

SOME DYNAMIC ASPECTS OF FOOD STANDARDS

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Food standards have existed since the beginning of trade and exchange, but have increased and expanded in recent years, affecting global and local value chains. This has triggered vigorous debates on the impacts on trade and development. Standards may simultaneously enhance economic efficiency and redistribute rents, complicating policy analysis and implying that “the economics” and “the politics” of standards are often hard to separate. While substantial research has contributed important insights, dynamic aspects of standards have not received much attention. I present a framework to illustrate some dynamic economic and political aspects of standards in closed and open economies. This framework integrates changes over time in preferences, implementation costs, and protectionist pressures as determinants of standards, and suggests explanations for persistent differences in food standards across countries. Hysteresis in standards can persist due to protectionist motives, even if the initial standards were not introduced for protectionist reasons. I use some historical cases to document both the persistence and adjustment of standards over time and with international integration.

Adulterations and frauds have existed as long as products have been exchanged. Standards to prevent fraud have been introduced by governments, religious authorities, private companies, and non-governmental organizations (NGOs). In recent years, standards have increased rapidly, both geographically and in addressing new concerns. Production and trade are increasingly regulated through stringent public and private standards on quality, safety, environmental, and ethical aspects.¹ These standards have spread geographically through trade and foreign direct investments (FDI), and have transformed global and local value chains (Swinnen 2007; McCullough, Pingali, and Stamoulis 2008).² This transformation has triggered a growing body of literature and vigorous debates on the impacts on international trade and development. There are two broad lines of debate, respectively, in the trade and the development

literature, with (surprisingly) little overlap (Beghin, Maertens, and Swinnen 2015). The first debate is whether standards are (non-tariff) trade barriers. As international trade agreements such as the WTO have contributed to a global reduction in tariffs, it is often argued that countries have turned to standards as new instruments to shield their domestic markets from foreign competition.³ The second debate is (a) whether standards are excluding small and weakly capitalized producers from the “high standard value chains,” and (b) for those who can participate, whether they are hurt by rent extraction through the superior bargaining power of increasingly concentrated downstream agents, or whether they may benefit from institutional innovations in the value chains.⁴

These issues have been debated in the academic literature and in the policy arena. Organizations such as the OECD and the WTO have studied and analyzed their role and effects. Standards are also central issues in major trade negotiations such as the Trans-

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¹ The SPS notifications to the WTO have increased from a few hundred in the mid 1990s to almost 18,000 in 2014. Private standards are often more stringent than public ones (Fulponi 2007; Vandemoortele and Deconinck 2014). Producers that are GlobalGAP certified increased from around 20,000 in the mid 1990s to around 130,000 in 2017 (Maertens and Swinnen 2014).

² The FDI has been triggered by several factors, including investment liberalizations and economic growth in emerging and developing countries (Reardon et al. 2003; Dries, Reardon, and Swinnen 2004; Dries and Swinnen 2004).

³ See, for example, arguments in Fischer and Serra 2000; Brenton and Manchin 2002; Anderson, Damania, and Jackson 2004; Augier, Gasiorek, and Lai-Tong 2005; Maertens and Swinnen 2007; Van Tongeren, Beghin, and Marette 2009; Marette and Beghin 2010; Beghin et al. 2012.

⁴ See for example, arguments in Unnevehr 2000; Warning and Key 2002; Reardon et al. 2003, 2009; Dries et al. 2009; Maertens and Swinnen 2009; Minten, Randrianarison, and Swinnen 2009; Chiputwa, Spielman, and Qaim 2015; Chiputwa and Qaim 2016.

Pacific Partnership, the Comprehensive Economic and Trade Agreement, and the Transatlantic Trade and Investment Partnership. A key reason is that standards affect both equity and efficiency, meaning that they may simultaneously enhance economic efficiency and redistribute rents to certain sectors. These simultaneous effects make policy analysis and advice complicated and also imply that “the economics” and “the politics” of standards are more difficult to separate than in the case of, for example, trade tariffs.

In Swinnen (2016), I analyzed (and reviewed literature on) the economics and politics of the interactions between standards, trade, and development. I concluded that models which include both negative and positive aspects of the standards yield nuanced/complex theoretical conclusions, and that careful empirical analyses support such nuanced arguments and complex effects. These arguments are based on static considerations.

However, some of the most important political economy aspects and welfare-reducing impacts are related to the dynamic effects. Dynamic aspects of these relationships have been much less studied than the static effects. In this paper I focus on some dynamic economic and political-economy aspects of standards in closed and open economy frameworks building on our previous work on the political economy of standards and regulation (Swinnen and Vandemoortele 2008, 2011). Because of space constraints I will focus on dynamic welfare effects and trade aspects, and less on development implications.⁵

To illustrate my arguments I use a simplified political and economic model of standards (in the appendix, I provide the outline of a mathematical model). This framework allows to integrate arguments of differences in consumer preferences and of producer protectionism as determinants of standards, and to provide a more nuanced explanation for the different food standards and regulations in countries with similar levels of development, such as in the European Union (EU)

and the United States.⁶ I provide an explanation why differences in standards persist, and discuss three historical cases of standards which have persisted for a long time and where dynamic political economy factors played an important role.

A key finding is that small variations in consumer preferences or implementation costs may determine whether a country imposes standards or not or the type of standards. Once adopted, countries will stick to the status quo in standards. Standards will persist because of changing producer (or consumer) interests. Even a temporary difference in preferences between countries, a “butterfly,” may create a difference in standards that may persist after the difference in preferences has disappeared. This hysteresis in regulation can be driven by protectionist motives even if the initial standards were not introduced for protectionist reasons.

My arguments are related to papers on hysteresis in socio-economic behavior and policy.⁷ For example, Dixit (1989a) shows that output price uncertainty leads to investment hysteresis for certain ranges of entry and exit costs. Dixit (1989b) and Baldwin and Krugman (1989) demonstrate that exchange rate fluctuations create similar hysteresis in firms’ export decisions. Hysteresis is also shown to exist in labor markets where firing and hiring costs lead to persistence in unemployment (e.g., Lindbeck and Snower 1986; Belke and Göcke 1999). Path-dependence in technical standards and technical lock-in by historical events can also be driven by network externalities, increasing returns to adoption, or learning by doing (Arthur 1989).

Economics and Politics of Standards

A crucial aspect of standards is that they have both efficiency and equity effects. Standards may enhance aggregate welfare, but they may also be set at suboptimal levels, causing welfare losses. In our basic framework, standards generate efficiency gains by

⁵ For some initial evidence on the dynamic development implications of standards, see Van den Broeck, Swinnen, and Maertens (2016) on the longer-term effects of standards in African horticulture, and Swinnen and Van Herck (2015) on the impact of stringent EU standards on farm restructuring in Eastern Europe using panel data.

⁶ Static models, for example, suggest that food standards differ between countries with different levels of development due to a combination of factors, resulting in pro-standard coalitions in rich countries and anti-standard coalitions in poor countries (Swinnen and Vandemoortele 2011).

