Global Trade Analysis Project
https://www.gtap.agecon.purdue.edu/

This paper is from the
GTAP Annual Conference on Global Economic Analysis
https://www.gtap.agecon.purdue.edu/events/conferences/default.asp

CPB Discussion Paper

No 11
August 2002

On Labour Standards and Free Trade

Michiel Kok, Richard Nahuis and Albert de Vaal

CPB Netherlands Bureau for Economic Policy Analysis
Van Stolkweg 14
P.O. Box 80510
2508 GM The Hague, the Netherlands

Telephone	+31 70 338 33 80
Telefax	+31 70 338 33 50
Internet	www.cpb.nl

ISBN 90-5833-109-1

Contents

Abstract

We investigate the effectiveness and efficiency of alternative measures to increase standards in low-income countries in a two-country framework where (a) trade and standards in low-income countries are negatively related, and (b) free trade is no longer optimal for the high-income country due to a negative psychological externality that low standards in low-income countries exert. We find that any uncoordinated, unilateral action by the high-income country to decrease the psychological externality is dominated by coordinated action; both with respect to the psychological externality as with respect to the welfare consequences for both countries. Since any increase in the standard in the low-income country decreases their welfare, co-ordination is not always a feasible solution. Only when incorporated in the framework of the WTO, co-ordination can be made incentive compatible and gives rise to a situation where free trade again works to the advantage of both countries.

Keywords: psychological externalities, coordination, trade intervention.

JEL-codes: D62, F13.

1 Introduction[1]

"As the angry confrontation erupted at the Seattle WTO meeting in late 1999, I found myself furious. Not at the protesters, but at myself and my kind for having done such a rotten job of explaining in clear and compelling English the power and benefits of globalization"[2]

As many economists recognize themselves in such an outcry it is worth asking the question why economists are not more successful in convincing the opponents of globalisation. Apparently, the protesters in the streets of Seattle had different things on their mind than the standard textbook treatment of the benefits of international trade and investment. Therefore, to be convincing, one should start with understanding the point of view of the opponents of globalisation. In this paper we try to do so. We analyse the concern of anti-globalists that increased trade might lead to lower (labour) standards in low-income countries. By positing that this concern is based on altruistic preferences, a low labour standard in developing countries bestows a negative psychological externality on people in advanced countries. This gives them the incentive to improve the situation in other countries, for instance by launching protests against further globalisation.

The psychological externality we see can be interpreted in two different ways. A first interpretation is that people do not want to consume products that are made under 'undesirable' circumstances. Their utility declines if they buy, for example, a carpet which is made by children compared to one made by adults. They experience disutility by 'contributing' to such a situation. Essentially this is a problem of asymmetric information that is to be solved by providing information, for example by means of product labelling (see Keyzer, 2002, for an overview). The second interpretation is stronger and states that people do not only care when buying a product made under unpleasant circumstances, but also care about the mere existence of the situation. Hence, disutility in one country is a consequence of an undesirable situation in a different country.

We argue that it is the second type of externality that moves anti-globalists. Think about children sewing footballs; not only those who buy or use a football care, most people would prefer to end such a situation.[3] Or think of the horrifyingly low labour standards on the ship demolition area on the beaches of Alang in India. The labour standards are notoriously low there and obviously, not the *users* of these Indian services are most concerned by the situation; it is the *general public* that is worried by the situation. In the remainder of the discussion we refer largely to labour standards but the analysis is also relevant for other cases: for example for cases where

[1] We thank Theo van de Klundert, Arjan Lejour and Paul Tang for valuable comments and suggestions. Berend Hasselman is acknowledged for technical assistance

[2] Tom Peters on the cover of Micklethwait and Wooldridge (2000).

[3] Whether this is merely paying lip service or an actual willingness to pay is difficult to determine, given the public good character of better circumstances abroad.

low-cost production techniques damage the (local) environment.
Though we think that it is obvious that people genuinely care about the situation abroad one would like to go beyond the anecdotes mentioned in the previous paragraph. Indeed, a concern is that the majority of the dismay about low standards raise is only protection of domestic interests in disguise. To address this concern Krueger (1997) analyses the support in the U.S. Congress of the Child Labor Deterrence Act of 1995 and finds that members of Congress representing districts with relatively many unskilled workers, who are most likely to compete with child labour, are *less* likely to support a ban on imports made with child labour. If protectionist motives played a major role representatives from these districts would have been *more* likely to support the act. This indeed suggests that altruistic concerns play a role. Whether domestic considerations also affect the "concerns" about standards abroad is an open question.

This paper uses a model to analyse psychological externalities related to standards, in conjunction with international trade. The way we proceed in this paper follows Bagwell and Staiger (1998).[4] We follow them in using the simplest possible model of international trade and expand it to allow governments in two countries to choose the level of labour standards. Moreover, we introduce psychological externalities in the model. We examine the interaction of trade and labour standards and then explore the different instruments the high-income country can use to alter the situation in the low-standard country. One way to accomplish this is by using trade reducing measures, as suggested by anti-globalists. The optimality of such a measure is not clear beforehand, since the potential welfare gain due to diminished psychological externalities may very well be more than compensated by lower gains from trade. This delineates the aim of this paper. We investigate whether or not a reduction of trade indeed raises foreign standards, as the anti-globalists seem to think. We investigate whether or not using trade-restricting measures is optimal regarding the objective one wants to achieve, that is raising the standards in foreign. As an alternative instrument a government could alter its own standard to manipulate the standards in other countries. Governments could also decide to opt for coordination while setting their standards.

This paper shows that (1) trade indeed leads to lower standards in the low income country. The basic intuition is that raising a standard is more costly in a world with free trade than in a world with countries in autarky, as some gains from trade are lost too in the former situation. (2) As psychological externalities are important and trade indeed leads to lower standards in the low-income country it is no longer guaranteed that free trade is desirable for the high-income country. For the high-income country the gains from trade can be counteracted by the increase in the negative psychological externality. As such trade is unfavourable for the *high*-income country, but not for the *low*-income country! Result (3) is that attempts by the high-income country to raise the standards in the low-income country *lowers* welfare in the *low*-income country! A

4 They address how domestic standards could be treated within the GATT, without referring to psychological externalities.

corollary of this result is that the altruistic motives of anti-globalists lead to policy that turns out 'egoistic'. The intuition is that higher standards abroad come at a cost, a cost greater than the benefit, as otherwise the low-income country would have raised their standards themselves.[5] Finally, we show (4) that it is actually the WTO – the organisation blamed by anti-globalists for thoughtlessly applying the free trade dogma – that provides a solution to overcome the negative impact of result (1)-(3). The solution we propose is to expand the interpretation of the existing reciprocity rule to ensure that no country lowers its standards below the autarky level.

