Home bias in preferences and the political economics of agricultural protection

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Summary *– Some consumers are willing to pay extra for food if it is of domestic origin. This paper theoretically examines the consequences of such home biased behavior for agricultural policy, assuming that the policy is decided by the median voter. The analysis is conducted in the framework of a small open economy, with a Ricardian production structure. Consumers differ with respect to how much extra they are willing to pay for a domestically produced agricultural good. For a tariff we find that, if there would be some home biased choices (no matter how few) in a laissez-faire regime, the political equilibrium will imply a strictly positive tariff. This tariff is high if the productivity in the agricultural sector of this country is low. A political equilibrium with a strictly positive subsidy requires stronger home bias than a tariff.*

Keywords: *agriculture, trade, home bias, tariff, subsidy*

Biais domestique et économie politique de la protection commerciale agricole

Résumé – Certains consommateurs ont un consentement à payer plus élevé pour les biens alimentaires d'origine nationale. Cet article théorique analyse les conséquences de ce biais domestique sur la politique agricole, lorsque la politique est dictée par l'électeur médian. L'analyse est réalisée dans le cadre d'une petite économie ouverte, avec une structure de production de type ricardienne. Les consommateurs diffèrent par rapport à leur consentement à payer pour des produits agricoles locaux. Nos résultats montrent que, en présence de biais domestique (peu importe son importance) dans un régime de laissez-faire, l'équilibre politique implique un tarif strictement positif. Ce tarif est élevé si la productivité du secteur agricole du pays est faible. Un équilibre politique avec une subvention strictement positive nécessite un biais domestique relativement élevé.

Mots-clés : agriculture, commerce, préférence nationale, tarifs, subventions

JEL Classification: Q17, Q18

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1. Introduction

Some consumers are willing to pay extra for food that is produced in their home country. This is a possible interpretation of several microeconomic studies of consumer preferences, for example Alfnes and Rickertsen (2003) and Alfnes (2004). These papers primarily address consumers' attitudes to hormone-treated beef, but the country of origin also shows to be an important determinant of the choices, with food from the own country often being the most preferred. A more recent piece of evidence is provided by Ellison *et al.* (2010), who interview citizens in three US states and find that a large majority of their sample is in favor of government support for domestic farmers, 'primarily because people believe it ensures a secure food supply.'

There is also a growing empirical literature indicating that home bias in preferences puts considerable constraints on trade between countries. For example, Olper and Raimondi (2008b) analyze such border effects in processed food trade between the US, Canada, Japan and the EU, using a gravity model. They use new proxies for information-related costs and home bias in preferences, and find that they explain the border effect to a much larger extent than the traditional policy barriers. In another article, Lopez *et al.* (2006) use an Armington (1969) model to estimate home bias in the preferences for US processed food. They find that the home bias is quite strong for almost all these goods, and even very strong for many of them. Furthermore, the agricultural content of the goods significantly raises the home bias.

The home-bias phenomenon has been observed for other goods than food, for instance cars and electronic devices. This is empirically documented in, for example, McCallum (1995). For a summary of more recent empirical studies on this topic, see Feenstra (2003). A central assumption of this paper is that the home bias is stronger for food than for other goods. The results in Lopez *et al.* (2006) give support to this assumption [1]. These examples do not prove that home bias in the demand for food is a universal phenomenon, but they may be interpreted as indicating that it is significant enough to affect markets for food in some countries [2].

In this paper we will, for variation, interchangeably use the terms *home biased* and *patriotic* for consumers acting in accordance with the findings mentioned above. A bias in the food consumption pattern towards the domestic supply may of course have other reasons than just patriotic feelings. For instance, it seems like consumers sometimes use the fact that a good is domestically produced as a cue for safety and quality of *e.g.* beef (Becker (1999) and Hoffman (2000)). In any case, the home bias in purchases of food, be it caused by pure patriotism, safety confidence (concerning, production methods or control systems) or a wish to keep one's nearby landscapes open (and guarantee

[1] See also Juric and Worsley (1998) for a survey.

[2] As for subjective evidence, I (living in Europe) have many times experienced stores displaying domestic and (cheaper) imported pork and beef side by side in their counters. On the other hand, one of the referees of this paper (living in the US) has never seen this. This anecdotal evidence is thus inconclusive, which means that the analysis below probably is less relevant for some parts of the world than for others.

continued domestic production), appears to be sufficiently important to influence food market outcomes [3].

Consumers are, however, not just buyers but also voters. This paper therefore examines the extent to which an element of home bias in the preferences for food can influence agricultural trade policy [4]. We construct a very simple model of a small open economy, with a Ricardian production structure where domestic agricultural productivity is lower than in the rest of the world. Consumers are heterogeneous, in the sense that they differ with respect to how much extra they are willing to pay for a domestically produced agricultural good. The indirect utility functions are used to find the specific values of tariffs and agricultural subsidies that the various households prefer. We assume that the median voter decides about the levels of these policy instruments.

A considerable share of the existing literature on the political economics of agriculture analyzes the activities of special interest groups, mostly on the producer side. These obviously are important in reality (and they apparently are an important explanation for agricultural protection in the public mind). This strong focus on the producer side sometimes seems to build on the assumption that agricultural protection would be reduced substantially if these lobby activities were forbidden. In contrast to this, the present paper investigates whether a considerable support for protection may still remain, even though it is only driven by non-organized consumers [5]. This is of course not meant to imply that the producer lobbies are irrelevant; the purpose is just to isolate one less examined mechanism.