⁷ Hysteresis is defined as “permanent effects of a temporary stimulus” - see Göcke (2002) for an overview of various concepts of hysteresis as applied in economics.

solving (or reducing) externalities or asymmetric information problems, but they also involve implementation costs. Under these assumptions, standards can create welfare gains but also involve rent distribution between consumers and producers, and among consumers and producers.

Consider the market for a “credence good,” that is, a good with certain characteristics that cannot be determined by the consumer, neither by search nor experience.⁸ A standard which guarantees certain credence features of the product positively affects consumer utility as it reduces informational asymmetries. It induces consumers to buy more of the product through an increased willingness to pay, *ceteris paribus*. A higher standard will thus shift the demand function upwards.

On the production side, a higher standard increases the marginal costs of production. In a dynamic framework, marginal costs depend on the current level of the standard (see, e.g., Ronnen 1991; Valletti 2000) and on previous standards because of investments which are a function of the difference between the standard of the current period and the standard of the previous period.⁹ This cost component can be interpreted as a capacity investment along the lines of Spence (1977) and Dixit (1980), which depends on the current and previous periods’ regulations. Hence, differently from a static equilibrium, standards in the previous period will influence the optimal allocation of production and consumption, equilibrium price, and the optimal standard in the current period.

Standards will thus cause a price increase due to an increase in consumer demand with higher standards, and due to the increased costs. The larger the price effect, the more producers are likely to benefit from the standard, and the less are consumers likely to benefit. The size of this effect depends on the supply and demand elasticities.

Because of the distributional effects of standards, various groups in society have a vested interest in trying to influence governments’ decision processes on standards. Lobbying by interest groups may cause governments to

choose standards which are not welfare maximizing. Note that influential interest groups may lobby for both more stringent or less stringent standards, depending on the relative magnitude of the price effect compared to the implementation cost (for producers) or the utility gain (for consumers). Hence, the political equilibrium standard may be set either too high or too low from a maximum welfare point of view, depending on which interest group is more effective at lobbying.¹⁰

A Graphical Illustration in a Closed Economy

The dynamic of standards in which switching between them implies an adjustment cost for producers also implies important dynamic political-economy effects. Figure 1a illustrates some of these effects. For the purpose of illustration, I make several simplifying assumptions, each of which should be relaxed (and the model generalized) in future research. I consider a discontinuous (discrete) standard (relaxed in the appendix) and three periods: the pre-standard period (0), period 1 (short run), and period 2 (long run). I assume that the introduction of standards can be represented by a parallel shift of supply and demand functions. An important factor is the extent to which the future effects of the standard that is introduced in the current period affect lobbying. Our results hold when there is some discounting of future effects. For illustrative purposes, we consider the case of full discounting, that is, agents do not take future periods into consideration when making decisions, that is, they have a “myopic planning horizon” (Göcke 2002).

Here, S_0 and D_0 represent the pre-standard supply and demand functions, and p_0 and x_0 are the equilibrium price and consumption (which equals production in this closed economy). The introduction of a standard s in period 1 would shift supply and demand functions to S_1 and D_1 . The new equilibrium

⁸ See Appendix for a formal model. For more details and other types of standards, such as those addressing externalities, see Swinnen et al. (2015).

⁹ See also Shaked and Sutton (1987) and Sutton (1991) for how the regulatory requirements related to a standard lead to an increase in sunk (non-recoverable) costs, and how this may affect concentration, particularly with trade liberalization.

¹⁰ These results may explain the empirically-observed positive relationship between food standards and economic development. This relationship not only reflects higher consumer preferences for quality and safety standards with higher income levels, but also other factors which differ between developing (“poor”) and developed (“rich”) countries, such as the quality of institutions for enforcement of contracts and public regulations, higher education and skills of producers, better public infrastructure, easier access to finance, and the structure of the media as a source of information (McCluskey and Swinnen 2004, 2011; Swinnen and Vandemoortele 2011).

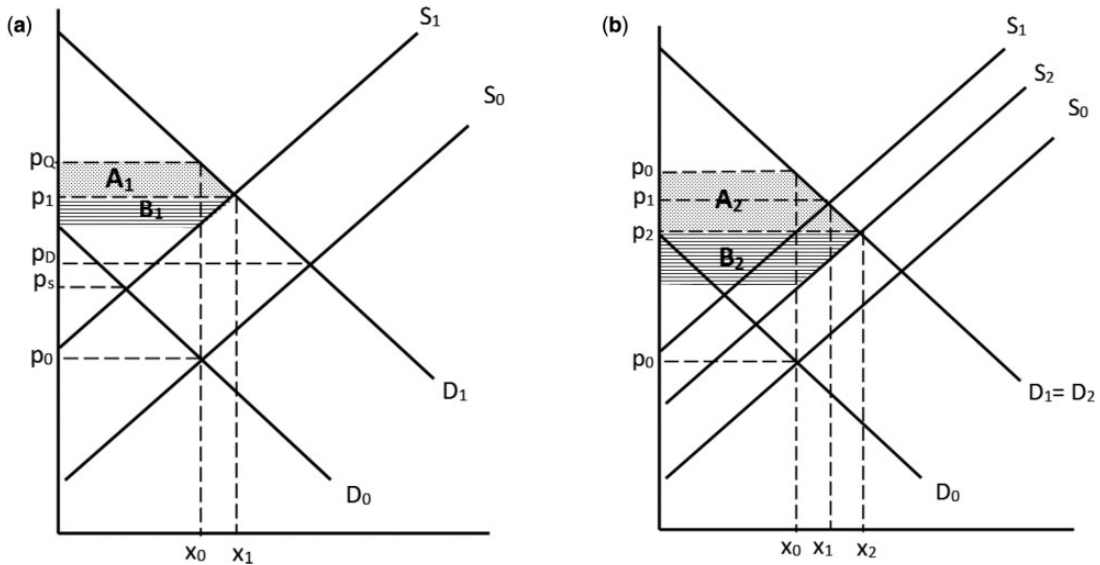


Figure 1. Impact of standards in closed economy (with net benefits for consumers and producers). (a) Period 1 effects, (b) Period 2 effects

price and quantity would then be p_1 and x_1 . The total price effect ($p_1 - p_0$) is the result of rising prices due to the growth in demand ($p_D - p_0$) and a cost increase ($p_S - p_0 = p_1 - p_D$).

In the case illustrated by figure 1a, the effect of the growth in demand (represented by the vertical shift in the demand curve) is stronger than the increasing cost effect (represented by the vertical shift in the supply curve). As a consequence, consumption and production increase ($x_1 > x_0$) and both producers and consumers gain. Consumer surplus increases by area A_1 and producer surplus increases by area B_1 . Total welfare increases by area $A_1 + B_1$.¹¹ In this case both consumers and producers would lobby for the standard since both gain, and the government would respond by introducing the standard.

With the standard introduced in period 1, the benefits in period 2 from the standard would be even larger for both parties since the investment costs are sunk and no longer affect the marginal costs. This is reflected in supply function S_2 in figure 1b. In period 2, the price falls from p_1 to p_2 and welfare effects of the standard increase from $A_1 + B_1$ to $A_2 + B_2$. With both producers and consumers benefiting from the standard in period

2, there is persistence in standards since the political government has no incentive to remove the standard.