The set-up of this paper is as follows. Section 2 discusses briefly some related literature. Section 3 sets up the model and discusses the interaction between standards and trade. Section 4 introduces the psychological externality. Policy options to reduce the externality are discussed in section 5, whereas section 6 provides an extensive comparison of all options. Section 7 discusses the incentives to cooperation and discusses the role we envision for the WTO. Section 8 provides a discussion on the robustness of the results. Section 9 concludes.

5 It is well known that any distortionary or costly measures imposed upon the formal economy drive out workers to the informal economy where standards are absent by definition; we make no use of this argument to derive our results.

2 Literature on international coordination

This paper fits in the line of literature dealing with claims that differences in regulation ought to be removed by international coordination in order to create a level playing field. This literature takes subsequent market failures into consideration and explores the need for coordination. Three types of potential market failures have been discussed extensively. First, there are domestic externalities. The basic point is that if market failures are strictly national the best way to address them is by nationally differentiated regulation. Efficient regulation reflects the national conditions. These include tastes, culture, governmental and legal systems, educational and physical endowments (Rollo and Winters, 2000). The fact that regulation must address the national needs, means that regulation should differ between countries. This is put forward by Robert Lawrence et al. (1996, p. 47): 'If national tastes or conditions lead to different laws, the playing field of international competition will not, and should not, be level' The important point made here is that diversity in standards is legitimate and desirable because characteristics of countries differ.[6] The second market failure relates to international externalities, think of the greenhouse-effect, ozone-layer depletion, deforestation and over-fishing. Any activities by one country that impose costs onto other countries that are not transmitted by prices in principle call for coordination (see Leebron, 1996, and Cooper, 1994, for a general discussion).[7] The third type of potential market failure is international policy competition; international interaction leads in some cases to inefficient policy making (see Wilson (1996) for a more extensive discussion).[8] Due to the fact that costs of a policy can be imposed on other countries a policy 'race to the bottom' might result. An example relevant in the context of this paper is when countries can influence their terms of trade with standards: Brown et al. (1996) show that if countries have the market power to influence their terms of trade, by using standards, they have an incentive to set standards either too high or too low. The intuition is that the cost of raising a standard in the export sector is translated into higher prices which implies an improved terms of trade. This is a worsening of the terms of trade for other countries and hence they bear part of the costs. Bagwell and Staiger (2001) propose the following solution to this problem. Given the present local standards, governments bargain over tariffs and the implied world price. These tariffs and the local standards together imply some level of market access. If governments want to alter their local standards after the negotiations, they must keep the market access at the same level. So if they increase the access to their own market, they have the right to increase their tariffs. If they decrease the level of market access, they must decrease their tariffs, to keep the level of market access for their trading partners at the same level. If governments have this freedom, an efficient

[6] Others making the same point include: Bhagwati and Srinivasan (1996), Brown, Deardorff and Stern (1996), Casella (1996), Cooper (1994), Esty (1994), Hansson (1990) and Krueger (1995).

[7] Whether coordination is actually desirable depends on the expected costs and benefits of coordination.

[8] Zodrow and Mieszkowski (1986) and Bucovetsky and Wilson (1991) are the seminal papers in this field.

combination of tariffs and domestic policies can be implemented.

This paper takes a closer look at an international externality that so far received very little attention, namely psychological externalities. Indeed, we are not aware of *any* formal analysis addressing the issue of psychological externalities. In some cases reference is made to this type of externality though in slightly different connotations. Bhagwati and Srinivasan (1996) refer to this problem as "the Question of Ethical Preferences" and Howse and Trebilcock (1996) as "altruistic or paternalistic concerns". The discussion in Bhagwati and Srinivasan (1996) is however limited. They argue that the values concerning those experiencing the disutility are often not universally recognised and culturally and income dependent. Moreover, it is easier for strong (developed) nations to force its values on weak (developing) countries than it is the other way round. Their final objection is of institutional nature. Countries can have objections to numerous practices in other countries, and it is hard to establish which are legitimate and which are not. The claims can therefore easily be driven by protectionist interests.

Without denying Bhagwati and Srinivasan's concerns, we want to extend the discussion by acknowledging that the altruistic or paternalistic concerns simply do exist. Hence, we do not reject such concerns beforehand but we argue that the altruistic reasoning is fundamentally flawed, as unilateral action imposed upon a developed country is actually lowering welfare in that country. Our analysis shows that with psychological externalities there is a role for coordination. Our finding that the WTO can play such a role, resembles the results by Bagwell and Staiger (2001), but is clearly different: they argue that when a country alters its standard (read: market access) it should be allowed to restore the market access by changing its tariff. We use the fact that when a country changes its market access (read: standard) its trade partner may retaliate.

This paper limits the discussion to the psychological externality: the fact that developed countries care about standards in the developing countries. We obviously do not deny that the other concerns discussed in this section are important, like for example policy competition that could lead to a race to the bottom (possibly between developing countries). Moreover, what we do not do is take into account that the demand for standards in developing countries likely depends positively on income, or that developed countries care about total welfare in developing countries. Again, these issues are likely important, but extending the model we develop with these mechanism obscures what we are after: how to deal with concerns people have about standards in developing countries.

3 Standards and trade

The Bagwell and Staiger (1998) model starts with a single country, called home. It focuses on a single good x with price p_x. The consumption (C_x) of the good is given by the function $C_x(p_x) = 1 - p_x$, the production (Q_x) by the function $Q_x(p_x, s) = (1-s) + p_x$.[9] In the production function the parameter s represents the economy's labour standard. This s lies between zero and one, where $s = 0$ corresponds to a very loose standard and $s = 1$ to a very strict labour standard. For the interpretation of the labour standard Bagwell and Staiger use the example of child labour. If $s = 0$, there is no regulation regarding child labour. Children of any age are allowed to work. In this case the production is given by $Q_x = 1 + p_x$. If $s = 1$, child labour would be completely forbidden. In this case production is given by $Q_x = p_x$.

In autarky, the price level of x then becomes $p_x^A = s/2$. It is positively related to the standard, since an increase in the standard limits the production possibilities. To return to the child labour example, a rise in s means that children can no longer work. This increases the cost of production, Q_x shifts to the left and the price rises.

The economic surplus in sector x is the sum of the consumer and producer surplus. Here it amounts to $(2 - s^2)/4$. Economic surplus therefore monotonically declines with the standard set, with a maximum value of $1/2$ at $s = 0$ and a minimum value of 0 at $s = 1$. As such, a labour standard has only economic costs.[10] From an economic point of view it is therefore best to set a very loose labour standard as it maximizes economic surplus.

A labour standard also has a social value. For a society it is desirable to ban child labour, or to impose certain minimum working conditions. Specifically, the government values an increase in s at rate λ. When the government decides on a labour standard for sector x, it takes into account both the economic costs and the social value of the standard. In autarky, domestic welfare then consists of the sum of economic surplus and social value. Hence,

$$W_x^A(s) = \frac{2 - s^2}{4} + \lambda s \tag{3.1}$$

The standard the government chooses is the one that maximises domestic welfare. In autarky, this is accomplished at a standard of $s^A = 2\lambda$. The welfare equals $W_x^A(s^A) = 1/2 + \lambda^2$ and the autarkic price level is $p_x^A = s^A/2 = \lambda$. The superscripts indicate the type of equilibrium: autarky (A), free trade (F), free trade with psychological externalities (P) etc.