For a tariff on imported food we find that the political equilibrium will imply a strictly positive tariff, if the laissez-faire economy generates just the slightest amount of home biased choices. In other words, an interventionist tariff policy is avoided only if no consumer would buy the more expensive domestic agricultural output in a situation without political intervention. This effect of patriotic preferences is perhaps surprisingly strong. A reason may be that we here have an instance of the well known 'tyranny of the majority' result in public choice theory: if the population is heterogeneous and there is majority voting, the majority will strive to exploit the minority [6]. The relative easiness with which a protectionist policy equilibrium arises is

[3] Tanner-Ehmke (2006) provides a meta-analysis of previously existing studies on the willingness to pay for country-of-origin. She finds some evidence for willingness to pay for own country-of-origin, but these results are sensitive to the number of credentials included in the description of the products, and to the location of the consumer. Note that some of the included papers concern goods with Protected Designation of Origin (PDO) labels, which indicate more than just origin, for instance high quality in terms of taste, texture and purity. In such cases the term 'patriotic' is of course much less applicable. In fact, consumers are often happy to pay more for imported labelled good in this case. This paper is not analyzing such goods.

[4] This idea is not new. For instance, when interpreting their results, Olper and Raimondi (2008a) suggest that home bias in food trade could influence political process in a protectionist direction.

[5] As will be discussed below, there are other models that give a large political clout to non-organized consumers, but (to our knowledge) they do not model the preferences for domestic food as explicit as we do here.

[6] See Buchanan and Tullock (1975). For a recent example of a theoretical political equilibrium with a 'tyranny of the majority', see Grossman and Helpman (2005). They derive a 'protectionist bias' result in a model with three stages in the policy formation process.

thus not only explained by the home biased preferences, but also by the opportunity of one group to take advantage of another. Since it is difficult to separate these two effects from each other, the conclusion cannot be that the effect of atomistic patriotic behavior is very strong, but rather that it should not be ignored as a force shaping agricultural policy.

Not surprisingly, we also find that only the group that buys the domestically produced agricultural good will favor a strictly positive tariff. It is more likely that this group constitutes a majority of the population if the difference between domestic and foreign productivity in the agricultural sector is small, and if the parameter that captures the degree of home bias in the utility function is large. The smaller the productivity disadvantage of the agricultural sector, the lower is the tariff and the less distorting is the political equilibrium, compared to the first-best optimum with a zero tariff.

Finally, we find that a subsidy is less likely as a political outcome than a tariff, in the sense that a higher degree of home bias is required. This is because the subsidy is paid by everyone, so the tyranny of the majority is weaker. Even the patriotic consumers tend to become reluctant to transfer money to the low-productive domestic farmers in this case.

Since it is often observed that lobby groups are very active in the formation of agricultural policy, the theoretical literature on the political economics of agricultural trade policy [7] has made much use of the literature on *collective action* by lobby groups. A seminal book is Olson (1965), and Becker (1983) is an influential article in this tradition. A different kind of approach is described in Swinnen and de Gorter (1993) and Swinnen (1994), where a *political support function* is central in the analysis, while there is no political organization. The politicians here maximize the total political support, taking a governmental budget constraint into account. This model gives a considerable political influence to the households, but for the problem of this paper it nevertheless seems more appropriate to use the median voter approach. The reason is that this makes it easier to derive the political equilibrium from ordinary utility maximization at the individual level, with an even stronger focus on the role of preferences, not least the variation in home bias between households.

Venables (1987) and Lancaster (1991) use preferences which allow for home-bias in consumer behavior [8]. Because of increasing returns to scale, a case for protectionism may arise from these analyzes. (In the present paper there are no market failures, so the social optimum requires zero political intervention.) Philippidis and Hubbard (2003) use a similar approach to argue that a varietal utility in the EU may be sufficient to balance the cost of the CAP.

Section 2 presents the basic model and the economic equilibrium. In Section 3 the political equililibria are analyzed and related to the social optimum. The two policy instruments, subsidy and tariff, are analyzed separately.

[7] See de Gorter and Swinnen (2002) for a review.
[8] The similarity with Armington (1969) is also apparent.

2. Model and economic equilibrium

2.1. Households

There is a large number (a continuum) of households/consumers, which for simplicity of notation is normalized to a unit mass. They are uniformly distributed on the unit interval, and indexed by j, *i.e.* $0 \leq j \leq 1$. Households consume an industrial good, x, and an agricultural output ('food'), which is denoted by a_I if the good is imported and by a_D if it is domestically produced. Consumer j's utility function is

$$U^j = x^j + \alpha \ln\left[a_I^j + (1+\beta \cdot j)a_D^j\right]. \tag{1}$$

This means that the two agricultural goods are perfect substitutes, with the qualification that the factor $(1 + \beta j)$ adds a 'patriotic premium' if the good is domestically produced. Moreover, consumers are heterogenous: the higher j is, the more home biased is the consumer. The household at $j = 0$ is not patriotic at all. The distribution of the 'patriotic premium' is thus quite simple: it is linearly increasing in j [9]. The parameter α captures the relative importance of food consumption in utility.