Now consider a case where the impacts on consumers and producers are not so positive. Figure 2 illustrates a case where the impact of standards would be negative in period 1. With the cost effect larger than the demand effect, the net effect is a reduction in consumption and production ($x_1 < x_0$) and total welfare falls by area $A_1 + B_1$. Notice that neither producers nor consumers would demand that the standard be introduced since they would both lose. Hence, the government will not introduce a standard in period 1.

There will not be a standard introduced in period 2 either. Since there was no standard in period 1, prices and volumes produced and consumed with the introduction of standard s would be the same ($p_1 = p_2$ and $x_1 = x_2$) and the impacts on consumers and producers in period 2 would be identical to period 1 ($A_1 = A_2$ and $B_1 = B_2$), as illustrated in figure 2. Again, there is persistence in standards: the (lack of) standards in period 1 is continued in period 2. Hence, whether standards are introduced in period 1 (the case of figure 1) or not (the case of figure 2), there is persistence in the choice of standards in both cases.

While this result may seem rather trivial at first sight, I will now explain that this result also holds in (much) less trivial cases, for example: (a) when the effects on producers and

¹¹ It is easy to illustrate that different elasticities of supply and demand affect the size of the effects.

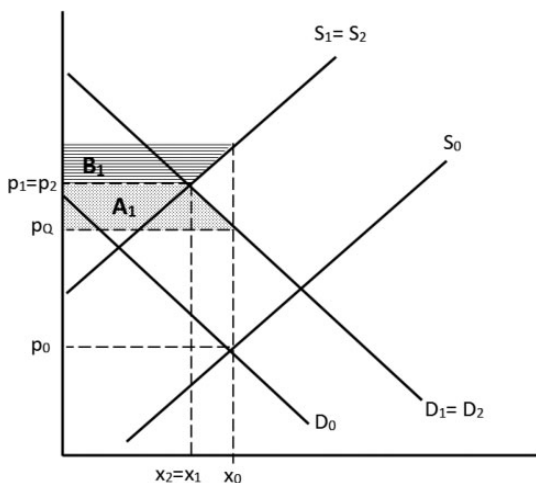


Figure 2. Impact of standards in closed economy (with net losses for consumers and producers)

consumers are opposite; (b) when there are temporary differences caused by, for example, shocks or crises; and (c) when the differences between the initial situations is small. I start with the last argument, as it is the easiest to illustrate with figures 1 and 2. The difference between the cases in figure 1 and figure 2 is the size of the cost shift. Any upward shift in the supply function that leads to a price less than p_Q will cause governments to introduce a standard in period 1 (which is sustained in period 2). Any shift in the supply function that increases prices above p_Q as in figure 2 causes governments to block the standard, which again persists over time. Hence, this implies that *small differences in implementation costs (or consumer preferences) in the short run (period 1) may lead to significant differences in standards in the long run (period 2) between countries*. A similar argument can be made in the case of differences in consumer preferences, which is reflected in the shift of the demand curves. These graphical arguments illustrate Swinnen and Vandemoortele’s (2012) conclusion that, in the case of discrete standards (e.g., allowing genetically modified organisms or not), there is a critical (consumer) preference level above which a standard is introduced, and that relatively small differences in consumer preferences may thus cause significant and long-term differences in standards between countries.

Importantly, these differences in standards may even *persist if the difference in consumer*

preference is temporary (e.g., induced by a shock such as in Europe’s food markets in the late 1990s).¹² If producers in different countries have access to the same technology or face the same implementation costs, but there is a temporary difference in consumer preferences, this may lead to long-term differences in standards.¹³ Figure 3 illustrates this “butterfly effect.” The original demand and supply curves are the same as in figure 2 but now a temporary shock (the butterfly) shifts consumer preferences with standards to demand curve D_1^Z in period 1. With consumer preferences represented by D_1^Z , the equilibrium with standards would be at (p_1^Z, x_1^Z) . The standard will be introduced by the government in period 1 since both consumers and producers would lobby for it, with income effects represented by areas A_1^Z and B_1^Z , respectively. Consider now what happens in period 2 when the temporary shock effects have disappeared (as shown in Figure 3b). Consumer preferences with standards are back to their “normal” state, captured by D_2 (which equals D_1 of figure 2). However, the government choice is not the same as in the case of figure 2. With the standard introduced in period 1, producers have made investments to satisfy the standard requirements and this changes their supply function in period 2, now captured by S_2 . The equilibrium with standard s would be (p_2^Z, x_2^Z) . There are benefits for consumers (area A_2^Z) and producers (area B_2^Z) from the standard in period 2 (in contrast to the case of figure 2). Consumers and producers will lobby to keep the standard and the government has no incentive to oppose. Hence, also in this case, where a temporary shift will cause a “short term” choice of standards, the standard will persist in the “long term.”

¹² It is often argued that the food scares that plagued Europe in the second half of the 1990s, such as BSE (mad cow disease), foot and mouth disease, and the dioxin crisis triggered (temporarily) higher consumer preferences for quality and safety in Europe (Bernauer 2003; Vogel 2003; Scholderer 2005; Graff and Zilberman 2007; McCluskey, Kalaitzandonakes, and Swinnen 2016).

¹³ The case that producers have different preferences and consumers have the same preferences is analogous. Paarlberg (2008) and Graff and Zilberman (2007) argue that agribusiness lobbying has been much more pro-genetically modified (GM) in the United States than in the EU. In the longer run it may be that because consumers live in different GM food environments such as the United States and the EU, they develop different preferences. Consumer attitudes with respect to biotechnology are likely to be endogenous. In countries where GM products are available, consumer preferences may shift in favor of this technology, while inversely, consumers may distrust GM technology more in countries where GM products have been banned.

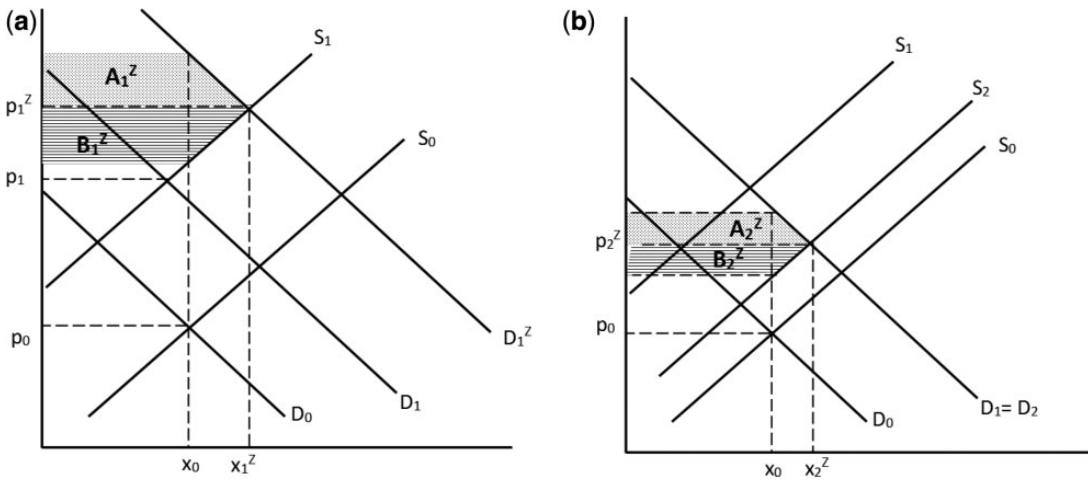


Figure 3. Impact of standards in a closed economy with temporary shift in consumer preferences. (a) Period 1 effects, (b) Period 2 effects