When Bagwell and Staiger introduce a second country in their analysis, called foreign, they assume that this country does not have any labour standards. For our analysis, it is useful to also

9 To keep on stressing that our analysis is partial instead of general equilibrium, we will retain the subscript x throughout the analysis.

10 Bagwell and Staiger assume that the workers excluded from sector x cannot work in another sector of the economy. So if they do not work in sector x, they do not contribute to the economic surplus.

incorporate a foreign standard.[11] We therefore assume that the production and demand structure in foreign is exactly identical to that in home. Hence, $C_x^*(p_x^*) = 1 - p_x^*$ and $Q_x^*(p_x^*, s^*) = (1 - s^*) + p_x^*$, with an asterisk denoting foreign variables. When also in foreign the government attaches value to standards, the social welfare function becomes

$$W_x^{A*}(s^*) = \frac{2 - s^{*2}}{4} + \lambda^* s^* \tag{3.2}$$

where all variables have the same meaning as before. The labour standard which maximizes the welfare of foreign in autarky is $s^{A*} = 2\lambda^*$. In our analysis we will assume that the government in foreign values the social value of a labour standard less than the home government. That is, we assume $\lambda > \lambda^* \equiv \varphi\lambda$, with $0 \leq \varphi < 1$. This implies that in autarky the foreign standard is always lower than the standard of home ($s^{A*} < s^A$).

We now turn to the question how trade affects the optimal standards set. In autarky, foreign not only has lower standards than home, it also produces x cheaper than home: $p_x^{A*} = \lambda^* < \lambda = p_x^A$. When both countries engage in trade, home will therefore import x and foreign will export x. The trading equilibrium is settled by the home import demand function and foreign export supply function. These are, respectively,

$$M_x(p_x, s) = s - 2p_x \tag{3.3}$$

$$E_x^*(p_x^*, s^*) = 2p_x^* - s^* \tag{3.4}$$

while taking into account that after trade $p_x = p_x^* \equiv p_x^F$. The free trade equilibrium price (p_x^F) is equal to $p_x^F = (s + s^*)/4$.

To determine the optimal standards for either country when there is trade, we derive an expression for the gains from trade as a function of both countries' standards. These gains are defined by the area under the import demand curve and above p_x^F for home and by the area above the export supply curve and below p_x^F for foreign[12]. By symmetry of the import demand and export supply curves, the expression for the gains from trade is equal for both countries and can be expressed as

$$G_x^F(s, s^*) = G_x^{F*}(s, s^*) = \left(\frac{s - s^*}{4}\right)^2 \tag{3.5}$$

The gains from trade increase as the difference between the domestic and the foreign standard increases. This is so because in our framework the basis for trade is the price difference between countries, which depends on the difference in standards between countries.

The government has to take into account the effect of the standard on the gains from trade when its sets the standard. This means that the introduction of trade changes the optimal

[11] Bagwell and Staiger do not introduce a labour standard in foreign as they are only interested in the home standard. As it will turn out, their analysis becomes a special case of ours.

[12] Since the intercept with the vertical axis denotes the autarkic price as a function of the standard of each country. That is, the intercept of the import demand curve is $p_x = s/2$, while for the export supply curve it is $p_x = s^*/2$.

standard. Given the expression for the gains from trade, the trade-ridden welfare functions of home and foreign become

$$W_x^F(s,s^*) = \frac{2-s^2}{4} + \lambda s + \left(\frac{s-s^*}{4}\right)^2 \tag{3.6}$$

$$W_x^{F*}(s,s^*) = \frac{2-s^{*2}}{4} + \lambda^* s^* + \left(\frac{s-s^*}{4}\right)^2 \tag{3.7}$$

When both countries set their standards simultaneously, and take the standard of the other country as given, welfare maximization leads to the following set of reaction functions in standards

$$s = -\frac{1}{3}s^* + \frac{8}{3}\lambda \tag{3.8}$$

$$s^* = -\frac{1}{3}s + \frac{8}{3}\lambda^* \tag{3.9}$$

The optimal standard in home declines as the standard in foreign rises (and analogously for foreign). The reason for this negative relationship between s and s^* is the gains from trade, which increase when the difference between standards increases.

The non-cooperative Nash trading equilibrium in standards is

$$s^F = 3\lambda - \lambda^*; \qquad s^{F*} = 3\lambda^* - \lambda \tag{3.10}$$

Since $\lambda^* < \lambda$, the free trade equilibrium standard in home is higher than in autarky, while the standard in foreign is lower[13]. The reason for this difference is related to the gains from trade. For the autarkic situation, see (3.1), the marginal benefit of a change in s is the social value of the standard λ, while the marginal cost is the decline in economic surplus by $1/2s$. The standard is set where the marginal costs equal the marginal benefits, hence $s^A = 2\lambda$.

When there is trade, however, a marginal change in the standard has a second effect: a change in the gains from trade of $1/8(s-s^*)$. For home, this implies that upon the introduction of trade the marginal benefits of a rise in s go up, while the costs remain the same as in autarky. This means that it is optimal to set a higher standard. For foreign the effect is exactly opposite. With the introduction of trade the marginal costs of a rise in the foreign standard rise, because this decreases the gains from trade. So when foreign trades, it is optimal to have a lower standard than in autarky.

Trade thus raises the standard in home and lowers it in foreign. This illustrates the claim in Bagwell and Staiger (1998, p. 13-14) that "countries will adopt more stringent labour standards in the presence of import competition than they would choose in its absence.". Among other things, this implies that the anti-globalists may have in point when they claim that trade leads to low standards in developing countries. Note, however, that these lower standards also bring

[13] The autarky standards are, respectively, 2λ and $2\lambda^*$. Since $\lambda > \lambda^*$ by assumption, $(3\lambda - \lambda^*) > 2\lambda$ and $(3\lambda^* - \lambda) < 2\lambda^*$.

welfare gains to foreign, as do the higher standards in home. Given the new equilibrium values for s and s^* it is easy to verify that trade leads to gains for both countries.[14]

[14] This is facilitated by calculating the welfare levels in each country in both the autarky and the free trade equilibrium. Making the relevant substitutions for s^A, s^{A*} in (3.1)-(3.2) and for s^F, s^{F*} in (3.6)-(3.7) leads to $W_x^F(s^F, s^{F*}) = W_x^A(s^A) + 3/4(\lambda - \lambda^*)^2$ and $W_x^{F*}(s^F, s^{F*}) = W_x^{A*}(s^{A*}) + 3/4(\lambda^* - \lambda)^2$. Since $\lambda > \lambda^*$, it follows that both countries' welfare increases due to trade.