The world market price of the industrial good is exogenously given and normalized to unity. (The domestic price will be the same, as explained below.) Similarly, the price of the imported agricultural good is given by the world market and equals P^W. If the home economy puts the tariff t on the import of this good, the effective price is $\tau = (1 + t)P^W$. By choice of units, we normalize P^W to unity. Consequently $\tau = 1 + t$ and $\tau = 1$ if the tariff is set to zero. Finally, the price of the domestic agricultural good is denoted by p and it is endogenous.

Looking first at the demand for food, there is a household that is indifferent between choosing the domestic or the imported agricultural good. This means that the marginal rate of substitution of this household equals the relative price of domestic to imported food: $(1 + \beta j) = p/\tau$. We solve this equality, to define the indifferent household as

$$j^* = \frac{p - \tau}{\beta\tau}. \tag{2}$$

Consumers with $j < j^*$ have a lower patriotic premium, and will therefore buy imported food, while those with $j \geq j^*$ will purchase the domestic agricultural output. Naturally, the latter fraction of the population is large (j^* is low) if the domestic price is low, the (effective) international price is high or if β, which captures the degree of home bias, is high.

[9] Given this choice of distribution of the 'patriotic premium', the limitation of j to the unit interval seems reasonable; if the upper limit of j were much higher, the home bias would become implausibly strong for individuals at the upper part of the interval. However, it would be fully possible to extend the interval, and still have a home bias within reasonable limits, if other parameters of the model were adjusted accordingly.

Net income is denoted by m and consists of a wage and of a governmental transfer or tax. We will see below that it is equal for all consumers. The demand functions [10] are non-variant within the groups:

$$a_I^j = a_I = \frac{\alpha}{\tau}, \qquad x^j = x = m - \alpha, \qquad j < j^* \tag{3}$$

and

$$a_D^j = a_D = \frac{\alpha}{p}, \qquad x^j = x = m - \alpha, \qquad j \geq j^*. \tag{4}$$

This formulation of consumer behavior is consistent with the empirical regularity that agricultural consumption accounts for a declining share of income as it increases.

Finally, using capital letters for aggregate quantities, we get the market demand functions by summing over all households in the two segments of the unit interval:

$$A_I^D = \frac{\alpha j^*}{\tau}, \quad A_D^D = \frac{\alpha(1-j^*)}{p}, \quad X^D = m - \alpha. \tag{5}$$

We will assume that $m - \alpha > 0$, so that there is positive consumption of the industrial good. An expression for m is given in equation (13) below.

2.2. Production

Each household supplies one unit of labor inelastically. Agricultural output per unit of labor is $\gamma > 0$. In manufacturing, the marginal and average product of labor equals unity. Let l_a and l_x denote the quantities of labor used in agriculture and manufacturing, respectively. Furthermore, let p_x be the price of x, w the wage and s a subsidy on agricultural output. Then the profit functions of the two sectors are

$$\pi_a = [p(1+s)\gamma - w]l_a \quad \text{and} \quad \pi_x = [p_x - w]l_x,$$

respectively. From these expressions it appears that corner solutions could easily arise: the slightest deviations of the brackets from zero would put labor demand either at zero or infinity. However, we will focus on the case with solutions on the unit interval, *i.e.* when $0 \leq j^* \leq 1$, and thus with production carried out in both domestic sectors, as will be explained in Section 2.3 [11].

To describe aggregate supply, we denote the number of persons who work in the domestic manufacturing sector by $\hat{j}$, leaving $1-\hat{j}$ to produce the agricultural good. Using the constant marginal products (1 and γ, respectively), we have the aggregate supply functions

$$X^S = \hat{j} \qquad \text{and} \qquad A_D^S = (1-\hat{j})\gamma. \tag{6}$$

Note that we only have domestic supply of the agricultural product here. The imported agricultural supply is horizontal at the price level τ. This concludes the description of the model. We now examine the economic equilibrium, still treating the policy variables as given. (They are finally determined in Section 3).

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[10] Households with $j < j^*$ maximize $x^j + \alpha \ln(a_I^j)$, subject to the constraint $m = x^j + \tau a_I^j$, while those with $j \geq j^*$ maximize $x^j + \alpha \ln((1+\beta j)a_D^j)$, subject to $m = x^j + p a_D^j$.

[11] The weak inequalities imply that we allow one sector to be just verging on production.

2.3. Economic equilibrium

The allocation of labor is entirely determined by the demand for the domestic agricultural good; the residual labor force is allotted to the production of x. We will start by assuming an interior equilibrium, and will then specify the conditions for this in *Assumptions A1* and *A2* below.

By competition, all profits are driven down to zero, so $p(1+s)\gamma - w = 0$ and $p_x - w = 0$. Because the cost of the imported x is unity, we must also have $p_x = 1$. This implies that $w = 1$ and that the price of domestic food is given by

$$p = \frac{1}{(1+s)\gamma}. \tag{7}$$

One implication of this equation is that a higher tariff does not increase the price of domestic food. This is because the supply curve is horizontal.

To see the mechanisms that lead to the two previous equalities, consider what would happen if they were not fulfilled: (i) if $w > 1$, domestic industrial output is too expensive, so nothing is produced. Thus all labor goes to domestic agricultural production. This production will however be in excess of demand, which puts a downward pressure on the wage; (ii) if $w < 1$, domestic industrial output is very cheap, and can be exported with a profit. This sector will then try to hire all labor, but there will then be an excess demand for domestic food, so that the wage is bidden up to unity; (iii) if $p > \frac{1}{(1+s)\gamma}$, domestic food producers make profits. Increased supply will drive the price down; and (iv) vice versa if $p < \frac{1}{(1+s)\gamma}$.