Standards and Trade—The Open Economy Case

To account for trade effects (and to illustrate cases where the impact on consumers and producers can be opposite), I extend the analysis to an open economy model. As explained in the introduction, the rapid growth of standards raised the question of whether standards are non-tariff measures (NTMs) used for protectionist purposes, especially since tariffs have decreased following trade agreements. Standards do affect trade. Only in very special circumstances would standards not affect trade: this is when the effect on domestic production exactly offsets the effect on consumption. However, the analogy to tariffs is not entirely valid. In a small open economy, the socially optimal tariff level is zero. A positive tariff level constrains trade, is harmful to social welfare, and is by definition protectionist. This is not necessarily the case for standards since this ignores the potential consumer or societal benefits induced by standards. The optimum standard in the presence of asymmetric information or externalities is more complex and there is no simple relationship between the trade effects of a standard and the social optimum (Van Tongeren, Beghin, and Marette 2009; Marette and Beghin 2010; Sheldon 2012; Beghin 2013; Marette 2015).

This result, however, obviously does not imply that there are no political forces or protectionist elements in standards setting. Lobbying domestic firms and consumers may also now lead to standards being set “too

low” or “too high” in the political equilibrium, depending, among other things, on the relative costs of compliance, the relative strength of lobbies, and the impact of standards on comparative advantage (Swinnen and Vandemoortele 2011).

A Graphical Illustration in an Open Economy

Consider the case where the government of a small open economy considers introducing a public standard which would be imposed on both domestic producers and imposed products.¹⁴ This is illustrated by figure 4. In period 1, illustrated by figure 4a, the introduction of a standard would cause a shift of the domestic supply curve from S_0 to S_1 and of domestic demand from D_0 to D_1 . The import price would increase from p_0 to p_1 , where the difference is caused by the implementation costs of the standard for foreign producers. The (vertical) difference between p_0 and p_1 is smaller than between S_0 and S_1 , representing the case that the implementation costs for foreign producers would be smaller than for domestic producers. If the standard would be implemented, domestic consumption would increase from x_0^D to x_1^D , domestic production decreases from x_0^S to x_1^S , and imports increase from $x_0^D - x_0^S$ to $x_1^D - x_1^S$. Hence, this standard would

¹⁴ Note that this does not necessarily require that foreign countries also implement the public standard; only that companies who export to the domestic economy implement it.

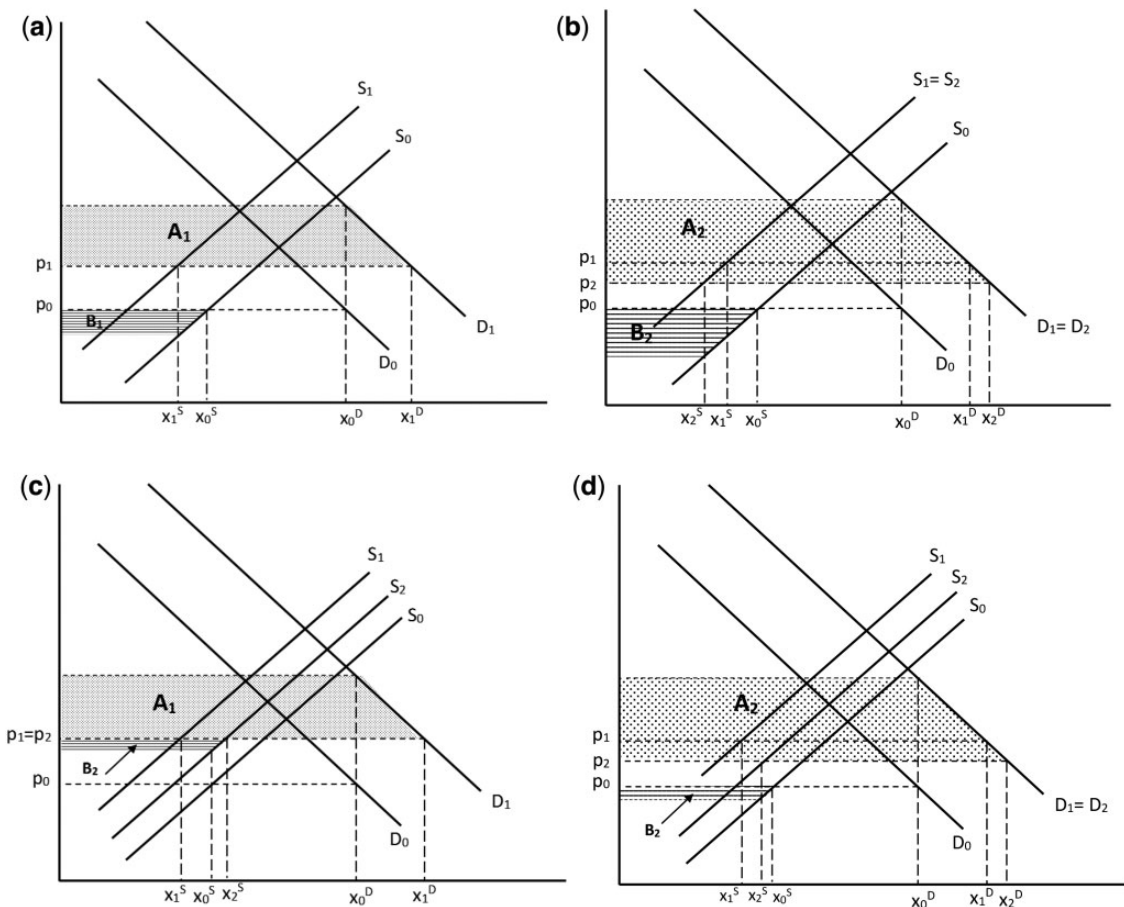


Figure 4. Impacts of standards in an open economy. (a) Period 1 effects (and period 2 effects with no period 1 standards in domestic and foreign economies), (b) Period 2 effects with period 1 standards in foreign economies and not in the domestic economy, (c) Period 2 effects with period 1 standards in domestic but not in foreign economies, (d) Period 2 effects with period 1 standards in the domestic and foreign economies

be a “catalyst” for trade.¹⁵ The benefits for domestic consumers are represented by area A_1 . The losses of the standard for domestic producers are represented by area B_1 .

5 What will the government do and what are the dynamic implications? Since consumers gain and producers lose, they will lobby the government for opposing outcomes. Consumers want the standard, while producers oppose it. The outcome of the lobby process depends on the size of the effects and their effectiveness in collective action.

Consider first the case that farmers are more effective in their lobbying and are able to influence the government not to introduce the standard in period 1. In this case there are two possible situations in period 2: foreign countries have also not introduced the public standard, or they have introduced the standard.¹⁶ If foreign countries did not introduce the standard in period 1, then period 2 is equivalent to period 1 and the same outcome

¹⁵ Trade can also increase when domestic producers gain, as is shown by Swinnen (2016), who shows cases that when trade increases, both domestic consumers and domestic producers benefit.

