools.

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**0.67%**

increase in trade flows

**2.1** percentage points

equivalent reduction  
in tariff rates

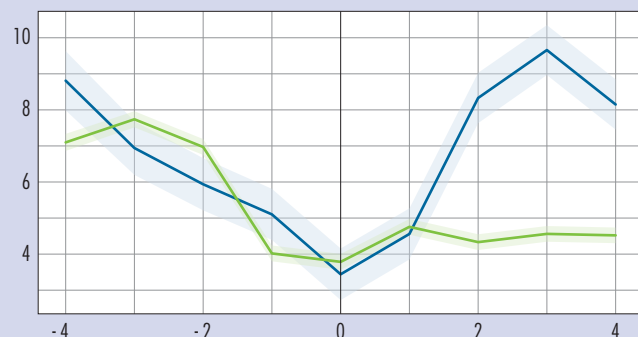
**0.27%**

average yearly contribution  
to world trade

### Growth rate of trade flows following harmonisation events

(x-axis: number of years, y-axis: % change)

— Harmonisation — No harmonisation



Source: Schmidt and Steingress (2019).

Note: This figure plots the mean growth rate before and after a harmonisation event for harmonised (treatment group) and non-harmonised trade flows (control group).



The concerns that were raised against trade-promoting policies in the light of free trade negotiations such as TTIP<sup>1</sup> and CETA,<sup>2</sup> have given way to worries about looming trade wars in the wake of Donald Trump's election.

However, a much more silent form of trade facilitation, which is not necessarily the direct result of government trade policy, is shaping the way firms produce and sell their output abroad: the elaboration of product standards and their cross-country harmonisation by standard-setting organisations, be they private or public. Take the example of general-purpose shipping containers that can be stacked on top of each other and used for ship, rail and truck transport, thus facilitating the onward travel of shipped goods and reducing shipping costs to a fraction of what they were before containerisation. The standardisation of containers, i.e. the definition of dimensions, construction features or tracking codes, was promoted by the *Bureau international des containers* (BIC), a private-sector organisation. Subsequently, standards disseminated by the International Organization for Standardization (ISO) in the 1960s led to the world-wide expansion of the use of standardised shipping containers. Consequently, world trade expanded rapidly, with the contribution of containerisation estimated to be higher than that of free trade agreements (Bernhofen et al., 2016).

### 1 Beyond health, environmental or safety regulations: omnipresence of standards

Product standards have been categorised as a major obstacle to trade (WTO, 2012). The harmonisation of these so-called non-tariff barriers to trade has been identified as a major policy tool to promote the growth of trade flows. In this respect, policy makers mainly look at product standards through a regulatory lens by concentrating on those standards that are legally binding such as health, safety or environmental standards.

This notwithstanding, the universe of product standards is much larger, covering aspects of production processes

and product attributes that are beyond regulatory concerns. The need for interoperability of complex technological systems (think about mobile phone technology or the internet) or compatibility of parts and components (think about screw threads or window frames) has led to the elaboration of standards that govern our everyday lives. Paper formats, electric plugs, railroad gauges and 5G mobile phone technology are prominent examples, but less obvious examples such as the composition of cement or fertilizer are abundant. Very often these serve the purpose of providing a production description to which producers can refer in order to categorise and advertise their products.

Industries often organise themselves independently of the government when it comes to the elaboration of product standards. Take the example of paper size formats. Standards regulating paper sizes such as A4 (standard: ISO 216:2007) or letter size (standard: ANSI/ASME Y14.1) exist despite the absence of an official law on paper sizes. Contrary to the common perception of trade economists who think of product standards as government-led regulatory efforts, much of the standardisation activities are undertaken by industry organisations and consortia (so-called standard-setting organisations, SSOs). Many SSOs are non-profit, non-governmental organisations. SSOs elaborate standards in working groups and technical committees that are composed of industry experts. For example, in ISO, there are technical committees on a variety of issues such as screw threads (ISO/TC 1), cosmetics (ISO/TC 217) or blockchain technologies (ISO/TC 307). The experts in those committees participate on behalf of private firms, and non-governmental and governmental agencies.

The bulk of these standardisation efforts are not confined to national borders, thus leading to the elaboration of harmonised standards. Many SSOs have an international scope: examples are IEEE, the Institute of Electrical and Electronics Engineers, or ASD-STAN, an industrial non-profit association which develops standards for the European aerospace and defence industry. In other

1 TTIP stands for Transatlantic Trade and Investment Partnership, a proposed free trade agreement between the European Union and the United States.

2 CETA stands for Comprehensive Economic and Trade Agreement, a free trade agreement between the European Union and Canada.



cases, national standard bodies such as AFNOR (*Association française de normalisation*) contribute to the dissemination of international standards by releasing equivalent, harmonised versions.