The equilibrium is recursive, in the sense that equation (7) determines one of the endogenous variables directly. To find the fraction of the population that buys the imported agricultural good, we can then use (7) to eliminate p from (2):

$$j^* = \frac{1-\tau(1+s)\gamma}{\beta\tau(1+s)\gamma}. \tag{8}$$

If any of the parameters increases, j^* becomes lower, *i.e.* the share of the population that chooses domestic food expands. It is of course entirely expected that this happens if there is a higher tariff, subsidy or productivity in agriculture, or if consumers are more home biased.

There is nothing in the model that prevents j^* from going outside the unit interval but, as mentioned above, we concentrate here on solutions that are on this interval. It is therefore useful to state explicitly what the conditions are for $0 \leq j^* \leq 1$. First

$$j^* \geq 0 \quad \Leftrightarrow \quad \tau(1+s)\gamma \leq 1. \tag{9}$$

This reflects that intense political interventions (high τ or s) can force imported food out of this market ($j^* \leq 0$). To make the model interesting, however, we assume that there is some food import, at least if there is no political intervention. This is ensured by the following assumption:

Assumption A1: $\gamma \leq 1$.

If we instead were having $\gamma > 1$, domestic agricultural productivity would be sufficiently high, compared to the productivity in the rest of the world, to make all consumers buy the domestic agricultural good. (There is of course no need for the home-bias parameter (β) to be involved in this condition).

Concerning the other end of the unit interval, the condition for the number of consumers buying domestic food being non-negative can be expressed as follows:

$$j^* \leq 1 \quad \Leftrightarrow \quad \gamma(1+\beta)\tau(1+s) \geq 1. \tag{10}$$

Here again, it is interesting to look at the case when $s = t = 0$ (implying that $\tau = 1$). Then we have that $j^* \leq 1$ if and only if the following assumption is fulfilled.

Assumption A2: $\gamma(1 + \beta) \geq 1$.

This would mean that some consumers will make the patriotic choice, even in the absence of economic policy. It requires that β is very high if γ is very low, *i.e.* that a low agricultural productivity is balanced by a high degree of home bias. One can of course imagine situations where *Assumption A2* is not fulfilled, but we will give a considerable amount of attention to cases where it does hold. The reason for this is that the issue about home bias is more interesting if it has at least some strength in itself, *i.e.* without public intervention.

Now we turn to the equilibrium between supply and demand of the domestic agricultural output. Using (2) and (7) to eliminate j^* and p from A_D^D in (5), and putting the result equal to aggregate supply in (6), the equilibrium allocation of labor is

$$\hat{j} = 1 - \frac{\alpha[\tau(1+s)\gamma(1+\beta)-1]}{\beta\tau\gamma}. \tag{11}$$

The value of $\hat{j}$ changes in the same direction as j^* when there are variations in the exogenous parameters. This of course mirrors the fact that the supplied quantity of the domestic agricultural good moves in the same direction as the demanded quantity if something exogenous changes [12].

The government collects a revenue from tariffs equal to tA_I^D and pays out the sum spA_D^D on subsidies. To balance its budget, it imposes a lump-sum tax or transfer, equal to η, on each household. Using the aggregate demand functions in (5), the government's budget constraint therefore is

$$s\alpha(1-j^*) - t\frac{\alpha}{\tau}j^* = \eta. \tag{12}$$

The policy parameters that the government choose here are s and t. Any variations in them of course have consequences for j^*. The lump sum tax (or transfer) is residually adjusted.

[12] Feasibility of course requires that $0 \leq \hat{j} \leq 1$. By (10), we directly have $\hat{j} \leq 1$. Moreover it is straightforward to find that $\hat{j} \geq 0$ if and only if $\tau(1 + s)\gamma(1 + \beta) \leq 1 + \beta\tau\gamma/\alpha$.

Since the gross income equals $w = 1$, the net income of each household now is $m = 1 - \eta$. Using (8) and (12), we have

$$m = 1 + \alpha\left(s + \frac{t}{\tau}\right)\frac{1-\tau(1+s)\gamma}{\beta\tau(1+s)\gamma} - s\alpha. \tag{13}$$

Note that this net income is equal for all consumers.

So far, we have described households as *economic agents*, taking the political parameters as given. Now that the economic behavior is understood (including the market equilibrium), we turn to the analysis of the households as *political agents*. This means that we analyze the political equilibrium, in which the political parameters are determined endogenously.

3. Political equilibrium

To analyze the political equilibrium, we start by formulating the households' indirect utility functions (which are functions of the policy parameters), using the results of the previous section. The indirect utility of a household depends on whether its j is above or below j^*. Thus, using the demand functions (3) and (4) in (1) we get

$$V_I^j = m - \alpha + \alpha\ln(\alpha/\tau), \qquad j < j^* \tag{14}$$

for those who buy the imported agricultural good, and

$$V_D^j = m - \alpha + \alpha\ln[(1+\beta j)(\alpha/p)], \qquad j \geq j^*, \tag{15}$$

for those who buy domestic food. The preferred magnitudes of the policy instruments for any household, j, will be obtained by maximization of these functions with respect to t and s, respectively.

