Common External Tariff Choice in Core Customs Unions

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July 22, 2008

Abstract

This paper investigates how customs union members select the common external tariff (CET) to levy on imports from non-members. A pure exchange, perfectly competitive general equilibrium model of world trade is simulated. Contrary to most previous work, countries have the freedom to share authority over CET choice and to select from a variety of possible coalition forms. The results confirm that when customs unions are observed in the core, members may wish to share responsibility for CET choice in a variety of ways. Generally, however, the member country that is relatively well-endowed or has relatively elastic consumer preferences tends to take the lead in CET choice.

1 Introduction

How do members of a regional trade agreement (RTA) coordinate trade policy with respect to excluded countries? Apart from a handful of notable exceptions, this fundamental question has received little serious attention in the literature. Nevertheless, it is an issue that is assuming added significance for at least two reasons. First, as the popularity of RTAs grows, more and more countries are finding themselves excluded from agreements that involve strategically important

*Melatos wishes to acknowledge financial support for this project from the Australian Research Council (ARC). Woodland also gratefully acknowledges the financial support of the ARC.

trading partners. For non-members, it is important to understand the mechanism by which RTA members coordinate external trade policy. Such information helps excluded countries determine *ex ante* their own strategic trade policy response, including any associated coalition formation decisions.

A second observation supports the argument for a more extensive examination of external trade policy decision-making within RTAs. The exponential growth in the popularity of these discriminatory trading clubs has, perhaps not surprisingly, coincided with a move towards more diverse membership. Many RTAs now include countries that differ markedly in terms of their size and degree of development, among other characteristics. The European Union (EU), MERCOSUR and the North American Free Trade Agreement (NAFTA) typify this trend. Planned expansions of the EU (to include Turkey, for example) and NAFTA to encompass developing Western Hemisphere nations suggest that, if anything, RTA membership is likely to become more heterogeneous in the future. This is problematic because, as will be shown later, a divergence in member interests renders RTA behaviour more unpredictable. That is to say, the range of common external trade policies acceptable to at least one customs union member (the Pareto optimal set) expands. In this way, the challenge of characterising the optimal trade policy responses of excluded countries becomes more acute.

In addressing these issues, this paper focusses on the role of asymmetric customs union members in determining the union's common external tariff (CET). We investigate not just the CET choice of prospective union members, but also their decision on whether or not to form a union in the first place. Therefore, we model the interplay between a customs union's external policy decision-making and the coalition formation decisions of individual countries, whether or not they are involved in the particular customs union under consideration.

Customs unions are effectively trade policy contracts in which member countries commit to: (i) preferential tariff rates on intra-union trade, (ii) common external tariffs rates on trade with non-members and (iii) a formula for distributing common external tariffs revenue amongst members. Since arrangements such as these imply a degree of trade policy homogeneity and require

unanimous agreement among prospective members for implementation, they are especially difficult to design when the countries involved are heterogeneous. In fact, such difficulties typically manifest themselves as disagreements between members over: (i) the choice of CET rate and (ii) the choice of CETrevenue sharing rule.[1] This occurs because an individual member's preferences over CET rates and sharing rules depend crucially upon that member's own characteristics, not just those of its trading partners situated within and outside the union. For example, each member will have a preferred CET rate based on their own terms-of-trade considerations. Of course, such disagreements do not arise if customs union members are symmetric. Hence, the growing membership asymmetry in RTAs is a particularly important motivating factor for our analysis.

With the notable exception of Gatsios and Karp (1991, 1995) and Syropoulos (2002), the literature has not attempted to explicitly model the mechanics of external policy coordination among RTA members. Indeed, it has generally avoided the issue, either by assuming symmetric members (Bond and Syropoulos, 1996; Krugman, 1991) or by imposing CET choice rules exogenously (Abrego et al., 2006; Kose and Riezman, 2002; Perroni and Whalley, 2000; Riezman, 1999). Highlighting the endogenous nature of a customs union's CET choice, Gatsios and Karp (1991, 1995) demonstrate that a union member may prefer to delegate responsibility for choosing the union's common external tariff to its partner. That is, even if the country choosing the CET does so purely to maximise its own welfare, the delegating union member may also benefit. The question of how customs union members select the CET is of particular interest in those cases where a customs union is likely to be observed. Hence, in this paper, we investigate how customs unions that exist in the core determine their CET and relate this to the distribution of preferences and endowments. In particular, we examine the roles of customs union members in CET determination and examine the range of CETs that are observed in the core.