Given the abundance of harmonised standards, an obvious question is to what extent trade flows have been affected by these standardisation efforts. Much less politicised or publicised than conventional trade policies, these continuous efforts at the industry level shape the way products are designed and marketed and thus also traded internationally. Actually, the share of products that are subject to harmonisation is larger than the share of those affected by tariff changes, as shown in Chart 1.

## 2 Standard harmonisation as a catalyst of international trade

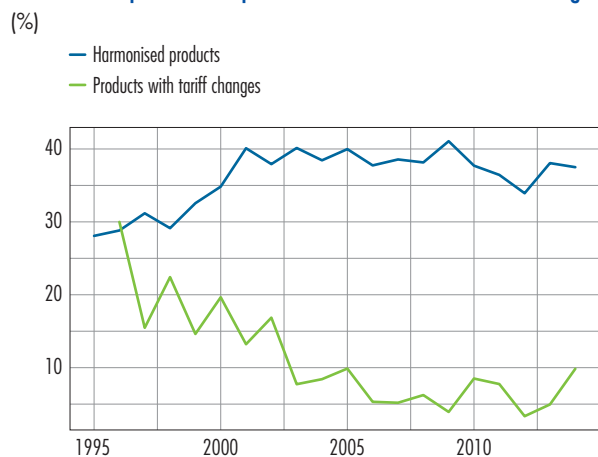
How do these developments impact trade flows? We attempt to give an answer to this question by estimating the average effect that a standardisation event has on bilateral trade flows (Schmidt and Steingress, 2019; see Chart 2). Comparing the growth rate of trade flows of harmonised and non-harmonised products before

and after a harmonisation event, one can see that bilateral exports of traded products pick up in the second year following a harmonisation event.

Using panel regression methods, we find that the release of a harmonised standard is associated with an increase in trade flows of 0.67%. Our estimated results are subject to endogeneity concerns, among others the concern that intensively traded products are subject to standard harmonisation more frequently. We address these concerns in a number of robustness checks, such as controlling for pre-trends, using a supranational and arguably exogenous measure of harmonisation as well as using instrumental variable techniques. We also show that our results are not driven by the fact that harmonisation may primarily occur in product categories with larger trade flows. All in all, the results are robust and quantitatively similar.

How does the increase of 0.67% in trade flows compare to observable changes in trade costs? To answer this question, we calculate the so-called ad-valorem equivalent (AVE) of tariffs following Kee and Nicita (2016). It measures the hypothetical percentage-point change in the tariff

### C1 Share of products subject to harmonisation and tariff changes (%)

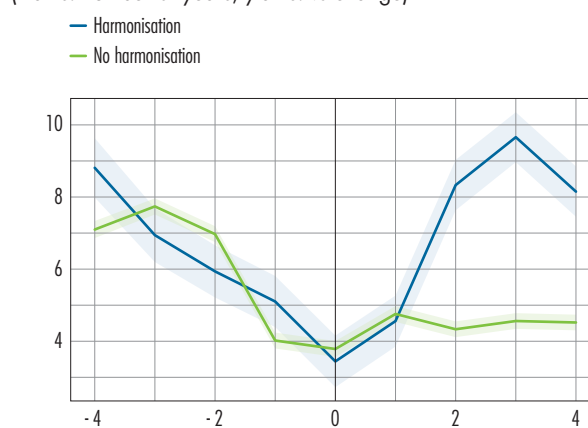


Source: Schmidt and Steingress (2019).

Notes: This chart displays the share of bilateral trade flows that are subject to standard harmonisation or subject to tariff changes. Bilateral product-level trade data for 1995-2014 are taken from the BACI database at CEPII (*Centre d'études prospectives et d'informations internationales*) and are matched to a database of bilateral standard harmonisation events constructed by Schmidt and Steingress (2019) covering 25 industrialised countries.

### C2 Growth of trade flows following harmonisation events

(x-axis: number of years, y-axis: % change)



Source: Schmidt and Steingress (2019).

Notes: This chart plots the mean growth rate before and after a harmonisation event for harmonised trade flows (treatment group) and non-harmonised trade flows (control group). The sources of the data used are described in the notes below Chart 1.

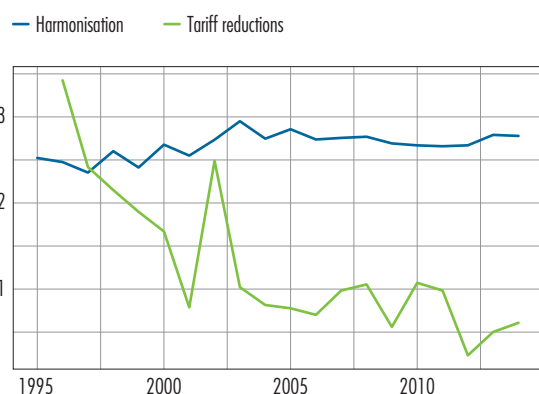


rate that would yield the same effect as a harmonisation event. We find that the increase in traded quantities after a standard harmonisation event can be associated with an equivalent tariff reduction of 2.1 percentage points.