To compare the political outcome with the first-best solution, we form the social welfare function, which we here define as the sum of the indirect utility functions over the entire population:

$$W = \int_0^{j^*} V_I^j dj + \int_{j^*}^1 V_D^j dj.$$

In the Appendix we confirm that welfare is maximized when there is no political intervention. This is of course expected, since the presence of home bias does not imply any market failure. Patriotic consumers should therefore pay for the additional utility from domestic consumption themselves.

Since the political equilibrium may fail to be well-defined when the political decision is multidimensional, we examine one policy instrument at a time, putting the other equal to zero [13].

[13] See however Swinnen and de Gorter (2002) for an analysis with two policy instruments in a political-support-function model. Alternatively, one could for instance use the methods of probabilistic voting (Lindbeck and Weibull (1987)) or lobbying (Grossman and Helpman (1994)), to analyze several instruments simultaneously, but that is beyond the scope of this paper.

3.1. Tariff

Starting the examination of the political outcome by looking at the tariff, we put $s = 0$ and $t \geq 0$. Equations (8) and (13) are important for the results and they are now reduced to

$$j^* = \frac{1-\tau\gamma}{\beta\tau\gamma} \quad \text{and} \quad m = 1 + \alpha\frac{t}{\tau} j^*.$$

The derivatives of these expressions will be used below, so we state them here (recall that $\tau = 1 + t$):

$$\frac{\partial j^*}{\partial t} = -\frac{1}{\beta\tau^2\gamma} < 0 \quad \text{and} \quad \frac{\partial m}{\partial t} = \frac{\alpha}{\beta\tau^3\gamma}[(1-\gamma)-(1+\gamma)t].$$

Not surprisingly, we find that a higher tariff makes more consumers choose the domestic agricultural good, because the imported good gets a higher effective price. A higher tariff also increases the governmental revenues (which are transferred directly to households), up to the level $t = \frac{1-\gamma}{1+\gamma}$. Beyond that point, the revenues decrease, because the effects of the decreasing j^*, implying a smaller tariff base, then dominates.

To find the political outcome, we proceed in two steps. First, we examine what the optimal tariff would be for a consumer, given that he/she chooses one of the two types of food. Using the results of this, we then determine what is required to make a positive tariff the preferred choice of the majority of voters.

For a consumer who chooses imported food, the condition for maximization of the indirect utility functions with respect to t is

$$\frac{\partial V_I^j}{\partial t} = \frac{\partial m}{\partial t} - \frac{\alpha}{\tau} = \frac{-\alpha}{\beta\tau^3\gamma}(\beta\gamma t^2 + (1+\gamma+2\beta\gamma)t + \gamma(1+\beta) - 1) \leq 0. \qquad (16)$$

The non-positive sign, for all $t \geq 0$, follows from Assumption A2, *i.e.* $\gamma(1+\beta) \geq 1$. Voters who end up in this group prefer to put the tariff as low as possible, *i.e.* at $t = 0$. The interpretation is that the positive effect of an increasing transfer is always dominated by the negative effect of the rising price of the (imported) agricultural good, when t increases. This is not surprising, since a part of what this group pays in tariff is transferred to the other group.

Turning to those who buy the domestically produced agricultural good, we note that a change in the tariff only affects the net income for this group [14]:

$$\frac{\partial V_D^j}{\partial t} = \frac{\partial m}{\partial t} = \frac{\alpha}{\beta\tau^3\gamma}[(1-\gamma)-(1+\gamma)t]. \qquad (17)$$

The function V_D^j is thus quasi-concave [15] in t and has a maximum at $t = \frac{1-\gamma}{1+\gamma}$. Households consuming the domestic agricultural good, benefit from the increasing tariff, up to the point where the transfer is maximized. Consumers in this group therefore prefer this strictly positive tariff level.

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[14] Recall that the horizontal supply curve for domestic food makes the price p independent of the tariff, as can be seen in Equation (7).

[15] The derivative is positive at $t = 0$ (for $\gamma < 1$) and directly to the right of this point. It equals zero at $t = (1-\gamma)/(1+\gamma)$ and is negative for higher values of t.

Let us sum up the result on the preferred policies. There is just one preferred tariff level in each group. Denoting them by 'tilde', we have:

$$\tilde{t}_I = 0, \qquad j < j^*,$$

and

$$\tilde{t}_D = \frac{1-\gamma}{1+\gamma}, \qquad j \geq j^*.$$

Which one is chosen in the political equilibrium depends entirely on which group is the largest. If $j^* > 1/2$ then the median voter buys the imported good and chooses a zero tariff. If $j^* \leq 1/2$, the median voter consumes domestic food and chooses a tariff equal to $\tilde{t}_D$.

To take the next step in the analysis, we assume that $t = \tilde{t}_D$ and compute j^* for this tariff level. We then check what is required from the parameters to actually have $j^* \leq 1/2$ under this assumption. To compute this j^*, we note that $\tilde{t}_D = (1-\gamma)/(1+\gamma)$ is equivalent to $\tau = 2/(1+\gamma)$, which means that the result is $j^* = (1-\gamma)/(2\beta\gamma)$. We can now use this expression for j^* to see what is required to make the median voter a person who favors the strictly positive tariff. The condition is given as follows:

$$j^* \leq \frac{1}{2} \quad \Leftrightarrow \quad 1 \leq (1+\beta)\gamma. \tag{18}$$

The latter inequality is exactly *Assumption A2*. We thus get the following proposition.

