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European Journal of Political Economy
Vol. 21 (2005) 483–501
European Journal of POLITICAL ECONOMY
www.elsevier.com/locate/ejpe

A political economy analysis of preferential public procurement policies

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Received 8 July 2002; received in revised form 14 November 2003; accepted 5 March 2004
Available online 11 August 2004

Abstract

In this paper, we analyze the role of political forces in the formation of protectionist policy in the award of procurement contract. Firstly, we consider the optimal policy designed by a utilitarian government maximizing the expected sum of the consumers' surplus and of the domestic firm's rent. Then, we characterize the awarding rule that would be optimal for a shareholders' majority and for a nonshareholders' majority and we compare the welfare effects of each rule. We show that the preferential treatment of the domestic firm increases when the proportion of shareholders having the majority decreases and that the domestic firm may have a greater expected profit when the awarding rule is left to the discretion of politicians for some high values of procurement contracts for the consumers.

JEL classification: F13; D82; H57
Keywords: Public procurement; Political economy; Protectionist policy

1. Introduction

The existence of preferential public procurement policies is a well-known fact in many countries. Favoritism in the awarding of public contracts can result from an explicit "buy local policy" when the government offers a specified preference for domestic suppliers. One example is the US "Buy American Act". Another is the price preference in natural monopolies sectors given by the EU directive 90/531. Favoritism can also be implicit

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doi:10.1016/j.ejpoleco.2004.03.006

when the government uses policies based on discriminatory product quality standards or restriction of information (such as inadequacies in publishing tender notices or response deadlines too short for foreign suppliers bid submission). Many empirical studies of government practices support the view that public procurement entities are more protected than private agents (for instance, see Hoeckman and Mavroidis, 1997; Trionfetti, 2000). Although there is a general agreement that discriminatory policies should be eliminated, favoritism continues. Though the main objective of the Government Procurement Agreement, signed in Marrakesh on April 15, 1994, was to subject public procurement to international competition, numerous instances of noncompliance were notified during the first years of implementation.

Discrimination in favor of domestic agents is often explained by the power of interest groups. Instead of maximizing the welfare of all the citizens, governments are captured by domestic producers and choose awarding rules in favor of domestic firms. However, two arguments have been developed in the theoretical literature to justify such a practice by rational decisions of governments. Firstly, McAfee and McMillan (1989) showed that the government should discriminate in favor of domestic firms to stimulate competition and minimize expected procurement costs if there are cost advantages for foreign firms. Secondly, Branco (1994) and Vagstad (1995) showed that governments have incentives to discriminate against foreign suppliers if they prefer domestic to foreign profits. Considering simultaneously the *competitive stimulation effect* and the *protectionist effect*, Naegelen and Mougeot (1998) showed that the government should not always offer preferences to domestic firms even if the domestic firm's profit enters the government objective function positively. The optimal policy depends on the trade-off between comparative advantage, the social cost of public funds and the weight attached to domestic profit, and should vary from industry to industry according to competitive advantage. However, current preferential procurement policies are always in favor of domestic firms. In the absence of comparative advantage, this widespread practice can be explained by the *profit shifting argument* of Brander and Spencer (1981). This is proven by Branco (1994) and Vagstad (1995) under a symmetric distribution assumption. However, in an economy with comparative advantage or disadvantage, if domestic and foreign firms draw their cost parameters from different distributions, the normative approach developed in the auction theory framework may be insufficient to explain this practice. It is necessary to consider a *positive approach* and to analyze the role of political and social forces in the formation of protectionist policy in the award of procurement contracts. This is the aim of this paper.

If foreign suppliers are always discriminated against, it may be the case that the government is not benevolent. If the majority in power can appropriate the domestic firms' rents, the trade-off between the competitive stimulation effect associated with comparative advantage and the profit shifting effect resulting from systematic procurement preferences is modified. If public expense is financed by distortionary taxation, an increase of the procurement cost is supported by all the citizens, while an increase of the rent of the domestic firm winning the procurement auction is appropriated only by the agents in power. Thus, if we assume that the government takes only the interests of the majority that has selected it into account, a shareholders' majority will consider an objective equal to the sum of its consumers' net surplus and of the rent of domestic firms. For a nonshareholders'

majority that cannot appropriate the rent of domestic firms, the objective will be the minimization of the procurement cost.