More recently, Syropoulos (2002) has demonstrated that if the CET and non-member tariffs are strategic complements (substitutes) then the optimal policy-maker in the customs union is the country with the smallest (largest) relative endowment of the factor employed intensively in the

[1] Syropoulos (2003) demonstrates that the choice of CET sharing rule and CET rate are, in fact, interdependent.

union's export sector. This Heckscher-Ohlin style prediction arises because this member's import demand function is more (less) sensitive to price changes and, hence, it has a smaller (larger) best response CET than its partner. This relative passivity (aggression) yields both union members a higher welfare, taking the optimal response of the non-member into account.

Delegation in the sense of Gatsios and Karp and Syropoulos may be characterised as being 'complete' in that one member assumes total authority over the choice of CET. Recently, Melatos and Woodland (2007a) have generalised the concept of delegation to account for the more realistic case in which members share authority over CET choice. They show that a Pareto efficient customs union may require members to share authority over CET choice. Moreover, such a customs union may Pareto dominate one in which authority is concentrated in the hands of either one member country or the other. However, their demonstration leaves open the possibility that such a customs union may itself be Pareto dominated by some other coalition structure such as global free trade, a free trade area or some other customs union. This paper, therefore, analyses CET delegation in an environment in which (i) customs union members are permitted to share control over CET choice - complete delegation á la Gatsios and Karp and Syropoulos being a special case - and (ii) a wide range of different coalition structures are permitted.

Drawing heavily on the contribution of Gatsios and Karp, we interpret delegation in terms of policy aggressiveness with respect to the choice of the union's CET. We compare the CETs that would be chosen if one of the members was given complete authority with the range of CETs that are Pareto optimal for those customs unions in the core. Following Melatos and Woodland (2007a), if any part of the Pareto optimal range lies between the CETs chosen by the two members, we say that there is 'partial' delegation. If any part of the Pareto optimal range lies beyond the CETs chosen by the two members then there is 'super' delegation with one of the members taking an aggressive role.

2 The Model

In order to investigate the nature of CET delegation in established customs unions, we simulate endogenous trade bloc formation in a world of asymmetric countries. The simulation model employed is identical to that used in Melatos and Woodland (2007b). That is, we implement a perfectly competitive pure exchange general equilibrium model in which three countries trade three goods. Each country i exports a unique product i and imports the other two goods - the Armington trade pattern. Optimal import tariffs are levied at all times.

The trade policy game follows a three-stage process. In the first stage, nations form coalitions. Coalition structures considered include global free trade, unilateral tariff setting (in which all countries stand alone), a customs union involving any two countries (all possible CET rates are considered) and a free trade area involving any two countries. In this paper the only difference between a customs union and a free trade area is that the former levies a CET. In both cases intra-RTA trade is assumed to be duty free. Given the coalition structure, optimal tariffs are chosen. In the case of a customs union, the optimal CET is chosen to maximise a weighted sum of member utilities. In the final stage of the game markets clear. The game is solved backwards for a subgame perfect Nash equilibrium.[2]

Consumer preferences are represented by constant elasticity of substitution (CES) utility functions of the form

$$U^i = \left[\sum_{j=1}^{3} \gamma_j^i \left(c_j^i \right)^{(\sigma_i - 1)/\sigma_i} \right]^{\sigma_i/(\sigma_i - 1)}, \quad i = 1, 2, 3, \tag{1}$$

where $\gamma_j^i = 1/3$ for all i, j are the consumption distribution parameters and $\sigma_i \neq 1$ is the elasticity of substitution. The distribution of endowments is given in Table 1, where ω_i^j is the endowment of good j in country i.

We have previously argued that delegation in CET choice is only an issue when customs union members are asymmetric; only then will disagreements arise over the choice of external tariff rate.

[2] See Melatos and Woodland (2007b) for further details on the model specifications and solutions.

Endowments	**good 1**	**good 2**	**good 3**
country 1	ω_1^1	$(1-\omega_2^2)/2$	$(1-\omega_3^3)/2$
country 2	$(1-\omega_1^1)/2$	ω_2^2	$(1-\omega_3^3)/2$
country 3	$(1-\omega_1^1)/2$	$(1-\omega_2^2)/2$	ω_3^3

Table 1: Endowment Distribution

At the same time, Syropoulos (2002) demonstrates that a member's CET preferences depend crucially on the sensitivity of its import demand function to price changes. In the simulations that follow, we investigate two forms of union member asymmetry - differences in endowments and consumer preferences - which imply different import demand elasticities and, hence, different CET preferences among customs union members. In particular, we vary the endowments of each country's export good ω_i^i $(i = 1, 2, 3)$ and substitution elasticities σ_i $(i = 1, 2, 3)$, computing the core for every combination of parameter values and, for those customs unions which reside within it, observing the nature of member CET preferences.