¹⁶ I do not consider strategic behavior, which is implicit in the small country assumption. See Swinnen et al. (2015) for an analysis of this. Also, for simplicity I assume here that all “foreign” countries make the same choice on standards. In reality it is likely that they have heterogenous policy outcomes—the impact of this should be reflected in the import price.

will result (see figure 4a). Hence, there is persistence in standards.

The more interesting case is when there is divergence in standards, that is, when foreign countries did introduce the standard in period 1. The period 2 world market price would then fall to p_2 with investment costs abroad implemented in period 1, as figure 4b illustrates. This makes consumer benefits from the standard increase from A_1 to A_2 , while producer losses increase from B_1 to B_2 . If as in period 1, producers are more effective at lobbying, they will again influence the government and the standard will not be introduced in period 2. Again, we have persistence of standards.

This outcome would be reinforced in political economy models where political support depends on relative utility change, such as in Swinnen (1994), or from models with loss aversion such as Freund and Özden (2008), Tovar (2009), and Pieters and Swinnen (2016). In these models, larger losses weigh more heavily than larger gains in political decision-making. This would reinforce farmers' political influence in period 2 compared to period 1, and thus the likelihood of the persistence of standards.

Consider next the alternative situation that consumers were more influential than farmers in period 1 and that the standard was implemented. Also, in this case we have to consider the two scenarios on the policy choices in foreign countries. We start with the case of diverging standards, that is, the scenario that foreign countries have not introduced the public standard in period 1, which is illustrated in figure 4c. The position of consumers in period 2 is then unaltered compared to period 1: their benefits from the standard are still represented by area $A_1 = A_2$ since the price of imported products produced with the standard is at $p_1 = p_2$. The interesting aspect is what happens with domestic producer interests. With standards implemented and investments sunk, their marginal cost function is now represented by S_2 . With imported products coming in at $p_1 = p_2$, the impact of the standards is now positive: it increased from (negative) B_1 in figure 4a to (positive) B_2 in figure 4c.

This has major implications for the dynamic political economy of standards. While consumers demanded standards in period 1 and producers opposed them, producers now switch political allegiance. With investments sunk producers now benefit from producing high-standards products for domestic consumption and have a comparative advantage

vis-à-vis importers. So, in contrast to period 1, in period 2 both producers and consumers support standards. The government will definitely support the continuation of standards with the support of both consumers and producers. Again: persistence.

The last scenario is when other countries also introduced the standard in period 1. In this case, consumers benefit more in period 2 than in period 1 with cheap high-standard products being imported. Their surplus increases from A_1 in figure 4a to A_2 in figure 4d (with prices at p_2). Producers still lose, but lose less than in period 1: their producer surplus declines in period 2 by B_2 in figure 4d compared to B_1 in figure 4a in period 1. The result is that consumers will lobby harder in favor of the standard in period 2 and producers will oppose the standard less. As consumers were already more influential in period 1, the government in period 2 will certainly chose their preferred policy, which is to continue the standard in period 2. Hence, also in this case we have policy persistence.

The Role of Shocks, Scandals, and International Integration

In summary, our model predicts that once a country chooses a standard, the dynamic political economy considerations may lead to persistence of this standard in the long run. Our model also predicts that minor or even temporary differences in implementation costs or consumer preferences may lead to significantly different standards in the short run. In combination, these predictions yield that countries that are relatively similar may end up with quite different standards, and that these differences in standards may persist for a long time.

Does this mean that reversals in standards are not possible? Not necessarily. For example, Vogel (2003) documents important historical shifts in the difference between consumer and environmental protection policies in the EU and the United States: “[f]rom the 1960s through the mid 1980s American regulatory standards tended to be more stringent, comprehensive and innovative than in ... the EU. However, since around 1990 ... many important EU consumer and environmental regulations are now more precautionary than their American counterparts.”

However, significant “shocks” to the political economy system may be required for such changes, that is, to move the political economy equilibrium to another equilibrium given the dynamic political and institutional constraints to overcome (Rausser, Swinnen, and Zusman 2011). Shocks may come from both internal or external sources. An internal source is the sudden emergence of “crises.” There are several examples how domestic crises have affected food standards. The first wave of modern public food safety and quality regulations were induced in the late nineteenth century by public outrages of consumers over the use of cheap and sometimes poisonous ingredients in food production (Meloni and Swinnen 2015, 2017). At the end of the twentieth century, the tightening public standards in food in the EU have followed food safety scandals in the late 1990s with consumers demanding better protection (McCluskey and Swinnen 2011). Also, the introduction of various public regulations in China in the late 2000s followed the “milk scandal,” where people died from consuming milk products with poisonous ingredients (Mo et al. 2012).

Another source of shocks is external. One example is the integration of countries with different standards through international agreements. This may either cause the removal of “inefficient standards” or the opposite: that inefficient standards are extended to other countries with international integration.

Lessons from History

In the rest of this paper I will summarize key lessons from a historical analysis of the introduction and persistence of standards in three important food sectors: chocolate, wine, and beer. Important standards in these markets were introduced centuries ago and persist until today (or have persisted until very recently). These standards have been remarkably robust and resistant to economic and political changes. In some cases international integration has been the driving force behind the removal of protectionist standards; in other cases, international integration has been conducive to the spread of (inefficient) standards to larger geographic areas. The cases differ in the reason for the introduction of the standards. In the cases of chocolate and beer, the standards were initially introduced to protect consumers, and only later were used by producers to protect their

markets. In the case of wine, standards were introduced to protect producers, and have continued to do so.

*European Integration and the Conflict over Chocolate Standards*¹⁷

Between 1973 and 2003, the EU was the location of a “Chocolate War.”¹⁸ It was actually a war of standards and lasted for thirty years. The conflict centered on how much milk was allowed in “milk chocolate,” and whether cocoa butter equivalents (CBEs) were allowed in “chocolate.”¹⁹ Before EU integration, countries had different standards. While different, all standards were introduced in the late nineteenth and early twentieth centuries to protect consumers against adulteration.

Adulteration was a problem from the moment chocolate consumption grew in Europe in the seventeenth century. Replacing the “natural” ingredients of chocolate (cocoa powder or cocoa butter) and substituting cheaper products reduced costs and increased profits. The Industrial Revolution transformed the production process of chocolate as well as quality controls.²⁰ Using new methods of detection (chemical analysis and the microscope), scientists discovered that adulteration was practiced on a large scale. Most of the adulterants were cheap substitutes, but some were dangerous for consumers (e.g., red oxide, iron, or lead). The public was shocked to hear that poisonous ingredients were used in sweets and candies. This induced government regulations on chocolate in the late nineteenth and early twentieth centuries.

The British government reacted by introducing food safety and quality regulations in 1860 and 1875 to protect consumers by forbidding sales of adulterated food “injurious to health,” by requiring the labeling of the ingredients in food products, and by introducing

¹⁷ See Cidell and Alberts (2006) and Meloni and Swinnen (2015) for more details and references.

¹⁸ Between 1957 and now, precursors to what is now the EU had different names and institutional arrangements. These are not essential for the arguments here, and I just refer to the EU.