4 Psychological externalities, standards and welfare

As alluded to in the introduction, a low standard in foreign might bestow a negative psychological externality on the inhabitants of home. In this paper we assume that people in home do not want the people in foreign to work below a certain threshold level of working conditions. More precisely, we assume that the people in home want the standard in foreign to reach a certain minimum target, say $\bar{s}$. This is an absolute target because all workers have some basic rights that must be fulfilled. Examples are minimum safety regulations and maximum hours of work. As long as the foreign standard is not equal to the target, the welfare of the people in home declines. And this decline is greater the worse the situation in foreign is. For example, if the regulation regarding safety is closer to the target, the negative effect declines.[15]

We model psychological externalities by adding the term $-1/2(\bar{s}-s^*)^2$ to the domestic welfare function. Consequently, total domestic welfare is given by

$$W_x^P(s,s^*) = \frac{2-s^2}{4} + \lambda s + \left(\frac{s-s^*}{4}\right)^2 - \frac{1}{2}(\bar{s}-s^*)^2 \tag{4.1}$$

If $s^* < \bar{s}$, the surplus in home decreases. Only when $s^* = \bar{s}$, the surplus in home is not negatively affected. The way we model the psychological externality is symmetric in the sense that also a higher standard in foreign would lead to a negative impact on home's welfare. In our analysis, we will therefore only consider cases where $s^* \leq \bar{s}$. Equation (4.1) also indicates that when the standard in foreign is much lower than the target value, a small increase in the foreign standard has a large positive effect on domestic welfare. This effect decreases when the difference between the foreign standard and the target decreases.

The people in foreign are not concerned with the situation in home, so the welfare function of foreign remains unchanged:

$$W_x^{P*}(s,s^*) = \frac{2-s^{*2}}{4} + \lambda^* s^* + \left(\frac{s-s^*}{4}\right)^2 \tag{4.2}$$

What is the effect of the introduction of psychological externalities on the labour standards in home and foreign? In autarky, obviously none, since each country determines its optimal standard in complete isolation. But also in the trading equilibrium there is no effect, since each country takes the standard of the other country as a given. The reaction functions of both countries therefore remain the same as in the free trade equilibrium without externalities. For the optimal standards this implies that $s^P = s^F$ and $s^{P*} = s^{F*}$. When standards are set non-cooperatively, the introduction of psychological externalities has no effect on the optimal standards.

Psychological externalities do have an effect on home welfare, though (welfare in foreign obviously does not change). To make this more concrete, we set the minimum target $\bar{s}$ equal to

[15] Alternatively, we could make it a relative target by relating it to the standard that prevails in home.

the home standard in autarky, that is: $\bar{s} = s^A = 2\lambda$. Since $s^{P*} = s^{F*} < s^{A*} < s^A$, the optimal standard of foreign is below the target value and welfare in home is lower than it was in the situation without psychological externalities. This holds true for both the autarkic equilibrium and for the trading equilibrium.[16] In autarky the psychological externality amounts to $-2(\lambda - \lambda^*)^2 < 0$; in the trade equilibrium it becomes $-9/2(\lambda - \lambda^*)^2 < 0$.

[16] Provided, of course, we assume that autarky only implies isolation in a material sense and not in an awareness sense.

5 Policy options and psychological externalities

To decrease the negative impact of the psychological externality on home welfare the standard in foreign should increase. This implies that home will have to find ways to change the marginal cost-benefit analysis of foreign such that it decides to have a higher standard. In this section we explore three policy options for home in this respect. The first option is that home uses its own standard to manipulate the foreign standard. This is a policy option since the costs for foreign of raising its standard are related to the standard home sets via the gains from trade. The second option is that home uses trade policy to affect foreign's optimal standard choice. For given levels of standards, a tariff will decrease the gains from trade, which makes the costs for foreign to raise its standard lower. The third option is that home confers with foreign to lower the psychological externalities. This requires a cooperative setting, which we approach by calculating the global planner equilibrium in standards. To be able to compare the outcomes of these alternative policy options — with each other and with the standard free trade outcome — we once more set $\bar{s} = s^A = 2\lambda$.

5.1 The home standard as policy instrument

To make the home standard an effective policy tool requires a setting where home has some power over foreign when the optimal standards are set. Analytically, we investigate the consequences of such a situation by making home the Stackelberg-leader in the game both nations play. This implies that whereas foreign still takes the standard of home as given, home knows that foreign acts this way and therefore takes foreign's reaction into account when it sets its own standard. That way, it can use its own standard to manipulate the standard in foreign and to increase its own welfare.

To determine the new equilibrium standards, we substitute the reaction curve of foreign (3.9) in the welfare function of home (4.1) and subsequently calculate the welfare maximising standards of home and foreign. This yields

$$s^{St} = \frac{18}{7}\lambda + \frac{8}{7}\lambda^* - \frac{6}{7}\bar{s} \tag{5.1}$$

$$s^{St*} = \frac{16}{7}\lambda^* - \frac{6}{7}\lambda + \frac{2}{7}\bar{s} \tag{5.2}$$

This implies that the optimal standard in home is lower than in the Nash equilibrium, whereas the optimal standard in foreign is higher.[17] Thus, in order to raise the foreign standard, home will have to decrease its own standard.[18] To understand this, recall that when home decreases its own standard, the difference between home and foreign decreases. Hence the gains from trade

[17] Substituting for $\bar{s} = 2\lambda$, the Stackelberg standards become $s^{St} = 6/7\lambda + 8/7\lambda^*$ and $s^{St*} = 16/7\lambda^* - 2/7\lambda$. It then follows that $s^{St} - s^P = -\frac{15}{7}(\lambda - \lambda^*) < 0$ and $s^{St*} - s^{P*} = \frac{5}{7}(\lambda - \lambda^*) > 0$ since $\lambda > \lambda^*$.

[18] This situation refers to the 'race to the bottom' argument, though the mechanism is clearly different from the policy competition literature.

decrease for home as well as for foreign. Because of this, the marginal costs of a rise in the foreign standard decrease, while the domestic costs and the social benefit in foreign do not change. Consequently, foreign finds it optimal to raise its standard. The psychological externality decreases and home's welfare increases.