Two broad types of simulations are undertaken. First, to isolate the role of country preferences in trade bloc formation, national elasticities of substitution are varied over a grid holding fixed the endowment distribution. In a second set of simulations endowments are varied over a grid holding country elasticities of substitution fixed.

3 Delegation Authority in Core Customs Unions

It has already been argued that the issue of how members of a particular customs union choose the CET is relevant only in so far as that customs union is likely to be observed; that is, survive in the core. Figures 1 and 2 present the contents of the core for each set of parameters simulated.

(Insert Figures 1 and 2 about here)

Figure 1 illustrates how differences in country preferences influence the choice of CET in core customs unions. The substitution elasticities of countries 1 and 2 respectively are varied in the range $[0.6, 2.4]$ (but illustrated in the figure for a subset for simplicity), while country 3's elasticity of substitution is fixed at $\sigma_3 = 0.9$. This range is selected based on existing estimated ranges of Armington elasticities (see, for example, Gallaway et al., 2003; Blonigen and Wilson, 1999;

Sheills et al., 1986 and Stern et al., 1976). To neutralize the role played by endowments, countries are symmetrically identical in their fixed endowments of the three goods - it is assumed that $\omega_1^1 = \omega_2^2 = \omega_3^3 = 0.99$ in Table 1. Countries are allocated 0.99 units of their exportable good and 0.005 units of each importable good.

Figure 2 highlights the role of endowment differences in the CET delegation decisions of union members. Country 1 and 2's endowments of their export goods are varied in the range $[0.01, 0.99]$ (but illustrated in the figure for a subset for simplicity), while country 3's endowment of its export good is set at $\omega_3^3 = 0.97$. The tested range of endowment parameters can be interpreted as percentages of world endowments (normalized to unity). The endowment matrix is chosen such that the trade pattern assumed in the underlying theoretical framework is maintained. To neutralize the role played by preferences in this set of simulations, all three countries are assumed to have the same preferences with elasticities of substitution given by $\sigma_1 = \sigma_2 = \sigma_3 = 0.999$.

In both Figures 1 and 2, the bolded-border cell represents the case in which all countries are identically symmetric. At this point and in its vicinity, global free trade tends to be observed. Further away from the bolded-border cell the core typically comprises coalition structures in which there are customs unions. These (and other) core structures are indicated by coded shading. The figures also identify the range of parameter values for which the underlying Armington trade pattern does not hold. In these cases, our model makes no predictions on the nature of the trade equilibrium and the contents of the core.

For those cases where a customs union is observed, the shading of each cell identifies its membership. Within these cells the Pareto optimal and partial delegation ranges of CETs (expressed as percentages) are specified. The first row gives the range of CETs in the core. The second row displays the CETs chosen under complete delegation to the first and second-named member respectively. That is, for $CU(i, j)$, the first number on the second row of each cell refers to the CET rate selected when country i is delegated complete authority over the choice of CET. The second number refers to the CET chosen by country j when it chooses the CET rate unilaterally. In the case of symmetric members these ranges collapse to a single CET and so only one rate is

reported.

For example, in the cell corresponding to $(\sigma_1, \sigma_2) = (1.1, 1.4)$ in Figure 1 the core comprises a customs union $CU(1,2)$ between countries 1 and 2. The range of CETs for which $CU(1,2)$ is in the core is 16.1% to 18.1%; for CETs outside this range a customs union will not be in the core and, hence, not observed. The second row of this cell shows that the CET would be 14.8% if country 2 were given full CET-setting authority, while it would be 17.3% if that authority were given to country 1. The core thus comprises cases of **super delegation** to country 1 (where the CET exceeds 17.3%), **complete delegation** to country 1 (where the CET equals 17.3%) and **partial delegation** (where the CET is between 16.1% and 17.3%). The cases of partial delegation (where the CET is between 14.8% and 16.1%) and complete delegation to country 2 (where the CET equals 14.8%) are not in the core.

Inspection of Figures 1 and 2 suggests a number of general propositions that arise from our analysis. The first relates to the nature of delegation within a core customs union.

Proposition 1 *When a customs union between two members is in the core (i) partial delegation of authority to determine the union's common external tariff may not constitute a core contract, and (ii) super delegation to one of the members may constitute a core contract.*

(Insert Figure 3 about here)

For variations in preferences, Proposition 1 may be verified with reference to Figure 3, which focusses on one particular customs union as well as on a particular range of elasticities of substitution. Note that these choices are made simply for illustrative purposes. Any other set of parameters, consistent with customs unions being observed in the core, can be chosen and the same conclusions obtained.