Proposition 1: If the laissez-faire economy generates just a slight amount of patriotic choices (which is the consequence of *A2*), then the political equilibrium will imply a strictly positive tariff.||

In other words, an interventionist tariff policy is avoided only if no consumer makes a home-biased choice in a laissez-faire situation. Thus, this model provides one way of obtaining the result that non-organized consumers can be influential on agricultural policy. This result should however be treated with caution, because the consumers' preferences for domestic food is not the only driver here; there is also the 'tyranny of the majority' phenomenon, which was discussed in the introduction. That is, the outcome here is to some extent due to the fact that one group is 'taxing' another [16].

Having seen that a distortionary tariff is the outcome of the political process in this model, if some home-biased behavior can be observed even without political interventions, we examine the magnitude of it [17]. If γ is high, t_D is close to zero. In this case consumers quickly leave the group that buys the imported agricultural good, when the tariff increases, because of the small price difference. Thereby the base for tariff revenues is rapidly reduced, so the transfer-maximizing tariff is low. This means that the difference between the political equilibrium and the social optimum is small. On the other hand, if the political equilibrium with a positive tariff involves a

[16] Note that this result does not involve any explicit mechanism for the protection of the continued production of the preferred good of home biased consumers. Such a mechanism would probably require a dynamic model, with *e.g.* learning-by-doing effects.

[17] A high patriotic parameter does not reinforce the distortion, since it does not influence the chosen tariff.

considerable disadvantage in agriculture, *i.e.* γ is low, then $\tilde{t}_D$ is larger and the distortion of the political equilibrium is significant. However, a realization of this case requires a very high β, since the patriotic policy is costly when domestic agricultural productivity is poor.

The prediction of the model, that the size of the tariff is inversely related to the (relative) productivity in agriculture, is consistent with much of the empirical research that tries to explain agricultural protection. For instance, in Honma and Hayami (1986), Sarker *et al.* (1993), Fulginiti and Shogren (1992) and Beghin and Kherallah (1994) the protection received by agriculture is higher if the relative agricultural productivity is lower. According to the political-support-function model (*e.g.* Swinnen (1994)), poor groups get large transfers from the politicians, because the large changes in utility leads to much additional political support. In the present model however, the driver is pure self-interest on the part of home biased consumers.

Let us finally look at a simple numerical example, which illustrates how much extra various consumers must be willing to pay for the domestic good, if there is going to be a political equilibrium in which $\tilde{t}_D$ is the outcome of the political process. We look at the border between a zero and positive tariff, respectively, *i.e.* when $(1 + \beta)\gamma = 1$. To see what this equality means, consider the example when $\gamma = 4/5$, *i.e.* the agricultural productivity of this country is only 80 percent of the productivity on the world market. Then we must have (at least) $\beta = 1/4$ and the indifference condition for consumer j is $1 + j/4 = p/\tau$. For the median voter we have that $1 + 1/8 = p/\tau$, which means that he accepts a domestic price that is 12.5 percent higher than the world market price. For the most patriotic consumer we have $1 + 1/4 = p/\tau$, *i.e.* he accepts a 25 percent higher price. The magnitude of the distortion is in this case represented by $\tilde{t}_D = 1/9$.

3.2. Subsidy

We now turn to the political determination of the level of a subsidy. Thus we examine the case in which $t = 0$ and $s \geq 0$, which means that equations (8) and (13) are modified to

$$j^* = \frac{1-(1+s)\gamma}{\beta(1+s)\gamma} \quad \text{and} \quad m = 1 - s\alpha(1-j^*).$$

The analysis below will include a study of the effects of marginal changes in s, so we will encounter the following two derivatives:

$$\frac{\partial j^*}{\partial s} = -\frac{1}{\beta(1+s)^2\gamma} < 0 \quad \text{and} \quad \frac{\partial m}{\partial s} = -\frac{\alpha}{\beta(1+s)^2\gamma}((1+\beta)(1+s)^2\gamma - 1) \leq 0.$$

The subsidy has an effect on j^* that is similar to the role of the tariff in the previous section: by increasing it, the consumer price of the domestic agricultural output falls. Therefore, more consumers buy this good, *i.e.* j^* gets lower. The subsidy implies a reduction of net income, which is unambiguously reduced when the subsidy level gets higher [18].

[18] The derivative of m equals zero only if $s = 0$ and $\gamma(1 + \beta) = 1$.

To describe the political equilibrium, we differentiate the indirect utility functions with respect to s. Looking first at the group of consumers who buy the imported agricultural good, we have

$$\frac{\partial V_I^j}{\partial s} = \frac{\partial m}{\partial s} = -\frac{\alpha}{\beta(1+s)^2\gamma}((1+\beta)(1+s)^2\gamma - 1) \leq 0. \tag{19}$$

For this group the effect of a higher subsidy is merely a higher tax and therefore a lower net income. They therefore vote for the lowest possible subsidy, *i.e.* $s = 0$.