In contrast to the Nash equilibrium, where the introduction of psychological externalities did not make a difference for the optimal standards set, the optimal standards in the Stackelberg equilibrium are dependent on the presence of psychological externalities. To see this, consider the outcome of the Stackelberg game without externalities, which yields $s^{St} = \frac{18}{5}\lambda - \frac{8}{5}\lambda^*$ and $s^{St*} = \frac{16}{5}\lambda^* - \frac{6}{5}\lambda$. The optimal standard of home is then higher than in the Nash equilibrium, whereas the standard in Foreign is lower.[19] Without externalities, welfare in home is enhanced by an as low as possible foreign standard (as is increases the gains from trade for home). Home should therefore make the costs for foreign to raise its standard higher, which is accomplished by raising the home standard. When home increases its standard, the marginal costs of increasing foreign's standard in the gains from trade component, $-(s-s^*)/8$, increases and foreign will find it optimal to lower its standard. The introduction of psychological externalities changes this situation, as it adds an explicit element for home to value a higher foreign standard. Depending on the relative magnitude of the psychological externality, the logical policy action for home might then be to lower its own standard. When $\bar{s} = 2\lambda$, this is clearly the case.[20]

5.2 The home tariff as policy instrument

Suppose that home introduces a tariff $t \geq 0$ and define $\tau \equiv (1+t) \geq 1$ so that $p_x = \tau p_x^*$. The trading equilibrium then yields $p_x^* = p_x/\tau = \frac{1}{2}\frac{s+s^*}{1+\tau}$, the gains from trade for each country becomes $\left(\frac{s-\tau s^*}{2(1+\tau)}\right)^2$, while the tariff revenue for home can be expressed as $(p_x - p_x^*)M_x = \frac{1}{2}(s+s^*)\frac{\tau-1}{\tau+1}\frac{s-\tau s^*}{1+\tau}$. The tariff-ridden welfare functions of home and foreign therefore become (including psychological externalities in home):

$$W_x^T(s,s^*;\tau) = \frac{2-s^2}{4} + \lambda s - \frac{1}{2}(\bar{s}-s^*)^2 + \frac{1}{4}\left(\frac{s-\tau s^*}{1+\tau}\right)^2 + \frac{1}{2}(s+s^*)\frac{\tau-1}{\tau+1}\frac{s-\tau s^*}{1+\tau} \tag{5.3}$$

$$W_x^{T*}(s,s^*) = \frac{2-s^{*2}}{4} + \lambda^* s^* + \frac{1}{4}\left(\frac{s-\tau s^*}{1+\tau}\right)^2 \tag{5.4}$$

The structure of these expressions is the same as before, except for the final term in (5.3), which depicts the tariff revenues for home. Moreover, the gains from trade part of both expressions

[19] As can be calculated by deducting the free trade equilibrium standards from these Stackelberg standards. This yields: $s^{St} - s^F = \frac{3}{5}(\lambda - \lambda^*) > 0$ and $s^{St*} - s^{F*} = \frac{1}{5}(\lambda^* - \lambda) < 0$.

[20] By doing some standard calculus, it follows that home will increase its standard when $\bar{s} > (5\lambda^* - \lambda)/2$. $\bar{s} = 2\lambda$ satisfies this condition, since $\lambda^* < \lambda$. For a lower target value of $\bar{s}$, it depends on the relative magnitude of λ^* to λ whether or not this condition holds. The farther apart λ and λ^*, the more likely the condition is also satisfied for $\bar{s} < 2\lambda$.

now depends on the tariff. Indeed, when $\tau = 1$, both expressions are identically equal to (4.1) and (4.2), the welfare expressions of the free trade Nash game.

Calculating the tariff-ridden non-cooperative Nash equilibrium in standards yields

$$s^T = T\left[(1+2\tau)\lambda - (\tau^2 - \tau + 1)\lambda^*\right]$$
$$s^{T*} = T\left[(\tau^2+2)\lambda^* - \tau\lambda\right]$$

with $T \equiv \dfrac{2(\tau+1)^2}{\tau^3+2\tau^2+3\tau+2}$. The optimal standards are again independent of the target value $\bar{s}$ and when $\tau = 1$, the optimal standards become equal to that of the free trade Nash equilibrium. To get insight how the introduction of a tariff alters the optimal standards, we differentiate s^T and s^{T*} with respect to τ and evaluate this at $\tau = 1$. It follows that:

$$\left.\frac{ds^T}{d\tau}\right|_{\tau=1} = \frac{5}{4}\lambda - \frac{3}{4}\lambda^* > 0$$
$$\left.\frac{ds^{T*}}{d\tau}\right|_{\tau=1} = \frac{5}{4}\lambda^* - \frac{3}{4}\lambda > 0 \text{ if } \lambda^* > \frac{3}{5}\lambda$$

Upon the introduction of a tariff, therefore, the home standard always increases, whereas the foreign standard increases if the social value attached to standards in foreign is not too low (relative to the valuation of standards in home). To understand this, note that a tariff diminishes the gains from trade, ceteris paribus, which makes it less desirable for home to have a high standard. In home, this effect is countered by the fact that tariff revenue increases when the home standard is higher. At $\tau = 1$, the latter effect clearly dominates the former. For foreign the terms of trade effect – lower gains from trade means lower marginal cost for raising the standard – dominates, conditional on $\lambda^* > \frac{3}{5}\lambda$.[21]

5.3 Coordinated policy

The previous two policy options assumed that home and foreign set their labour standards non-cooperatively. By taking unilateral action, home tries to increase the standard in foreign. Another type of equilibrium a cooperative setting. We analyse such a setting by calculating the central planner equilibrium. A central planner aims at maximising world welfare and determines the optimal domestic and foreign standards accordingly. The standards this planner sets may therefore not be optimal from an individual country's point of view. In principle, it is possible that to maximise world welfare, the welfare of one country increases, while the welfare in the other country decreases. The typical solution to resolve this problem is income transfers from the country that gains to the country that loses. If these transfers are possible, both countries have an incentive to cooperate.

[21] Technically, the slopes and intercepts of the reaction curves shift with higher trade taxes. The condition ensures that the outward shift of the foreign reaction curve is sufficiently strong for s^* to increase.

The central planner maximises the combined welfare of home and foreign. Total welfare is obtained by summing the welfare functions (4.1) and (4.2) to yield:

$$W_x^W(s,s^*) = \frac{2-s^2}{4} + \frac{2-s^{*2}}{4} + \lambda s + \lambda^* s^* + 2\left(\frac{s-s^*}{4}\right)^2 - \frac{1}{2}(\bar{s}-s^*)^2 \tag{5.5}$$

Differentiating this function to s and s^* leads to the following two optimality conditions:

$$s = -s^* + 4\lambda \tag{5.6}$$

$$s^* = \frac{4}{5}\lambda^* - \frac{1}{5}s + \frac{4}{5}\bar{s} \tag{5.7}$$

The condition which determines the home standard is a negative function of the foreign standard and a positive function of λ. The negative relationship between s and s^* depicts the gains from trade. The coefficient is larger than in the Nash situation because the planner also takes into account the gains for foreign. The gains from trade now have a bigger impact on the home standard.

A large part of the foreign standard now depends on the target standard $\bar{s}$. This represents the positive effect of a higher foreign standard on home welfare. Of course it also depends on the social value of the standard, λ^*. The foreign standard is still negatively related to the home standard, due to the gains from trade effect.

The solution to this pair of optimality conditions leads to the following optimal standards:

$$s^{CP} = 5\lambda - \lambda^* - \bar{s} \qquad \text{and} \qquad s^{CP*} = \lambda^* - \lambda + \bar{s}$$

These results can be interpreted as follows: if $\bar{s}$ is high a low foreign standard is (quadratically) costly for home and the planner thus chooses a relatively high foreign standard. The signs for the λ's are intuitively clear.