Figure 3 assumes that $\sigma_2 = 2.4$ and considers variations in σ_1 such that customs union $CU(1,2)$ is in the core (moving vertically from the bottom right hand cell in Figure 1). This figure contains a plot of the CETs that each of the members of customs union $CU(1,2)$ would choose individually ($cet1$ and $cet2$) and a plot of the minimum and maximum CETs that are Pareto optimal for the

members (i.e., the range of customs unions $CU(1,2)$ in the core, denoted by *corelow* and *corehigh*). In the figure, *cet*2 lies below *cet*1 except at the endpoint where $\sigma_1 = \sigma_2 = 2.4$, showing that country 1, if choosing the CET on behalf of the customs union, would always choose the higher tariff rate and is, therefore, the 'aggressive' member. It is particularly noteworthy that the range of CETs in the core, given by *corelow* and *corehigh*, not only overlaps the $cet1 - cet2$ range but also contains CETs outside the $cet1 - cet2$ range.

The first point to note from an examination of Figure 3 is that partial delegation, whereby the chosen CET is a weighted average of the compete delegation CETs (equivalently, the union chooses positive weights for both members in its welfare function, in the present context), may not be Pareto optimal for the members and, hence, such a union contract may not be in the core. This is the case for all $\sigma_1 \in [1.3, 2.3]$, where CETs in the range $corelow - cet2$ lie outside the core (i.e., outside the $corelow - corehigh$ range). Customs union contracts giving a large weight (role) to country 2 in the determination of the union's CET will be Pareto dominated by unions giving a lesser role to country 2 and, hence, will not appear in the core.

Second, the core consists of customs unions $CU(1,2)$ that yield CETs in the range $corehigh - cet1$. This is the case for all $\sigma_1 \in [1.4, 2.3]$ in the figure. In these cases, the union's CET is larger than even the aggressive member would have chosen if given complete authority to determine the CET. This is a case of **super delegation**. It implies a choice of weights that translates into a very high CET, distorting the union's offer surface to the non-member in favour of the union members.

These two observations verify Proposition 1 in the case of preferences - partial delegation may not be part of an appropriate union contract and super delegation may be.

(Insert Figure 4 about here)

Proposition 1 may also be verified for variations in endowments using Figure 4, which refers to a customs union between countries 2 and 3. This customs union is in the core, for example, when $\omega_{11} = 0.73$ and $\omega_{22} \in [0.76, 0.99]$ in Figure 2. Figure 4 plots the same information as plotted in Figure 3, but this time for variations in endowments. Notice that, in this customs union, country 3 is the aggressive CET setter whenever $\omega_{22} < 0.97$, since the *cet*3 curve is above the *cet*2 curve

in this interval, while country 2 is the aggressive CET setter whenever $\omega_{22} > 0.97$, since the $cet2$ curve is above the $cet3$ curve in this interval.

Proposition 1 is verified rather strikingly for endowments in this case. It is evident from Figure 4 that, with two exceptions, the partial delegation range of CETs given by the gap $cet2 - cet3$ lies completely outside the region of core CETs given by the gap $corehigh - corelow$, verifying that partial delegation may not yield Pareto optimal (core) outcomes. The first exception is at the point of symmetrically identical endowments for the customs union members at $\omega_{22} = 0.97$, where both union members agree on the appropriate (Pareto optimal) CET. The second exception is at $\omega_{22} = 0.76$, where partial delegation with anything but a very small weight given to country 2 will not constitute a core customs union agreement. Thus, part (i) of the proposition is verified completely in this figure. Part (ii) of Proposition 1 is verified for endowments by the observation that, for all values of ω_{22}, with the two exceptions noted above, super delegation is a *requirement* of every customs union contract. This super delegation is to the most aggressive member - country 3 for low levels of ω_{22} and country 2 for high levels. In the first mentioned exception, super delegation is a core agreement with the aggressive member, country 3, getting a large weight and country 2 getting a small weight.[3] In these two cases, the CET is higher than the aggressive member would have chosen had it been the complete delegation of tariff setting authority. The second mentioned exception is the trivial case where the issue of delegation does not arise.

The above discussion suggests that so long as customs union members are even slightly asymmetric, it is Pareto efficient for them to share authority over CET choice in some way. In other words, while complete delegation á la Gatsios and Karp and Syropoulos is often observed as a Pareto efficient outcome in our simulations, it is *never* observed as the *unique* Pareto efficient outcome. Indeed, it is often the case that complete delegation does not reside in the Pareto optimal set at all. This merely reinforces the point made by Melatos and Woodland (2007a), although in the framework adopted here countries have access to a significantly wider range of options with

[3] In cases of super delegation, the small weight can be negative. See Melatos and Woodland (2007a) for more detail.

regards coalition formation. Further, it suggests that the complete delegation arguments advanced by Gatsios and Karp and Syropoulos are only part of the story.