¹⁹ Cocoa butter equivalents (CBEs) are vegetable fats (such as palm oil, mango kernel, etc.) with similar physico-chemical characteristics as cocoa butter, and thus fully compatible, but less expensive (Fold 2000).

²⁰ From the late eighteenth century onwards, technical innovations allowed the large-scale manufacture of chocolate. These technological innovations and scale economies led to large chocolate companies, and cheaper chocolate.

compulsory chemical-technical investigations and controls—the “safe ingredients” approach. This implied that, since flour, other starches, sugar, or (non-cocoa) vegetable oils were not “injurious to health,” they were accepted legal additions but needed to be listed on the label.^{21,22} In France, the government took a different approach and introduced a law on frauds in chocolate in 1910, which defined the “quality” of chocolate by referring to a specific composition of cocoa mass, cocoa butter, and chocolate.²³ Chocolate (and its quality) was now defined by law in France—the “recipe approach.” Other countries followed one of these models, which caused domestic chocolate industries to invest and produce according to local standards (Meloni and Swinnen 2015).

The difference in chocolate regulations caused a conflict with European integration in the second half of the twentieth century; EU integration required integration of national chocolate standards into one EU chocolate standard. The six founding EU members (Belgium, France, Italy, Luxembourg, the Netherlands, and West Germany) had chocolate standards similar to France.²⁴ As a result, the initial EU regulation was very close to the 1910 French chocolate law. The use of vegetable fats other than cocoa butter (such as CBEs) was prohibited and the maximum percentage of milk used in milk chocolate was 14%.

In 1973 three countries (Denmark, Ireland, and the UK) that allowed chocolates with CBEs and allowed more milk in “milk chocolate” (up to 20%) joined the EU. The chocolate companies in the original member states wanted to keep the existing EU standards to

²¹ The law induced different reactions from the leading chocolate manufactures, and thereby had a major impact on the British chocolate industry (see Meloni and Swinnen 2015).

²² Canada and the United States initially followed the British approach, but later (after 1906 when the Federal Food and Drugs Act was introduced) switched to the early German approach, which combined private standards and public regulation (Meloni and Swinnen 2015).

²³ The law specified that “chocolate” was to be obtained from the “blend of sugar and cocoa mass, (...) with or without added cocoa butter so that 100 grams of the product contain (...) at least 35 grams of cocoa mass containing at least 18 grams of cocoa butter.”

²⁴ In Germany public regulations were initially like those in the UK, but were combined with private standards used by the Association of German Chocolate Manufacturers. The private standard also considered “the addition of foreign fat to chocolate, cacao mass or cacao butter” an adulteration. In 1933 (under Nazi rule) the government integrated this private standard into public regulation and thus defined chocolate by law, as in France (Meloni and Swinnen 2015).

“maintain craftsmanship,” “prevent fraud,” and “preserve quality chocolate” (Alberts and Cidell 2006). However, the regulations were obviously also protecting chocolate companies from the competition from large British chocolate companies. The Chocolate War had begun.

In the 1970s and the 1980s, companies using CBEs in their chocolate products could not sell it as “chocolate” in the countries where CBEs (and “high-milk” chocolates) were outlawed—thereby effectively banning British chocolate from these markets. When other countries joined the EU in the 1980s and 1990s, the pro-CBEs camp became stronger. By 1995, seven EEC countries were using CBEs and eight countries were not. In 1997, the addition of CBEs (up to a maximum of 5%) was allowed in EU “chocolate,” and up to 20% of milk was allowed in “milk chocolate.” Opposition (which insisted on selling chocolate containing CBEs as “chocolate substitute”) continued until 2003, when the European Court of Justice ruled that these demands infringed on the principle of the free movement of goods, effectively ending the 30-year “Chocolate War.”²⁵

*The Oldest Food Law: Protection against Contamination or against Competition?*²⁶

The German *Reinheitsgebot* is arguably the oldest active food law in the world and is an interesting case of how food standards and regional integration interact. The *Reinheitsgebot*, or “Purity Law,” decreed that all beer be made from three ingredients: barley, water, and hops (yeast was added later when it was discovered). It was signed into law by Duke Wilhelm IV for Munich in 1487, and for all of Bavaria in 1516. It is generally argued that the *Reinheitsgebot* served first as a consumer protection policy—to ensure quality and safety of beer (as brewers experimented with various additives)—and to protect consumers from rising bread prices if wheat was used for beer production. Later on, brewers became the strongest lobby for it.

²⁵ The relaxation of the CBE standards induced little change in the industry as very few EU chocolate manufacturers who did not before use CBEs have incorporated CBEs into their recipes (LMC International 2014).

²⁶ This section is based on Swinnen and Briski (2017) and Van Tongeren (2011).

Changes in the political constellations of Bavaria and Germany over the next five centuries were intertwined with discussions on the *Reinheitsgebot* because of the protection it provided to brewers. When Bavaria joined northern regions in 1871 in the German Empire, it demanded that the Bavarian *Reinheitsgebot* be applied to entire Germany. This was contested by northern Germany brewers with different brewing traditions, including the use of sugar and spices. It took twenty-five years to come to an agreement. In 1906, an adjusted *Reinheitsgebot* allowed brewers in northwestern Germany to include malted wheat in their beer recipes.

World War II and the division of Germany caused significant migration. Migrants started the production of *süssbier*, or sweet beer, within Bavaria. *Süssbier* was permitted under the national *Reinheitsgebot*, but not under the stricter requirements of Bavaria. The Bavarian Brewer Association lobbied against this *süssbier*. After fifteen years, the German Federal Court of Justice decided in 1965 that *süssbier* could be sold in Bavaria, not as “beer,” but as a “nutritional beverage.” Later, when the fall of the Berlin Wall reunited Germany, the Bavarian brewers argued that some East German black beer could not be marketed as “beer” because it was not in accordance with the *Reinheitsgebot*. Again, it took fifteen years of legal battles until the Federal Court ruled that it was indeed “beer.”²⁷

The final battle over the *Reinheitsgebot* took place at the European level. In 1987, exactly five centuries after Duke Wilhelm IV signed the initial *Reinheitsgebot*, the European Court of Justice (ECJ) ruled that the *Reinheitsgebot* was a non-tariff barrier in conflict with the European single market and ordered it to be removed—at least for foreign beers.

After the ECJ ruling, imports of foreign beers increased from 1% of German beer consumption to around 3% a decade later, and around 8% today, three decades later. These numbers confirm the protectionist nature of the *Reinheitsgebot* but also suggest that other forces are at work. Van Tongeren (2011) argues that taste and consumer perception probably played a big role in the slow change. Far from fading from relevancy, the

Reinheitsgebot transitioned to function as a signal of quality. German breweries began advertising their adherence to the *Reinheitsgebot* prominently on bottles—similar to the CBE ruling effect on chocolate standards.²⁸

*International Integration, Terroir, and European Wine Standards*²⁹

The case of wine standards is different in that several standards were introduced to protect producer interests from the beginning—although consumer benefits were often used to justify them. These standards were introduced as a protectionist reaction to international trade and expanded to a much larger area with international integration.