To find the preferred subsidy level of the other group, we compute the derivative

$$\frac{\partial V_D^j}{\partial s} = \frac{\partial m}{\partial s} - \frac{\alpha}{p}\frac{\partial p}{\partial s} = \frac{\alpha}{\beta(1+s)^2\gamma}(1-\gamma(1+s)(s(1+\beta)+1)). \tag{20}$$

The terms are of opposite signs; this group benefits from a lower price but suffers from a net income loss, due to a higher tax, when s increases. However, the tax burden is shared with the group that does not buy this good. Therefore, it is plausible that this group would like to see a subsidy that is strictly positive. This is indeed what we find: the derivative is monotonously decreasing in s and it is positive before it eventually turns negative, since it is positive at $s = 0$, if $\gamma < 1$, which we assume.

The function V_D^j is thus quasi-concave in s, and the preferred subsidy level is found by putting the derivative equal to zero. This yields a second-order equation [19] with the solutions

$$s_{1,2} = \frac{-(2+\beta) \pm \sqrt{(2+\beta)^2 + (1-\gamma)\gamma^{-1}4(1+\beta)}}{2(1+\beta)}.$$

The positive root is declining in γ, converging to zero as γ approaches unity. Thus, the less productive the agricultural sector is, the more are the consumers who are patriotic enough to buy it, willing to protect it. By contrast to the case with tariffs, the subsidy level depends on β.

To see how likely it is that the political equilibrium is one in which the subsidy is strictly positive, we use the expression for j^* above and find that

$$j^* \leq 1/2 \quad \Leftrightarrow \quad s \geq \frac{2-(2+\beta)\gamma}{(2+\beta)\gamma}.$$

If β or γ gets higher, a lower subsidy is required to win the majority over to this group. To express the condition in terms of exogenous parameters, we use the positive root above to eliminate s. Simplifying, we have:

$$4 \leq \frac{2+\beta}{1+\beta}\gamma\left[\beta + \sqrt{(2+\beta)^2 + (1-\gamma)\gamma^{-1}4(1+\beta)}\right] \equiv g(\beta,\gamma)$$

For combinations of β and γ that satisfy this inequality, the political equilibrium implies that $j^* \leq 1/2$ and thus $s > 0$.

[19] The equation is $(1 + \beta)\, s^2 + (2 + \beta)s - (1 - \gamma)\gamma^{-1} = 0$.

In the case with tariffs we saw that an interventionist policy wins the majority of voters when $(1 + \beta)\gamma \geq 1$. For a comparison, we use the border condition $(1 + \beta)\gamma = 1$ to simplify the inequality above:

$$4 \leq 1 - \gamma^2 + (1+\gamma)(5 - 2\gamma + \gamma^2)^{1/2} \equiv f(\gamma).$$

To see whether this inequality holds, at different values of γ, we first note that $f(1) = 4$, so the condition is fulfilled with equality. However, this case is not very interesting, since it assumes that this country has no disadvantage in agricultural production, and it also implies that the political equilibrium yields $s = 0$. Thus, it is more interesting to examine cases in which $\gamma < 1$. A numerical study reveals that $f(\gamma) < 4$ for all $\gamma \in (0,1)$. The assumption that $(1 + \beta)\gamma = 1$ is thus less than sufficient to make the regime with a strictly positive subsidy arise. In other words, we have the following proposition.

Proposition 2: A subsidy is less likely than a tariff, as an outcome of the political process.‖

The main reason for this result is that the tariff is paid by other people than those who vote for it. The latter thus get an indirect transfer from the group that buys imported food.

4. Conclusions

This paper starts from the observation that some consumers are prepared to pay extra for food that is produced in their home country, a behavior that we call *home biased* or *patriotic*. Although more empirical work remains to be done before we can say how important this phenomenon is, it seems to be significant enough to motivate an examination of its implications.

The paper therefore analyzes how much a patriotic element in the preferences for food can influence agricultural trade policy in a very simple model for a small open economy. We assume that the median voter decides about the levels of the policy instruments tariff and subsidy, respectively.

The main finding is that a political equilibrium with a strictly positive tariff does not seem unlikely. What is required is that some fraction of the population (no matter how small) would buy domestic food if there were no political intervention at all. This result is one indication that non-organized consumers can be influential on agricultural policy as voters. This result is new, by coming through a mechanism that has not been analyzed before, and which is motivated by an empirically documented phenomenon. For the subsidy, the requirement for a non-zero level (in terms of home biased preferences) is somewhat stronger. However, these results must be interpreted with much caution, since a possibility for one group to exploit another is involved, which magnifies the effects.

Does this model contribute to our understanding of actual agricultural policy in Europe for instance? To be sure, the extensive agricultural protection within the EU has been driven by lobbies organized by farmer organizations. But the motive to secure food supply in the member countries cannot be ignored, and it has clearly been backed by consumers. To the extent that this can be called home bias, the analysis of this paper illustrates one possible explanation for the strong European agricultural protection.

Needless to say, the analysis presented here builds on a series of simplifying assumptions. To examine the robustness of the results, these assumptions should be relaxed. For example, it should be investigated how much the results change when (i) the utility function for food is something more general than a logarithmic function; (ii) the distribution of patriotism is non-linear; (iii) the productivities vary between firms in the economy, so that the supply curve becomes positively sloping. In the latter case, with the price rising as demand increases, one could expect an equilibrium where fewer households buy domestic food. This would probably make it less likely that a majority votes for agricultural protection. A similar result could arise if (with reference to (ii)) the distribution of patriotism were modified such that a larger share of the population does not derive any 'patriotic premium' at all.