This effect is sizeable and we can translate it into an implied contribution to the growth in trade flows over the time period we consider (1995-2014). Chart 3 plots the estimated increase due to standard harmonisation which, on average, is 0.27%. For comparison, we also include the implied change in trade flows due to tariff reductions. The associated increase in trade flows is smaller, amounting to only 0.12%. Overall, these estimates reveal that standard harmonisation contributed significantly more to higher trade flows compared to reductions of traditional trade barriers such as tariffs.

### C3 Predicted contribution to growth in trade flows

(%)



Source: Schmidt and Steingress (2019).

Notes: This chart plots the contribution of standard harmonisation and tariff changes to the growth rate of trade flows among the countries in our sample. The estimates are based on a regression of total trade flows on standard harmonisation and tariffs. The sources of the data used are described in the notes below Chart 1.

### 3 How does standard harmonisation impact trade?

The academic trade literature usually considers that cross-country trade is impeded by fixed costs of exporting, i.e. costs that are independent of the volume exported such as those related to the adaptation of products to destination-specific requirements of the export market (which includes compliance with product standards; see Shepherd, 2007). In addition, variable costs of exporting, i.e. those that apply to every unit exported such as tariffs or transaction costs, impede trade. Standard harmonisation can be expected to lower both fixed and variable costs of exporting, in particular by providing easier access to export markets and by lowering compliance costs (see table below).

However, there is a more subtle argument for why trade increases when two countries release a harmonised standard. One specific reason why standards are elaborated is to reduce information asymmetries or to create positive externalities such as network effects. Standards are widely used in technological applications to ensure the compatibility of different devices. The positive externalities associated with this interoperability should increase the demand for such products (Katz and Shapiro, 1985; Farrell and Saloner, 1985). In a similar vein, standardisation can lead to economies of scale and scope when complementary intermediate goods are used for a large variety of final products. As a consequence, not only does the price of exported goods fall due to standard harmonisation; more importantly, demand for harmonised products goes up. Importers and consumers value screw threads that are compatible, mobile phones that can operate in both the US and Europe, fertilizer whose components they can identify easily, and so on and so forth.

### Economics effects of standard harmonisation

Dimension	Impact on firms	Potential economic effects
Fixed costs of exporting	Production structures (blueprints, machines) Compliance costs	Easier market access Need to certify compliance with standard only once
Variable costs	Common definitions for product descriptions	Lower transaction costs between producer and user/buyer
Demand	Compatibility Complementary goods Common definitions	Network effects (larger number of users) Economies of scale and scope Reduction of information costs

Source: Schmidt and Steingress (2019).



It is thus not surprising that we find that most of the effects of standard harmonisation are driven by this additional demand. When decomposing the increase in trade flows into the average increase of trade flows and the number of products being exported, we show that the former drives the results. New product entry plays a much more muted role.

In addition, we find that the effects are stronger for differentiated products (i.e. complex, manufactured products) than for homogeneous products (such as wheat or crude oil), thus suggesting that the reduction of information asymmetries is an important circuit via which the positive effects from standard harmonisation materialise.

## References

Bernhofen (D. M.), El-Sahli (Z.) and Kneller (R.) (2016) "Estimating the effects of the container revolution on world trade", *Journal of International Economics*, Vol. 98, No. 1, Elsevier, January, pp. 36-50.

Farrell (J.) and Saloner (G.) (1985) "Standardization, compatibility and innovation", *The RAND Journal of Economics*, Vol. 16, No. 1, Wiley-Blackwell/The RAND Corporation, Spring, pp. 70-83.

Katz (M. L.) and Shapiro (C.) (1985) "Network externalities, competition, and compatibility", *American Economic Review*, Vol. 75, No. 3, American Economic Association, June, pp. 424-440.

Kee (H. L.) and Nicita (A.) (2016) "Trade frictions, trade elasticities and non-tariff measures", *mimeo*.

Schmidt (J.) and Steingress (W.) (2019) "No double standards: quantifying the impact of standard harmonisation on trade", *Working Paper*, No. 729, Banque de France, October.

Shepherd (B.) (2007) "Product standards, harmonisation, and trade: evidence from the extensive margin", *Policy Research Working Paper Series*, No. 729, The World Bank, November.

World Trade Organization – WTO (2012) "Trade and public policies: A closer look at non-tariff measures in the 21st century", *World Trade Report*.

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