Proposition 1 gives a general prediction regarding the nature of delegation likely to be observed in core customs unions. However, it provides little guidance on the direction of delegation; that is, which country will be vested with greater authority to choose the CET. The next proposition addresses this question directly.

Proposition 2 *When a customs union is in the core, if member preferences (export endowments) differ even 'slightly' then the member with the more inelastic preferences (respectively, greater endowment of the export good) assumes greater authority in common external tariff choice.*

Proposition 2 may be verified for preferences with reference to Figure 3. In this figure, a customs union $CU(1,2)$ that gives a strong role (large weight) to the aggressive country 1 will appear in the core. Such unions are represented by contracts yielding CETs in the range $cet1 - corehigh$. In these cases, the aggressive member is given greater authority than country 1 in the upper section of the CET range. Moreover, the aggressive member, country 1, is characterized by having the lower elasticity of substitution since $\sigma_1 < \sigma_2 = 2.4$, except at the endpoint. Thus, the country with the lowest elasticity of substitution assumes greater authority in CET determination in the customs union.

In order to verify Proposition 2 for endowments consider, once again, Figure 4. Note that the Pareto optimal (core) range $corehigh - corelow$ is higher on average than (indeed, almost always above) the partial delegation range $cet2 - cet1$. It is recalled that country 3 is the aggressive CET setter whenever $\omega_{22} < 0.97$, which corresponds to country 3 being better endowed than country 2, while country 2 is the aggressive CET setter whenever $\omega_{22} > 0.97$, which corresponds to country 2 being best endowed country. Thus, delegation (here super delegation) is toward the country that is relatively well endowed in its export good, thus verifying the proposition.

Our simulations suggest a third proposition regarding the nature of the set of Pareto efficient customs union contracts.

Proposition 3 *For a customs union that is in the core, the range of common external tariffs tends to expand as member preferences (export endowments) diverge.*

Again referring to Figure 3, we can verify Proposition 3 in the case of preferences. At low levels of σ_1, where the divergence of preferences is greatest, the range of Pareto optimal (core) CETs is largest. This range of Pareto optimal CETs gradually diminishes in size and vanishes once the elasticity of substitutions in the two countries converge to equality at $\sigma_1 = \sigma_2 = 2.4$. Thus, the greater the divergence of preferences of the two customs union members, the greater the range of common external tariff rates that reside in the core.

To verify Proposition 3 for endowments note that in Figure 4 the Pareto optimal range of CETs is widest when ω_{22} is smallest or largest, and becomes generally smaller as ω_{22} converges towards the value of $\omega_{22} = 0.97$ (as does the partial delegation range $cet2 - cet1$). At this value, countries 2 and 3 have the same endowments of their respective export goods. Thus, the set of potential CETs for the customs union is larger the greater the divergence in endowments of the union members.

As a final remark on the delegation results for the endowment experiment, we observe that Proposition 2 seems in the spirit of Syropoulos' (2002) Proposition 2. This proposition states that "If ROW's tariff is a strategic complement (strategic substitute) to the union's CET, then CU members should delegate authority over CET choice to the member with the smallest (largest) relative endowment of the factor employed intensively in the CUs export sector." For every case that we have tested using our simulation model, union and non-member tariffs are strategic substitutes.

More generally, the intuition for Proposition 2 is as follows. In a customs union, authority over common external tariff choice is delegated to that member who can induce the non-member nation to levy the lowest tariffs on member exports. This occurs because the parameter and functional form assumptions underlying this analysis invariably produce an inverse relationship between a country's welfare and the tariffs levied on its exports by its trading partners. In Figure 1, it turns out that the union member characterised by a relatively low elasticity of substitution in consumption is always the one that can induce the lowest rest of world tariff. Thus, authority over common external tariff choice is delegated (and, in the words of Melatos and Woodland (2007a),

often 'super delegated') to this member. Likewise, in Figure 2, the union member with the larger export endowment can induce the non-member to levy a lower tariff on customs union exports.

4 Conclusion

The issue of how a customs union sets it common external tariff rates has only recently been addressed in the literature. The results in this paper shed some light on this issue. Importantly, it has been shown that core customs unions may exhibit 'super-delegation' as well as 'partial-delegation' of tariff-setting authority. Furthermore, when a customs union forms it is typically the member which is relatively well-endowed with its export good or has the relatively inelastic preferences that assumes greatest responsibility for external tariff choice. Future research in this field could consider explicitly modeling CET choice as the outcome of a political bargaining game between customs union members.