By the mid-nineteenth century, France was the world’s leading producer and exporter of wine. However, a dramatic invasion of the vine disease *Phylloxera* destroyed many vineyards. Wine production fell by 70% between 1875 and 1889, and France became a wine importer. Imports came initially mostly from Spain and Italy, but later also from Algeria and Tunisia, France’s North African colonies (Meloni and Swinnen 2013, 2014).

When French vineyards recovered thanks to resistant grape varieties, wine prices fell as French production competed with imports. Under pressure from French producers, the government introduced three types of regulations: import tariffs, supply restrictions, and “quality standards.” These were the policy outcomes of political conflicts between several interests.

In 1890, the French government imposed high tariffs, effectively stopping wine (and raisin) imports from Italy, Spain, and Greece (Pinilla and Serrano 2008).³⁰ However, pressure on the French market continued with growing imports of colonial (mostly

²⁸ A remarkable observation is that the region of Bavaria, which has defended the *Reinheitsgebot* with great vigor and force, is also associated with its world-renowned “weissbeer,” a beer produced from wheat—which obviously violates the basic rules of the *Reinheitsgebot*. It turns out this is the result of a loophole in the original standard and the role of weissbeer played a major source in tax revenue (See Swinnen and Briski (2017) for details).

²⁹ This section summarizes insights from Meloni and Swinnen (2013, 2014, 2017).

³⁰ Among the first quality regulations, a 1889 law defined “wine” as “a beverage made of the fermented juice of grapes,” thereby excluding wines made from dried grapes mostly imported from Greece (Milhau 1953).

²⁷ The argument was based on a technicality: the sugar syrup which gave the beer a black color was not a substitute for barley malt since it was added after the brewing and filtration process. Therefore, Schwarzer Abt was technically beer plus syrup, rather than the “nutritional beverage.”

Algerian) wine, which was hurting French producers. Algeria, as a colony of France, was not affected by external tariffs and became the largest wine exporter in the world.

5 Another issue was a conflict between the traditional producers of Bordeaux, Champagne, and Burgundy, and producers from other French regions. New hybrid vines were more productive, easier to grow, and more resistant to diseases (and thus required less pesticides and lower costs). Regions that previously did not have a strong wine tradition took advantage of it (Milhau 1953).

15 Under pressure from traditional wine producers, new government regulations introduced an explicit link between the “quality” of the wine, its production location (the *terroir*), and the traditional way of producing wine. Between 1905 and 1912 regulations formally established the boundaries of Bordeaux, Cognac, Armagnac, and Champagne wines, called *Appellations*. Another new standard was that “wine” could no longer be produced from imported grapes, effectively destroying the raisin exports from Greece to France (Meloni and Swinnen 2017). Further restrictions on grape varieties and production methods included the prohibition of hybrid vines. The official argument was safety, since hybrid-based wines were argued to be harmful for human consumption. In the mid 1930s, when pressure on the wine market continued, new standards created the *Appellations d’Origine Contrôlées* (AOC), restricted production to specific regions and grape varieties, and imposed maximum vineyards yields, etc. Later regulations introduced minimum prices for wine producers.

40 The integration of France’s wine standards and regulations with Italy’s more liberal wine regime in the EU led to a “wine war” in 1974, when French wine producers blocked Italian wine imports. Under pressure from French producers, more regulations were introduced and French wine standards and heavy government interventions in markets effectively became the official EU wine policy.

50 Soon, Italy introduced the “*Denominazione di Origine Controllata*” (DOC). With the integration of other wine-producing nations in the EU such as Greece, Spain, Portugal, Austria, Hungary, Slovakia, Slovenia, Bulgaria, and Romania, these regulations expanded to a vast wine producing region. All these countries had to adjust their national wine standards to access the EU. For example, as was initially the case in France, EU “wine” cannot

be produced from imported grapes and hybrid vines are outlawed for “quality wines” throughout the EU. Upon its accession to the EU, Romania had to agree to uproot hybrid varieties, which accounted for half of Romania’s total vineyard surface, and replace them with vine varieties accepted by the EU.

Conclusion

65 While standards have played an important role in food trade and exchange for a very long time, standards have spread rapidly in recent years through trade and foreign investments and have changed the way global value chains are organized. This has triggered debates on the impacts on international trade and development. Research has shown that models which incorporate essential aspects of standards yield complex theoretical results and nuanced conclusions; careful empirical analyses support such nuanced arguments and complex effects. Standards can generate efficiency gains by solving (or reducing) externalities or asymmetric information problems, but also involve rent redistribution between consumers and producers, and among consumers and among producers. These rent distributional effects induce lobbying by these groups to set the standards at their preferred level. These effects make it hard to distinguish socially desirable standards (levels; “the economics”) from those resulting from political rent-seeking (“the politics”).

90 The dynamic political economy effects complicate things further. Our simple conceptual model predicts that minor or even temporary differences in implementation costs or consumer preferences may lead to significantly different standards in the short run. The model also predicts that once a country chooses a standard, dynamic political economy effects may lead to persistence of this standard in the long run. Countries that are relatively similar may end up with quite different standards and these differences in standards may persist for a long time. Moreover, if standards are introduced because of consumer demands, their persistence in the long run may result from (a coalition of consumer and) producer demands. Standards may affect comparative advantages, and may therefore induce producers to support maintaining the standard in the longer run in order to protect them from (cheaper) non-standard imports. Such

hysteresis in standards may also result from adaptations on the demand side. If consumer preferences adapt to the standards once introduced, this may then induce similar long-term effects in political equilibria.

Historical evidence suggests that there are indeed important dynamic political economy components of food standards, and that international integration can both lead to the mitigation of (inefficient) standards or to a spread of them to larger areas depending on the political equilibria.

Many of today's food standards have their roots in regulations stemming from the nineteenth century or even earlier, and have influenced the development of the food industries. Countries with similar food production systems and consumer preferences may diverge importantly after the introduction of different standards. This paper discussed examples such as the introduction of the *Reinheitsgebot* (Purity Law) in Germany about 500 years ago, which still has lasting impacts, the introduction of different food (including chocolate) regulations in western countries in the mid-nineteenth century, or of different wine regulations in the early twentieth century which had long-lasting impacts on the economic development of the food industry and the political economy of later negotiations on food standards. A more recent example is the divergence of genetically modified organism regulations in both OECD and developing countries, with major implications for agriculture and related industries.

There is much to be learned about these dynamic effects. This paper has identified a few dynamic issues, both conceptually and based on historical cases. However, it should be obvious that this is just a first step. Much can be improved both in terms of theory and empirics. Assumptions in the conceptual framework should be relaxed and tested, the models made truly dynamic, etc. In this paper, I also considered that only "producers" and "consumers" are politically active. I thus ignore important lobbying effects by NGOs, agribusiness, etc. Given their active participation in domestic and international food standards, this is obviously an important limitation and an issue that should be addressed in future work.³¹

³¹ For a model of NGO activities and their relationship with donors, see, for example, Chau and Huysentruyt (2006); Aldashev and Verdier (2010) and Swinnen, Knops, and Van Herck (2013).

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Appendix

A formal version of our conceptual framework extends the model of Swinnen (2016).