Then, in a democratic country, the optimal mechanism will change according to the results of the elections. Assume now that a constitution could define a rule maximizing the expected domestic utilitarian surplus under the veil of ignorance. Furthermore, assume that a majority voting system will give each period the decision power to the majority in power. In each period, the majority will choose a rule maximizing its specific objective. If we consider the random majority model[1] and assume that each majority is in power half the time, we can compare the expected social welfare and the expected utility of consumers and domestic firms obtained under the ex ante constitutional rule with those obtained as the result of the democratic process. This is what we intend to do in this paper by answering the following questions: should the awarding rule be imposed in an inflexible way by the constitution or left to the discretion of the politicians? When do the agents—consumers and domestic firms—prefer a rule delegated to politicians rather than imposed ex ante by the constitution?

Firstly, we consider the optimal rule chosen by a benevolent utilitarian government maximizing the expected sum of the consumers' surplus and of the domestic firm rent. Then, we analyze the awarding rule that would be optimal for a shareholders' majority and for a nonshareholders' majority and we characterize the expected social welfare associated with each mechanism. We show that the awarding rule chosen by a shareholders' majority is more protectionist than the rule chosen by a utilitarian government that is itself more protectionist than the rule designed by a nonshareholders' majority. We show also that *the preferential treatment of domestic firms increases when the proportion of shareholders constituting the majority decreases*. Then, we prove that the expected social welfare obtained with a utilitarian inflexible rule is greater than the level obtained with discretionary rules. However, we show that the interests of the agents may be opposite: when the social value of the contract is high, *the expected profit of domestic firms is greater when the awarding rule is left to the discretion of politicians whereas the expected utility of consumers is lower*.

The paper is organized as follows. In the next section, we consider the mechanism selected by a benevolent government maximizing the expected sum of the consumers surplus and of the domestic firm rent as a benchmark. The random majority model is considered in Section 3. In Section 4, we compare the benchmark model with delegation of the rules to the majority in power. Section 5 contains concluding remarks.

2. The benchmark model

The government wishes to undertake an indivisible project that generates social value S for the consumers. This project can be carried out by two suppliers: a domestic firm d and a foreign firm f.[2] The government and the firms are risk neutral. Let the cost of

[1] cf. Laffont (1996).

[2] The results can be easily generalized to the case of multiple suppliers in one or both countries without yielding new insights.

implementing the project by firm i, $i \in \{d, f\}$ be c_i. Each firm i knows its cost. The other firm and the government perceive this cost as independently drawn from a cumulative distribution $G_i(.)$ on $\Delta_i = [\underline{c}_i, \bar{c}_i]$. Assume $G_i(.)$ is continuously differentiable, with derivative $g_i(.)$. To characterize the optimal mechanism, we restrict attention to the regular case, corresponding to an increasing hazard rate $G_i(.)/g_i(.)$ and we denote $r_i(c_i) = c_i + G_i(c_i)/g_i(c_i)$.

An optimal procurement mechanism can be summarized by four functions $\{t_i(c), p_i(c)\}$ where $t_i(c)$ and $p_i(c)$ are, respectively, the expected payment and the probability of awarding the project to firm i when c is the vector of true costs. A utilitarian government maximizes the sum of the expected surplus of consumers and of the expected utility of the domestic firm with respect to $t_i(c)$ and $p_i(c)$, $\forall i$, subject to incentive compatibility, participation and possibility constraints for the firms. Let λ, $\lambda \in [0,1]$ denote the shadow cost of public funds induced by distortionary taxation: when the government raises \$1, society pays $\$(1+\lambda)$. Furthermore, we assume that the consumers' expected surplus must be constitutionally nonnegative.[3] Let $U_i(c_i) = E_{c_{-i}}(t_i(c) - c_i p_i(c))$ firm i's expected utility. Then, the government maximizes

$$W^U = \int_{\Delta} (p_{\mathrm{d}}(c) + p_{\mathrm{f}}(c))S - (1+\lambda)(t_{\mathrm{d}}(c) + t_{\mathrm{f}}(c)) + (t_{\mathrm{d}}(c) - c_{\mathrm{d}} p_{\mathrm{d}}(c))g(c)\mathrm{d}c$$

under the following constraints, when each firm's reservation utility is normalized to 0, with $\Delta = \prod_i \Delta_i$ and $g(c) = \prod_i g_i(c_i)$:

– individual rationality constraints

$$\forall i \quad U_i(c_i) \geq 0 \quad \forall c_i \in \Delta_i \tag{1}$$

– incentive compatibility constraints (with $U_i(\hat{c}_i, c_i) = E_{c_{-i}}(t_i(\hat{c}_i, c_{-i}) - c_i p_i(\hat{c}_i, c_{-i}))$):

$$\forall i \quad U_i(c_i) = U_i(c_i, c_i) \geq U_i(\hat{c}_i, c_i) \quad \forall c_i, \hat{c}_i \in \Delta_i \tag{2}$$

– consumers' expected surplus nonnegativity constraint

$$\int_{\Delta} \{(p_{\mathrm{d}}(c) + p_{\mathrm{f}}(c))S - (1+\lambda)(t_{\mathrm{d}}(c) + t_{\mathrm{f}}(c))\} g(c)\mathrm{d}c \geq 0 \tag{3}$$

– possibility constraints

$$\forall c \in \Delta \quad \forall i \quad p_i(c) \geq 0 \text{ and } p_{\mathrm{d}}(c) + p_{\mathrm{f}}(c) \leq 1 \tag{4}$$

In the following, we assume that the social value of the project is so high that it is worth producing for any c_i in any case and that constraint (3) is satisfied. Applying the envelope

[3] This constraint is always satisfied in the benchmark model. However, it must be taken into account in the case of a shareholders majority to avoid unlimited transfers from the non shareholders.

theorem to the maximization U_i in Eq. (2) with respect to $\hat{c}_i$, we obtain after standard transformation:

$$W^U = -\lambda U_{\mathrm{d}}(\bar{c}_{\mathrm{d}}) - (1+\lambda)U_{\mathrm{f}}(\bar{c}_{\mathrm{f}}) + \int_{\Delta}((S-(1+\lambda)c_{\mathrm{d}} - \lambda\frac{G_{\mathrm{d}}(c_{\mathrm{d}})}{g_{\mathrm{d}}(c_{\mathrm{d}})})p_{\mathrm{d}}(c) + (S-(1+\lambda)(r_{\mathrm{f}}(c_{\mathrm{f}}))p_{\mathrm{f}}(c))g(c)\mathrm{d}c \quad (5)$$

The optimal mechanism is the solution of the pointwise maximization of W^U with respect to $p_i(c)$, $\forall i$, under $E_{c-i}p_i(c)$ non-increasing in c_i and under (2) and of the maximization of W^U with respect to $U_i(\bar{c}_i)$, under $U_i(\bar{c}_i) \geq 0$ $\forall i$. We obtain the following proposition (see McAfee and McMillan, 1989; Naegelen and Mougeot, 1998):

Proposition 1. *The optimal procurement mechanism designed by a utilitarian government satisfies* $U_i(\bar{c}_i) = 0$ $\forall i$, $p^u_d(c) = 1$, $p^u_f(c) = 0$ *if* $(1+\lambda)c_d + \lambda(G_d(c_d)/g_d(c_d)) \leq (1+\lambda)r_f(c_f)$, $p^u_f(c) = 1$, $p^u_d(c) = 0$ *otherwise.*

The *optimal mechanism is discriminatory*. According to Proposition 1, the domestic firm is awarded the contract if $c_{\mathrm{d}} < c_{\mathrm{f}} + (1/(1+\lambda))(G_{\mathrm{d}}(c_{\mathrm{d}})/g_{\mathrm{d}}(c_{\mathrm{d}})) + (G_{\mathrm{f}}(c_{\mathrm{f}})/g_{\mathrm{f}}(c_{\mathrm{f}})) - (G_{\mathrm{d}}(c_{\mathrm{d}})/g_{\mathrm{d}}(c_{\mathrm{d}}))$. First, there is a *favoritism effect*. The government gives a preferential treatment to the domestic firm by adding $(1/(1+\lambda))(G_{\mathrm{d}}(c_{\mathrm{d}})/g_{\mathrm{d}}(c_{\mathrm{d}}))$ to the foreign firm cost. This effect is analogous to the profit-shifting of tariffs in the analysis of Brander and Spencer (1981). Second, there is a *competitive stimulation effect*. The government adds a positive term $(G_{\mathrm{f}}(c_{\mathrm{f}})/g_{\mathrm{f}}(c_{\mathrm{f}})) - (G_{\mathrm{d}}(c_{\mathrm{d}})/g_{\mathrm{d}}(c_{\mathrm{d}}))$ to the foreign cost when the foreign firm is in average more eager to sell than the domestic firm. Hence, there is a trade-off between the two effects and a discrimination against the foreign firm if $(G_{\mathrm{f}}(.)/g_{\mathrm{f}}(.)) > (\lambda/(1+\lambda))(G_{\mathrm{d}}(.)/g_{\mathrm{d}}(.))$, i.e. if the profit shifting effect is stronger than the efficiency effect when they work in opposite directions. Consequently, the domestic firm is always favored when there is no social cost of public funds.[4]