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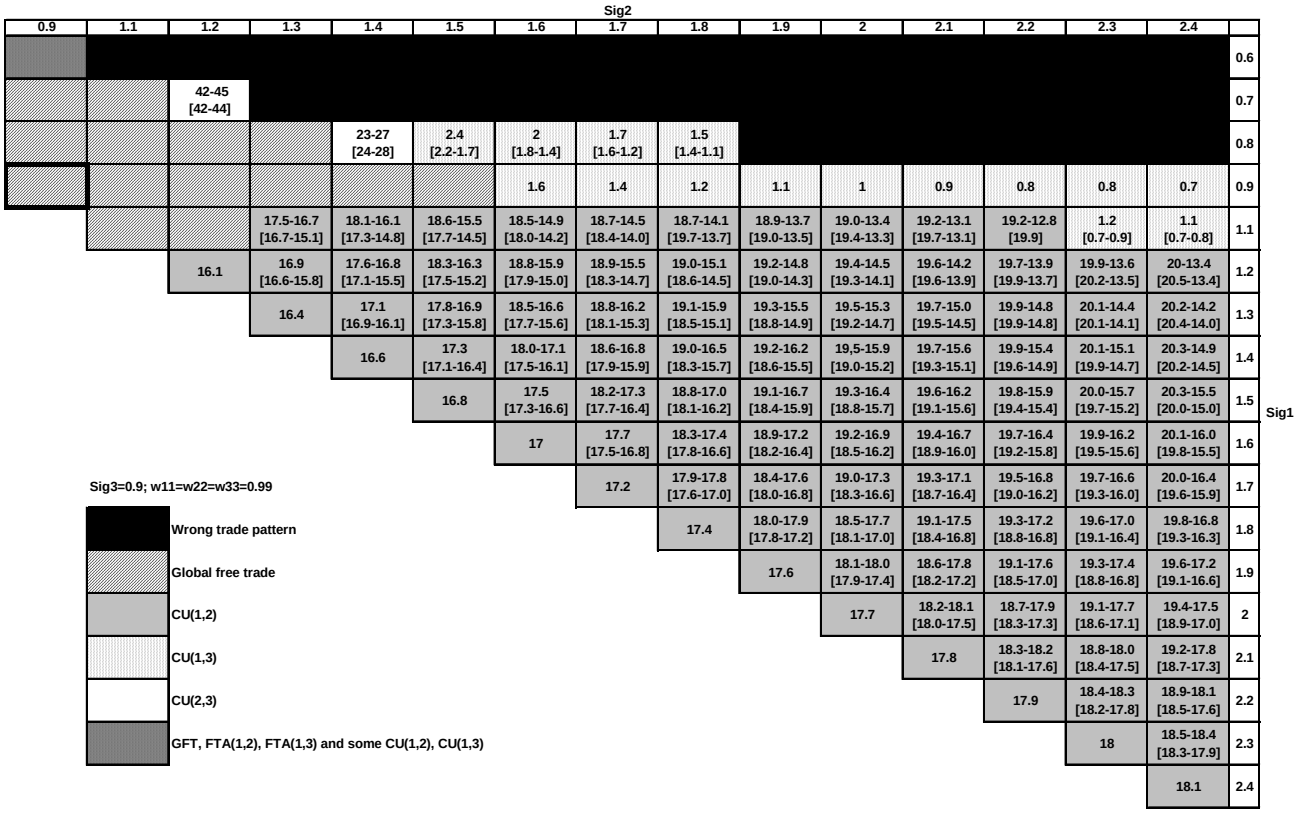

Figure 1: Pareto efficient coalition structures and common external tariff rates when preferences vary.