6 Comparing the alternative policy options

In the previous section we have seen that alternative policy options can be used to reduce the psychological externality that the low standards in foreign bestow upon home. Now we address the question which of these policy instruments is most effective in reaching that goal. We thereby define effectiveness as the percentage change in the psychological externality a certain policy option yields compared to the non-cooperative Nash free trade equilibrium. To facilitate the comparison we set $\bar{s} = 2\lambda$ and use $\lambda^* = \varphi\lambda$, with $0 \leq \varphi < 1$.

Table 6.1 presents the level of psychological externality attained for each of the policy measures and gives the percentage change compared to the free trade. For reference sake we also include the optimal standards.

Table 6.1 Effectiveness of alternative policy measures

	Optimal standards		Psychological	Change compared
	home (s)	foreign (s^*)	externality ($\bar{s} = 2\lambda$)	to free trade (%)
Autarky	2λ	$2\lambda^*$	$-2(\lambda - \lambda^*)^2$	−56
Free trade	$3\lambda - \lambda^*$	$3\lambda^* - \lambda$	$-\frac{9}{2}(\lambda - \lambda^*)^2$	
Stackelberg	$\frac{18}{7}\lambda + \frac{8}{7}\lambda^* - \frac{6}{7}\bar{s}$	$\frac{16}{7}\lambda^* - \frac{6}{7}\lambda + \frac{2}{7}\bar{s}$	$-\frac{1}{2}\left[\frac{16}{7}(\lambda - \lambda^*)\right]^2$	−42
Tariff	$T[(1+2\tau)\lambda \ldots$	$T[(\tau^2+2)\lambda^* \ldots$	$-\frac{1}{2}[(2+T\tau)\lambda - \ldots$	depends on tariff
	$\ldots - (\tau^2 - \tau + 1)\lambda^*]$	$\ldots - \tau\lambda]$	$\ldots(\tau^2+2)T\lambda^*)]^2$	
Central planner	$5\lambda - \lambda^* - \bar{s}$	$\lambda^* - \lambda + \bar{s}$	$-\frac{1}{2}(\lambda - \lambda^*)^2$	−89

Since the effectiveness of the tariff measure is a function of the tariff, we cannot make a clear conclusion on the effectiveness of the policy options. After all, when we derived the tariff-ridden tariffs, we saw that upon inception a tariff typically raised the foreign standard. We therefore rely on numerical analysis to get more concrete insight on the matter. Suppose, $\lambda = 0.4$ and $\varphi = 0.8$, which implies that $\bar{s} = 0.8$ and $\lambda^* = 0.32$. Then we can calculate the levels of standards as a function of τ. This is reported in Table 6.2, which gives the levels of standards attained and also the impact on the psychological externality. As the table shows the psychological externality is most reduced in the central planner's equilibrium. However, the psychological externality is only one of the elements in the welfare function of home. Typically, the reduction in the psychological externality will come at the cost of other welfare components, for instance the gains from trade. To get insight in the desirability of the different equilibria, we compare the welfare effects of the alternative policy options. Especially the welfare effects for foreign deserve our attention. First, because of the moral dilemma that might evolve when raising standard in foreign would imply a welfare loss to foreign. Second, and related, because of the feasibility of the central planner option: in order to get cooperation off the ground, the distribution of the worldwide welfare gains in the central planner solution should be such that both countries improve upon their fall-back position.

Table 6.2 Numerical example of effectiveness of alternative policy measures

	s	s^*	change in psychological externality compared to free trade (%)
autarky	0.800	0.640	−56
free trade	0.880	0.560	
stackelberg	0.709	0.617	−42
central planner	0.880	0.720	−89
tariff*			
$\tau = 1$	0.880	0.560	0
$\tau = 1.1$	0.901	0.572	−10
$\tau = 1.2$	0.913	0.589	−23
$\tau = 1.3$	0.917	0.609	−37
$\tau = 1.4$	0.914	0.633	−52

*At $\tau > 1.4$ home becomes an exporter of good x.

The analytical results of the previous section show that each policy option has countervailing effects. To analytically compare welfare levels turn out cumbersome, therefore we rely on numerical analysis to derive total welfare effects.[22] Using the same numerical example as above, we present in Table 6.3 and Table 6.4 the levels of the different components of the domestic and foreign welfare functions, as well as the total welfare effect. Table 6.3 gives the results for home, Table 6.4 for foreign. For future reference, we also include the outcomes of a policy option yet to be discussed (row WTO+).

Concentrating on the final columns in Tables 6.3 and 6.4, we obtain the following insights. For home the move from autarky to free trade does not increase welfare. This result, contrasting with one of the classic results in economics, derives from the fact that, due to the opportunity to trade, foreign lowers its standard and thereby increases the disutility it imposes upon home. The Stackelberg policy obviously improves upon the free trade Nash equilibrium.[23] The reduced psychological externality, by a higher standard in foreign, comes at the cost of a lower standard in home though (see the column on social benefit). Moreover, as is clear from Table 6.4, the reduction in home's psychological externality comes at the cost of foreign welfare. The gain in the standard translates indeed into a higher social benefit in foreign but comes at a high economic cost! Note that *any* uncoordinated policy by home lowers welfare in foreign below its free trade level. Note, moreover, that home has an incentive to raise trade barriers (starting from a free trade agreement). Finally, the coordinated solution derived by solving the planners

[22] The appendix contains a comparison of the different element of the welfare function. These can easily be ranked in terms of welfare levels.

[23] Note that the Nash policy is in the choice set of home when playing the Stackelberg game.

Table 6.3 Welfare effects of different policies for home

	domestic surplus	social benefit	gains from trade	psych externality	tariff revenue	Total welfare
uncoordinated						
autarky	0.340	0.320	-	−0.013	-	0.647
free trade	0.306	0.352	0.006	−0.029	-	0.636
stackelberg	0.374	0.283	0.017	−0.017	-	0.642
tariff						
$\tau = 1$	0.306	0.352	0.006	−0.029	-	0.636
$\tau = 1.1$	0.297	0.360	0.004	−0.026	0.005	0.640
$\tau = 1.2$	0.291	0.365	0.002	−0.022	0.006	0.643
$\tau = 1.3$	0.290	0.367	0.001	−0.018	0.005	0.645
$\tau = 1.4$	0.291	0.366	0.000	−0.014	0.001	0.644
coordinated						
central planner	0.306	0.352	0.002	−0.003		0.657
WTO$^+$	0.318	0.314	0.003	−0.013		0.649

Table 6.4 Welfare effects of different policies for foreign

	domestic surplus	social benefit	gains from trade	psych externality	tariff revenue	Total welfare
uncoordinated						
autarky	0.398	0.205	-			0.602
free trade	0.422	0.179	0.006			0.607
stackelberg	0.405	0.197	0.001			0.603
tariff						
$\tau = 1$	0.422	0.179	0.006			0.607
$\tau = 1.1$	0.418	0.183	0.004			0.605
$\tau = 1.2$	0.413	0.188	0.002			0.604
$\tau = 1.3$	0.407	0.195	0.001			0.603
$\tau = 1.4$	0.400	0.203	0.000			0.602
coordinated						
central planner	0.370	0.230	0.002			0.602
WTO$^+$	0.398	0.205	0.003			0.605

problem learns that joint welfare is (by construction) the highest. From these observations we conclude that coordination is desirable.