3. A positive analysis of procurement rules

We assume now that the choice of the awarding rules is delegated to political majorities and that each majority in power selects a mechanism maximizing its utility. As majority changes, rules change. Then, we want to compare the expected social welfare obtained by a constitutional inflexible rule with the expected social welfare obtained under delegation. For this purpose, we consider the random majority model (Laffont, 1996). In the economy, there is a random proportion α of nonshareholders (type 1 agents) and a random proportion $(1-\alpha)$ of shareholders (type 2 agents), with $\alpha \in [0, 1]$.The shareholders share the rent of the domestic firm, while the nonshareholders do not.[5] Following Boyer and Laffont (1999), we assume that each majority is in power half a time. Let α be drawn

[4] As in McAfee and McMillan (1989).

[5] This assumption does not imply that ownership is random. The domestic firm is private and belongs to type 2 agents. However, a shareholders' government chooses an objective function with a higher weight associated to domestic firm rent than a nonshareholders' government.

independently over each period, taking the value $\alpha^* \in]1/2, 1[$ with probability 1/2 and $1-\alpha^*$ with probability 1/2. When $\alpha = \alpha^*$, the nonshareholders' majority, of measure α^*, is in power. When $\alpha = 1-\alpha^*$, the shareholders' majority, of measure α^*, is in power. To simplify, we assume that the public project has the same value S for each type of consumers and we consider nondiscriminatory payments from the consumers, which can be implied by ex-post incentive compatibility when the consumers' types are unknown. To define the awarding rule chosen by the selected politicians, we assume that they represent the interests of the majority having elected them.

3.1. Nonshareholders' majority

When type 1 agents have the majority, the politicians maximize the welfare of nonshareholders. As type 1 agents do not appropriate the rent of domestic firms, the government's objective function is the net consumers surplus:

$$W_1 = \alpha^* \int_\Delta \{(p_\mathrm{d}(c) + p_\mathrm{f}(c))S - (1+\lambda)(t_\mathrm{d}(c) + t_\mathrm{f}(c))\} g(c)\mathrm{d}c \tag{6}$$

The constraints are the same as in the previous case and the objective function can be rewritten

$$W_1 = -(1+\lambda)\alpha^*(U_\mathrm{d}(\bar{c}_\mathrm{d}) + U_\mathrm{f}(\bar{c}_\mathrm{f})) + \alpha^* \int_\Delta ((S-(1+\lambda)r_\mathrm{d}(c_\mathrm{d}))p_\mathrm{d}(c) + (S-(1+\lambda)r_\mathrm{f}(c_\mathrm{f}))p_\mathrm{f}(c))g(c)\mathrm{d}c \tag{7}$$

As W_1 is equivalent to W^U with a domestic firm's profit weight equal to zero, we obtain the following corollary:

Corollary 2. *When the nonshareholders have the majority, the optimal procurement mechanism satisfies* $U_i(\bar{c}_i) = 0\ \forall i$, $p_d^1(c) = 1$, $p_f^1(c) = 0$ *if* $r_d(c_d) \leq r_f(c_f)$, $p_f^1(c) = 1$, $p_d^1(c) = 0$ *otherwise.*

This rule is the same as the rule obtained by McAfee and McMillan (1989). It implies no favoritism and discrimination against the low cost suppliers to stimulate competition and minimize expected procurement cost.

3.2. Shareholders' majority

When type 2 agents are in power, the shareholders' majority can appropriate the domestic firm's rent. So the government maximizes

$$W_2 = \alpha^* \int_\Delta \{(p_\mathrm{d}(c) + p_\mathrm{f}(c))S - (1+\lambda)(t_\mathrm{d}(c) + t_\mathrm{f}(c))\} g(c)\mathrm{d}c + \int_\Delta (t_\mathrm{d}(c) - c_\mathrm{d}p_\mathrm{d}(c))g(c)\mathrm{d}c \tag{8}$$

which can be rewritten as previously

$$W_2 = \alpha^*(-(1+\lambda)U_{\mathrm{f}}(\bar{c}_{\mathrm{f}}) - (1+\lambda-1/\alpha^*)U_{\mathrm{d}}(\bar{c}_{\mathrm{d}})) + \alpha^* \int_{\Delta} (S-(1+\lambda)c_{\mathrm{d}} - (1+\lambda-1/\alpha^*)\frac{G_{\mathrm{d}}(c_{\mathrm{d}})}{g_{\mathrm{d}}(c_{\mathrm{d}})})p_{\mathrm{d}}(c)g(c)\mathrm{d}c + \alpha^* \int_{\Delta} (S-(1+\lambda)(r_{\mathrm{f}}(c_{\mathrm{f}})))p_{\mathrm{f}}(c)g(c)\mathrm{d}c \quad (9)$$