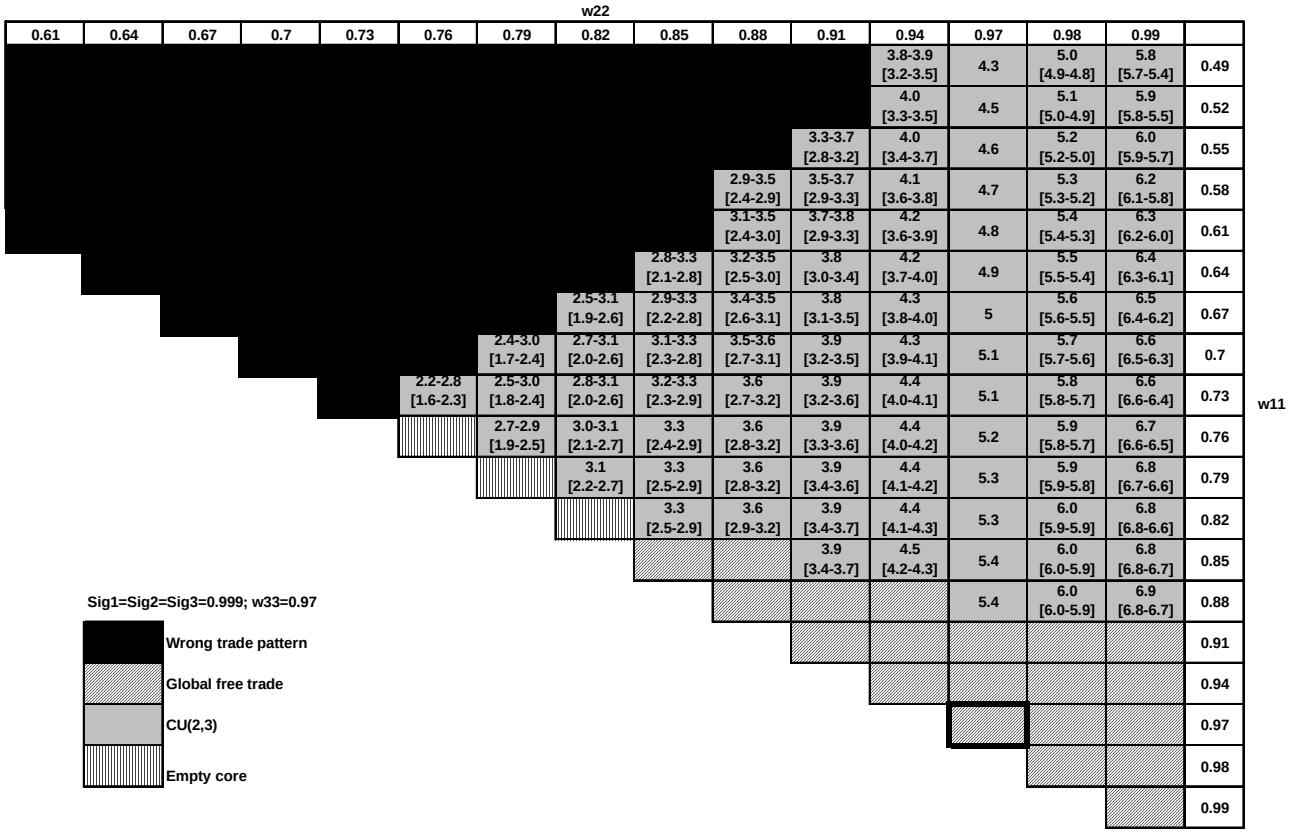

Figure 2: Pareto efficient coalition structures and common external tariff rates when endowments vary.