7 Coordination, incentive compatibility and the WTO

The central planner creates the highest welfare, taking home and foreign together. The question is whether the two countries are able to agree upon cooperation? Obviously, income transfers to foreign have to be made in order to induce them to cooperate (foreign's welfare under free trade is higher). A genuine interest in foreign standards is therefore to be realised by 'asking' them to raise their standard and to provide an income transfer, conditionally thereon. This is implausible for two reasons: first of all, economists tend to believe that lump sum transfers are infeasible. Second, and probably more convincing, foreign is not able to commit itself to the high standard agreed upon by implementing the planner's solution: after receiving the lump sum payment, it is beneficial to defect by lowering the standard to the free trade level again (see Tables 6.3 and 6.4).[24] Thus the time inconsistency makes it impossible for foreign to commit to the policy.

An alternative way to think about coordination is to give the WTO a role in standard setting and facilitating and monitoring agreements. We think of this as follows: WTO guarantees free trade (access to the market in home) but requires that a country does not lower its standards. We dub this WTO$^+$. Variations of this proposal, like including labour standards within WTO, are often criticised. We, however, propose something much less drastic, as our proposal relates to the reciprocity principle already embedded in WTO rules. A full discussion of the drawbacks of including labour standards in WTO is beyond the scope of this paper but we provide a limited overview of the arguments.[25] The essence of the argument is that (1) the useful role the WTO plays might be undermined if it is burdened with tasks that are more controversial and (2) there is a 'slippery slope' argument: once core labour standards are set and checked by WTO it might be easily seduced to interfere with all domestic policy issues that somehow affect trade (read: all policies, as it is hard to come up with policy that has no effect on the prices of tradeables).

We formalise WTO$^+$ as follows:

$$s^{WTO+*} \geq s^{A*} = 2\lambda^* \quad \text{and} \quad \tau = 1$$

It is simple to show that the inequality is binding, hence foreign sets its standard at the autarky level. Home sets the best (Nash) response:

$$s^{WTO+} = \frac{2}{3}(4\lambda - \lambda^*)$$

[24] To defect implies for foreign, at worst, returning to autarky. It is simple to show that as long as $\bar{s} \geq 2\lambda$, autarky is at least as good (for foreign) as the welfare outcome under the central planner for foreign (of course ignoring the transfer as that has been received already in our thought experiment; it is a sunk benefit for foreign). To fully consider a multi-round game is beyond the scope of this paper, but in a multi-round game defection is optimal if a finite number of rounds is played. As the final round is analogous to the one-shot game described above, then – by backward induction – defection is already optimal in the first round.

[25] See Bagwell and Staiger (2000) for an elaborate discussion.

One can verify that home sets its standard lower than in the free trade Nash equilibrium. The final rows in the Tables 6.3 and 6.4 indicate that this policy is the best in terms of joint welfare.[26] Moreover the WTO$^+$ policy is incentive compatible. For incentive compatibility, (1) both countries ought to have an incentive to cooperate starting from the uncoordinated equilibrium and (2) both countries should have no incentive to deviate from the coordinated WTO$^+$equilibrium. Let us start with condition (2). For this we need to compare the free trade equilibrium under WTO$^+$ rules with the relevant alternative non-coordinated equilibrium. Note that for home the WTO$^+$ is better than autarky and better than any tariff outcome (and free trade, but this is irrelevant as home welfare increases with the tariff). For foreign the WTO$^+$ scenario is better than the situation with tariffs or autarky. WTO$^+$ is worse than free trade but this is irrelevant as in a hypothetical free trade equilibrium home will always deviate, likely by raising tariffs[27] as that raises home welfare. This threat is credible as WTO rules allow such a retaliatory response to a change in foreign standards to rebalance the concessions under the reciprocity principle. Exactly analogous reasoning ensures that condition (1) holds.

[26] Of course the planner exceeds this welfare level. The analytical comparison with the other policy options is hampered by the dependence of the various policy options on $\bar{s}$ and/or τ. It is possible to show though that the WTO+ welfare in foreign is always higher than in autarky, but lower than under uncoordinated free trade. When $\bar{s} = 2\lambda$, we can also show for home that welfare under WTO+ is higher than in autarky, but a comparison with uncoordinated free trade gives inconclusive outcomes.

[27] Returning to an autarky-like situation, by setting a prohibitively high tariff, could also be a policy option. Autarky and a situation where trade is zero are however not identical as optimal standards set will differ. Details can be obtained from the authors.

8 Robustness

The model – or call it an example – used to derive the results serves to illustrate our reasoning. The question is whether the results are robust to changes therein. We answer this question in two different aspects. The numerical results and the set-up of the model are discussed. First, the numerical results: after numerical testing these results show to be extremely robust, in the sense of the ordering of the relevant welfare comparisons used in the previous section.[28] With respect to the modelling exercise more has to be said. We use a few basic ingredients whereby we introduce several simplifications that can, in principle, be generalised to derive more general restrictions under which our results hold. First, there are gains from trade; gains that increase exponentially in the countries' differences in production cost. This holds for most trade-model specifications, it is merely saying that gains from trade look like triangles (not necessarily the symmetric ones that follow from our demand and supply elasticities that equal unity). Second, we have a specific functional form for the psychological externality that is quadratic with a threshold level.[29] We argue that both characteristics are plausible. At a certain level, better standards in foreign do not make you feel better. Whether the Indian office workers' desks are cleaned daily or weekly does not really matter is what we argue, whether children work does! That the marginal disutility of bad standards increases with lower standards is obvious when thinking of children working at an ever lower age. We have seen that restrictions on $\bar{s}$ play an important role, as these essentially determine the weight of the psychological externality. Also in a more general setting one needs to determine the relative weight of the psychological externality. Finally, we abstained from using a general-equilibrium model. To do that the essential extensions come down to modelling a second sector and a resource to finance home's imports. To leave the results unaffected the second sector in foreign should not contribute to the surplus; an informal subsistence sector is what we have in mind. Home could pay for imports by either the production of the second sector or by received interest payments on past debt of foreign (the second sector could in that case be a non-tradeable producer).

All these extension complicate the analysis and deliver more general conditions. However, as the results we derive show up in our restricted setting we believe it is possible to derive them under some conditions in a more general setting.