A representative consumer has utility function $u_t(x_t, s_t)$ where x_t is consumption of the good, and s_t is the level of the standard in period t .³² A higher level of s_t represents a more stringent standard.³³ Consumer utility is increasing and concave both in consumption ($u_x > 0; u_{xx} < 0$) and the standard ($u_s > 0; u_{ss} < 0$).³⁴ We assume that $u_{xs} > 0$, that is, that an increase in the standard leads to a higher marginal utility of consumption.³⁵ Consumer surplus $\Pi_t^C = u_t(x_t, s_t) - p_t x_t$ with p_t the price. The first-order condition (FOC)

$$(A.1) \quad \frac{\partial \Pi_t^C}{\partial x_t} = u_x(x_t, s_t) - p_t = 0$$

defines the inverse demand function, which is downward sloping. A higher standard shifts the inverse demand function upwards.

On the production side, a representative producer has cost function $C_t(x_t, s_t, s_{t-1})$ that depends on output x_t and the standard of the current period s_t and the previous period s_{t-1} . Assume that the cost function is increasing and convex both in production ($c_x > 0; c_{xx} > 0$) and the standard ($c_s > 0; c_{ss} > 0$), and that a higher standard increases the marginal costs of production ($c_{xs_t} > 0$). The intertemporal effect of s_{t-1} on c_t is captured by $c_{xs_{t-1}}$. This effect will depend on the investments required and whether they affect marginal and/or fixed costs, etc. A specific cost function used by Swinnen et al. (2015) has $c_{xs_{t-1}} < 0$ for $s_t > s_{t-1}$ and vice versa: changes in standards increase marginal costs of production. Standards set in previous

periods thus affect costs and profits, and thus producer preferences and ultimately lobbying. Profits $\Pi_t^P = p_t x_t - c_t(x_t, s_t)$ and the FOC

$$(A.2) \quad \frac{\partial \Pi_t^P}{\partial x_t} = p_t - c_x(x_t, s_t, s_{t-1}) = 0$$

defines the inverse supply function. The inverse supply function is upward sloping, and a higher standard s_t shifts the function upwards, while a standard in the previous period, which is closer to s_t , shifts the curve downwards. At the market equilibrium (x_t^*, p_t^*) , demand equals supply and

$$(A.3) \quad p_t^* = u_x(x_t^*, s_t) = c_x(x_t^*, s_t, s_{t-1}).$$

Using conditions (1)–(3) and applying total differentiation and the envelope theorem, it follows that the impact of an increase in the standard on consumer surplus in period t is

$$(A.4) \quad \frac{\partial \Pi_t^C}{\partial s_t} = u_s - x_t^* \frac{\partial p_t}{\partial s_t}.$$

The first term, u_s , is the (positive) utility gain of the more stringent standard, that is, the value that consumers attach to the reduced informational asymmetries. The second term, $-x_t^* \frac{\partial p_t}{\partial s_t}$, is the marginal increase in consumption expenditure, and is negative as consumption expenditures increase because of an increase in the equilibrium price due to increased demand and the cost of implementing the standard. The impact on producer profits in period t is

$$(A.5) \quad \frac{\partial \Pi_t^P}{\partial s_t} = x_t^* \frac{\partial p_t}{\partial s_t} - c_s.$$

The first term on the right-hand side is the increase in revenue due to increased prices with higher standards (and represents a transfer between consumers and producers). The second (negative) term, $-c_s$, represents reduced profits due to the costs of implementing the standard, which depends on the standard of the previous period. With aggregate welfare, $W_t(s)$, the sum of consumer surplus and profits, maximum welfare is at standard s_t^* , where the marginal utility gain equals the marginal cost

³² For the closed economy, we denote both consumption and production by x to simplify the notation.

³³ This specification assumes that a standard can be described in terms of "strictness." The illustrations in the main text use a binary (0-1) case. Standards such as pesticide MRLs or car emission standards can be ranked on a vertical scale, and hence have a notion of strictness, while other standards are better represented as binary choices. I refer to Swinnen et al. (2015) for a classification and examples of different models.

³⁴ Subscripts denote partial derivatives to x or s , that is, $u_x = \frac{\partial u_t}{\partial x_t}$, $u_s = \frac{\partial u_t}{\partial s_t}$, etc.

³⁵ A functional form that meets these assumptions is Mussa and Rosen (1978), which is widely used in studies focusing on quality differentiation.

$$(A.6) \quad u_s(x_t^*, s_t^*) = c_s(x_t^*, s_t^*, s_{t-1}).$$

To model governments' decisions on standards (following Grossman and Helpman 1994) applied to standards by Swinnen and Vandemoortele (2011, 2012), consider a government that maximizes an objective function $\Pi_t^G(s)$, which is a weighted sum of social welfare and lobby contributions of interest groups. With lobbying by producers ($i = P$) and consumers ($i = C$), the politically optimal standard, s_t , is determined by³⁶

$$(A.7) \quad \frac{\partial \Pi_t^G}{\partial s_t} = (1 + \alpha^C) \left[u_s - x_t \frac{\partial p_t}{\partial s_t} \right] + (1 + \alpha^P) \left[x_t \frac{\partial p_t}{\partial s_t} - c_s \right] = 0$$

where x_t denotes consumption and production in the political optimum, and α^i are the political weights, reflecting lobbying strengths of interest groups (with $0 \leq \alpha^i \leq 1$ and $\sum_i \alpha^i = 1$).³⁷ With c_s being a function of both the current standard (s_t) and the standard in the previous period (s_{t-1}), the political optimum, s_t , depends on s_{t-1} . If producers have previously invested to satisfy the s_{t-1} requirements, this will lower current implementation costs and affect their lobby behavior. It will also influence consumer lobbying as it affects the price effect of the standard in period t .

To capture trade, define x_t^S as domestic production (supply) and x_t^D as domestic consumption (demand). The impact of standards on aggregate welfare in a small open economy is

$$(A.8) \quad \frac{\partial W_t}{\partial s_t} = u_s - x_t^D \frac{\partial p_t}{\partial s_t} - c_s + x_t^S \frac{\partial p_t}{\partial s_t} = u_s - c_s - (x_t^D - x_t^S) \frac{\partial p_t}{\partial s_t}$$

where (in comparison with equation [A.6]) the last term captures the change in expenditures on imports or revenues from exports as a result of the standards-induced price effect. It is clear from this equation that the standard that maximizes domestic welfare may be greater than zero.

The politically optimal standard in an open economy is then determined by

$$(A.9) \quad \frac{\partial \Pi_t^G}{\partial s_t} = (1 + \alpha^C) \left[u_s - x_t^D \frac{\partial p_t}{\partial s_t} \right] + (1 + \alpha^P) \left[x_t^S \frac{\partial p_t}{\partial s_t} - c_s \right] = 0$$

using a similar political economy model as before. The dynamic effects are captured directly by the marginal cost effect, as in the closed economy equation.

³⁶ The government receives higher lobby contributions from interest groups if the standards creates surplus for them. See Section 4.9 in Swinnen et al. (2015) for a detailed derivation of such optimality conditions.

³⁷ As in the main text, I consider the case that agents do not take future periods into consideration when lobbying.