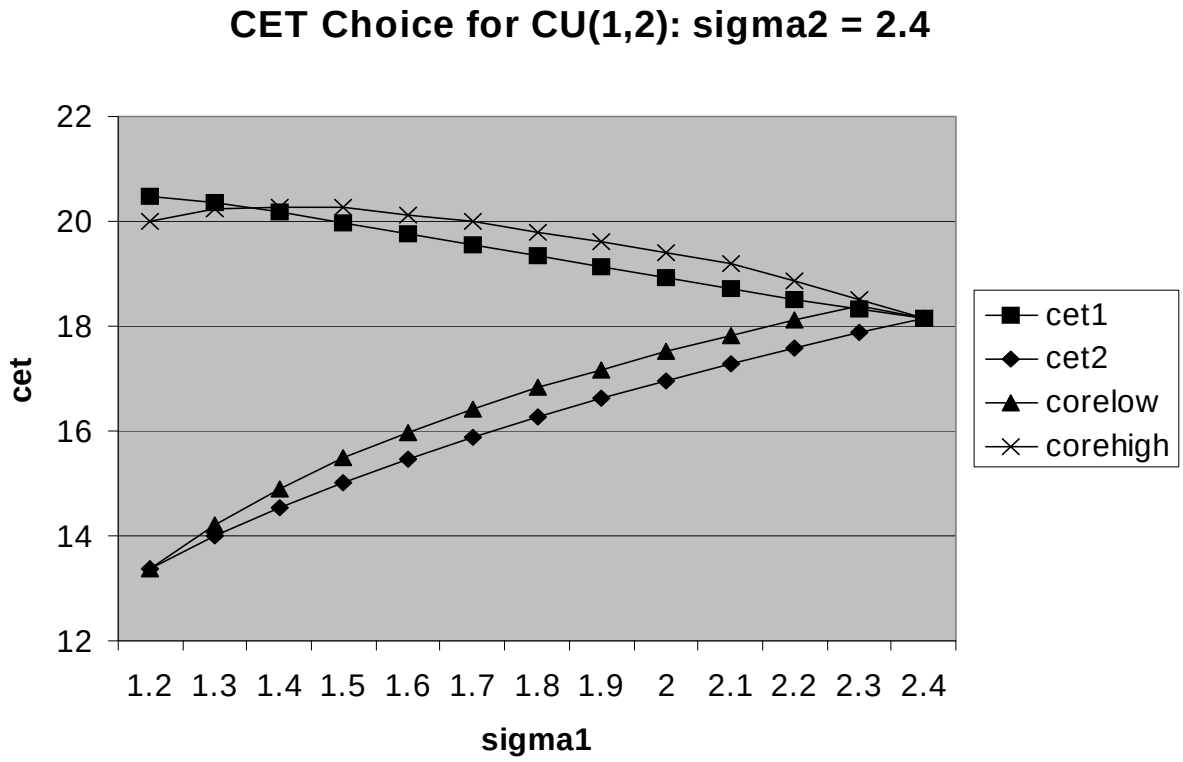

Figure 3: Delegation of CET choice as preferences vary.

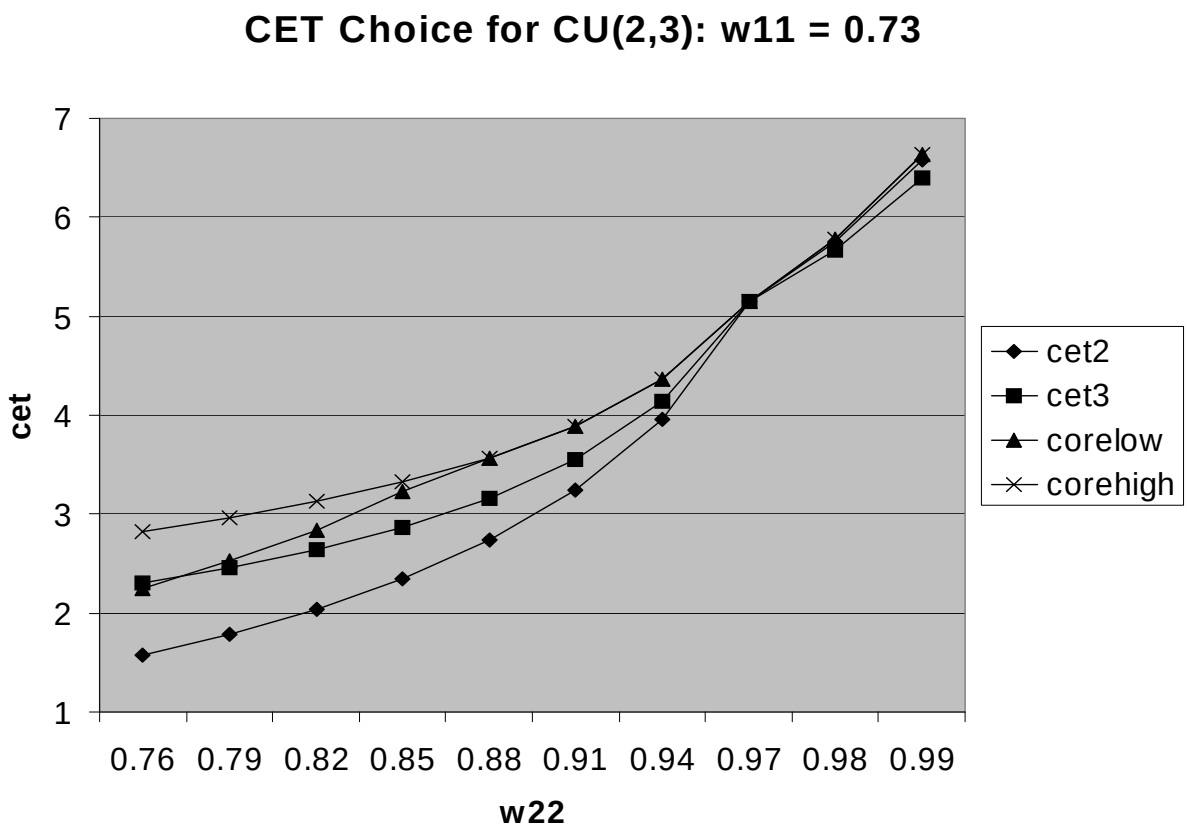

Figure 4: Delegation of CET choice as endowments vary.