[28] We, however, obey in the numerical tests the restriction that $\lambda^* > \frac{3}{5}\lambda$ and $\bar{s} = 2\lambda$.

[29] In future work we intent to derive the psychological externalities from first principles.

9 Conclusion

This paper uses a model to analyse psychological externalities related to standards, in conjunction with international trade. We use a simple two-country, one-sector model of international trade where differences in costs of production between countries solely depend on the level of labour standards governments choose. We apply this model to a situation where in autarky foreign, the low-income country, chooses a lower standard than home, the high-income country. In addition, we assume that standards in foreign negatively affect the well-being of home, as low standards in foreign bestow a psychological externality on home. When trade commences, the gap between the standards of home and foreign widens, which increases welfare in both countries due to increased gains from trade, but at the same time lowers welfare in home due to the negative psychological externality. Free trade is therefore not necessarily welfare improving for home, while it is for foreign, and home may opt for policy intervention.

In the paper we investigate the effectiveness and efficiency of alternative measures home can take to raise standards in foreign. We find that any uncoordinated, unilateral action by home to decrease the psychological externality, such as imposing an import tariff or by altering its own standard to manipulate the standards in foreign, is dominated by coordinated action. This is true both regarding the extent the policy intervention reduces the psychological externality in home (a measure of effectiveness), as regarding the impact on home's welfare (a measure of efficiency). Any policy action comes at the cost of welfare in foreign, though, as for them unconstrained free trade is always optimal. This implies that coordination is not automatically incentive compatible. When incorporated in the framework of the WTO, by slightly expanding the interpretation of the existing reciprocity rule to ensure that no country lowers its standards below the autarky level, we argue that coordination can be made incentive compatible and that the situation where free trade works to the advantage of both countries can be restored.

For the discussion on globalisation and labour standards, our analysis implies that the solution typically forwarded by anti-globalists — to reduce trade by imposing import restricting measures — is by no means optimal. Though it will raise the standards in low-income countries and thereby reduces the negative psychological externality bestowed on them, at the same time it reduces welfare in the low-income countries. Ironically, the solution to this dilemma is in the hands of the WTO, the organisation typically blamed by anti-globalists for thoughtlessly applying the free trade dogma.

References

Bagwell, K. and R. Staiger, 1998, The simple economics of labor standards and the gatt, NBER Working Paper 6604, NBER, Washington D.C.

Bagwell, K. and R. Staiger, 2000, Gatt think.

Bagwell, K. and R. Staiger, 2001, Domestic policies, national sovereignty and international economic institutions, *Quarterly Journal of Economics*, vol. 116, pp. 519–562.

Bhagwati, J. and T. Srinivasan, 1996, Trade and the environment: Does environmental diversity detract from the case for free trade?, in J. Bhagwati and R. Hudec, eds., *Fair Trade and Harmonization: Prerequisites for Free Trade?*, vol. 1, chap. 4, The MIT Press, Cambridge, Massachusetts, London, England.

Bucovetsky, S. and J. Wilson, 1991, Tax competition with two tax instruments, *Regional Science and Urban Economics*, vol. 21, pp. 333–350.

Cooper, R., 1994, *Environment and Resource Policies for the World Economy*, The Brookings Institution, Washington D.C.

Esty, D., 1994, *Greening the GATT*, Institute for International Economics, Washington D.C.

Hansson, G., 1990, *Harmonisation and International Trade*, Routledge, London and New York.

Howse, R. and M. Trebilcock, 1996, The fair trade-free trade debate: Trade, labor and the environment, *International Review of Law and Economics*, vol. 16, pp. 61–79.

Keyzer, M., 2002, Culture and labelling.

Krueger, A., 1995, *Trade Policies and Developing Nations*, The Brookings Institution, Washington D.C.

Krueger, A., 1997, Observations on international labor standards and trade, in M. Bruno and B. Pleskovic, eds., *Annual World Bank Conference on Development Economics 1996*, pp. 281–302, Washington, DC: The World Bank.

Lawrence, R., A. Bressand and T. Ito, 1996, *A Vision for the World Economy*, The Brookings

Institution, Washington D.C.

Leebron, D., 1996, Lying down with procrustes: An analysis of harmonization claims, in J. Bhagwati and R. Hudec, eds., *Fair Trade and Harmonization: Prerequisites for Free Trade?*, vol. 1, chap. 2, The MIT Press, Cambridge, Massachusetts, London, England.

Micklethwait, J. and A. Wooldridge, 2000, *A Future Perfect*, Crown Publishers, New York, New York.

Rollo, J. and L. A. Winters, 2000, Subsidiarity and governance challenges for the wto: Environmental and labour standards, *The World Economy*, vol. 23, pp. 561–576.

Rollo, J. and L. A. Winters, 23, Subsidiarity and governance challenges for the wto: Environmental and labour standards, 561-576, The World Economy.

Wilson, J., 1996, Capital mobility and environmental standards: Is there a theoretical basis for a race to the bottom?, in J. Bhagwati and R. Hudec, eds., *Fair Trade and Harmonization: Prerequisites for Free Trade?*, vol. 1, chap. 10, The MIT Press, Cambridge, Massachusetts, London, England.

Zodrow, G. and P. Mieszkowski, 1986, Pigou, tiebout, property taxation and the underprovision of local public goods, *Journal of Urban Economics*, vol. 19, pp. 336–370.

Appendix A Welfare effects

To gain insight in the welfare effects, we present in Table A.1 the analytical results on the individual welfare components. For each of the welfare components — domestic surplus, social benefit, gains from trade and psychological externality — we indicate the ranking of the policy options. The tariff option is excluded, due to its dependency on τ. The table is based on an comparison of the analytical results in Sections 3 to 5 and is constructed for $\bar{s} = 2\lambda$. The results can be derived by straightforward calculations. Calculational details can be obtained from the authors.

Table A.1 Analytical ranking of policy options

Home	
domestic surplus	(1) stackelberg, (2) autarky, (3) free trade and central planner
social benefit	(1) free trade and central planner, (2) autarky, (3) stackelberg
gains from trade	(1) free trade, (2) central planner, (3) stackelberg, (4) autarky
psychological externality	(1) central planner, (2) autarky, (3) stackelberg, (4) free trade
Foreign	
domestic surplus	(1) free trade, (2) stackelberg, (3) autarky, (4) central planner
social benefit	(1) central planner, (2) autarky, (3) stackelberg, (4) free trade
gains from trade	(1) free trade, (2) central planner, (3) stackelberg, (4) autarky
psychological externality	-

These analytical results emphasize that each policy option has countervailing effects. For instance, whereas for home free trade is best for the gains from trade, the social benefit and the psychological externality, it is worst for domestic surplus. Alternatively, the Stackelberg solution is best for the domestic surplus, but worst or intermediate for other welfare elements. Moreover, note that since $\bar{s} = 2\lambda$, the home standard under free trade is the same to that of the central planner, welfare items that only depend on the home standard are the same for both of these policy options.