To further generalize the above analysis, a natural and straightforward extension of the present model would be in the direction of the influential paper by Grossman and Helpman (1994), so that lobbying activities were taken into account [20]. A utility function like the one in (1) could then be used in their model. As in their original model, there would arise rents to fixed factors, of which one could be interpreted as land rent. If the land rents are larger than other rents, they may reinforce the protectionist policy outcome that is found here. Moreover, the stylized fact that a land-owning minority is subsidized (in rich countries) could be an emerging result of the analysis. Finally, since this model easily allows for many goods, a possible equilibrium outcome is that individual consumers buy both foreign and domestic food products (in contrast to the either-or solution of the present model). Since the computations of such an extension are likely to become more complicated, the analysis of the present paper should be a useful foundation to build on.

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[20] This model has been empirically applied to agricultural policy (see Gawande and Hoekman (2006)).

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APPENDIX

To obtain the social welfare function, we sum (14) and (15) over the entire population:

$$W = \int_0^{j^*} V_I^j dj + \int_{j^*}^1 V_D^j dj =$$

$$= m - \alpha + \alpha \ln \alpha - j^* \alpha \ln \tau - (1 - j^*) \alpha \ln p + \alpha \int_{j^*}^1 \ln(1 + \beta j) dj. \qquad (21)$$

To see how social welfare is affected by a change of the tariff, we differentiate (21) with respect to t:

$$\frac{\partial W}{\partial t} = \frac{\partial m}{\partial t} - \frac{\partial j^*}{\partial t} \alpha \ln \tau - j^* \frac{\alpha}{\tau} + \frac{\partial j^*}{\partial t} \alpha \ln p - \alpha \ln(1 + \beta j^*) \frac{\partial j^*}{\partial t}.$$

By equation (2), $\ln p - \ln \tau = \ln(1 + \beta j^*)$. Therefore this expression simplifies to

$$\frac{\partial W}{\partial t} = \frac{\partial m}{\partial t} - j^* \frac{\alpha}{\tau} = \frac{\alpha}{\beta \tau^3 \gamma} t[t - (1 - \gamma)]. \qquad (22)$$

The derivative is equal to zero at $t = 0$ and at $t = 1 - \gamma$. The former is a local maximum, while the latter is a minimum, since the derivative is negative between 0 and $1 - \gamma$ and positive for $t > 1 - \gamma$. We must therefore ask whether a very high tariff may imply a higher welfare than a zero tariff. The highest interesting value of t is $t = (1 - \gamma) / \gamma$, because j^* becomes negative at higher values, by (9). The question is therefore whether welfare is highest at $t = 0$ or at $t = (1 - \gamma) / \gamma$. Noting that these points are equivalent to $\tau = 1$ and $\tau = 1 / \gamma$, respectively, we find that the values of the welfare function at the two endpoints are

$$W(\tau = 1/\gamma) = 1 - \alpha + \alpha \ln \alpha + \alpha \ln \gamma + \alpha \int_0^1 \ln(1 + \beta j) dj$$

(where $j^* = 0$) and

$$W(\tau = 1) = 1 - \alpha + \alpha \ln \alpha + (1 - j^*) \alpha \ln \gamma + \alpha \int_{j^*}^1 \ln(1 + \beta j) dj,$$

where $j^* = (1 - \gamma) / (\beta\gamma)$, by (8) (with $s = 0$ and $\tau = 1$). The difference is

$$\Delta W = W(\tau = 1) - W(\tau = 1/\gamma) = -j^* \alpha \ln \gamma - \alpha \int_0^{j^*} \ln(1 + \beta j) dj$$

Computing the integral, we find

$$\Delta W = \frac{\alpha}{\beta} [\beta j^* (1 - \ln \gamma) - (1 + \beta j^*) \ln(1 + \beta j^*)]$$

Using the fact that $-\ln \gamma = \ln (1 + \beta j^*)$, this reduces to

$$\Delta W = W(\tau = 1) - W(\tau = 1/\gamma) = \frac{\alpha}{\beta} \left(\frac{1 - \gamma}{\gamma} + \ln \gamma \right).$$

A first implication of this is that $\Delta W = 0$ when $\gamma = 1$. Both policies then imply the same welfare, because the agricultural good will have a price and marginal cost equal to unity in both cases. (In fact, $\tau = 1$ in both cases.) However, we are more interested in the case when our economy has a disadvantage in agricultural production, *i.e.* $\gamma < 1$. We therefore note that the value of ΔW increases when γ decreases from unity [21]. Consequently, we have that $\Delta W > 0$ for $\gamma < 1$, which implies that welfare is maximized when $\tau = 1$, *i.e.* when the tariff is equal to zero.

[21] The derivative $\frac{d(\Delta W)}{d\gamma} = \frac{\alpha}{\beta \gamma^2} (\gamma - 1)$ is negative for $\gamma < 1$.

The socially optimal subsidy is obtained by maximizing W with respect to s. Again we use the implication from (2), that $\ln p - \ln \tau = \ln(1+\beta j^*)$, which eliminates three terms. The remaining expression is

$$\frac{\partial W}{\partial s} = \frac{\partial m}{\partial s} - (1-j^*)\frac{\alpha}{p}\frac{\partial p}{\partial s} = -\frac{\alpha(1+\beta)s}{\beta(1+s)} < 0. \tag{23}$$

Increasing the tariff unambiguously decreases welfare, as expected. The socially optimal tariff is thus $s = 0$.