As usual, W_2 is maximized by setting $U_f(\bar{c}_f)=0$. However, as the rent of the domestic firm is captured by the fraction of the population in power, the solution concerning the domestic firm's profit depends on the sign of $1+\lambda-1/\alpha^*$. In his application of the random majority model to natural monopoly regulation, Laffont (1996) assumes that $1+\lambda-1/\alpha^*>0$. With this assumption, $U_{\mathrm{d}}(\bar{c}_{\mathrm{d}})=0$ at the optimum and the awarding rule can be derived directly from the maximization of W_2. However, if we consider the usual value of the opportunity cost of public funds, λ varies between 0.2 and 0.3 according to the authors.[6] Then, the majority should be greater than a value between 0.769 and 0.833. As the political alternance occurs in most democratic countries for values of the majority in the neighbor of 0.5, it seems more plausible that $1+\lambda-1/\alpha^*<0$ for usual values of λ and α^*. In this case, W_2 is maximized for $U_{\mathrm{d}}(\bar{c}_{\mathrm{d}})$ as great as possible. Therefore, we must take the constraint on the expected surplus of the consumers (Eq. (3)) into account, to avoid unlimited transfers to the domestic firm from nonshareholders. Under this assumption, we obtain the following proposition:

Proposition 3. *When the shareholders have the majority, with $1+\lambda-1/\alpha^*<0$, the optimal procurement mechanism satisfies: $U_f(\bar{c}_f)=0$, $p_d^2(c)=1$, $p_f^2(c)=0$ if $c_d \le r_f(c_f)$, $p_f^2(c)=1$, $p_d^2(c)=0$ otherwise. With $1+\lambda-1/\alpha^*>0$, it satisfies $U_i(\bar{c}_i)=0 \ \forall i$, $p_d^2(c)=1$, $p_f^2(c)=0$ if $(1+\lambda)r_d(c_d)-(1/\alpha^*)(G_d(c_d)/g_d(c_d)) \le (1+\lambda)r_f(c_f)$, $p_f^2(c)=1$, $p_d^2(c)=0$ otherwise.*

Proof. See Appendix A. □

When the shareholder majority is small ($1+\lambda<(1/\alpha^*)$), the rule defined in Proposition 3 is purely protectionist and implies always a discrimination in favor of the domestic firm. The government adds always a positive term to the foreign cost.

4. Constitutional rule versus discretionary power of politicians

Should the awarding rule be imposed rigidly by the constitution or left to the discretion of the politicians? Which group of agents (consumers or domestic firms) benefits from the delegation? To answer these questions, we can firstly compare the awarding rules.

[6] See for instance Ballard et al. (1985) and Snow and Warren (1996).

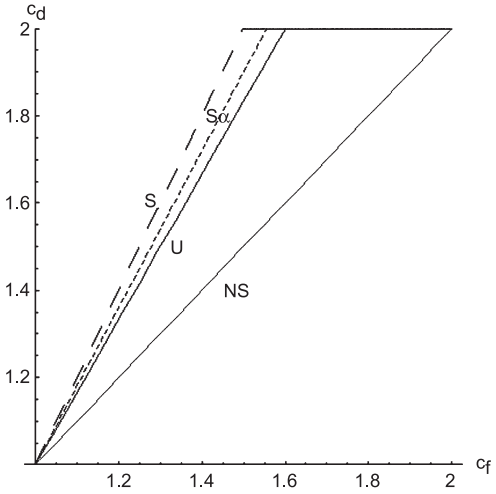

Fig. 1. Awarding rules in the symmetric case.

4.1. Awarding rules comparison

We can note that the rule designed by a shareholders' majority is more protectionist than the rule designed by a utilitarian government that is itself more protectionist than the rule designed by a nonshareholders' majority. It is a consequence of the weight of the domestic firm rent in the government's utility function. When the government is utilitarian, this weight is $-\lambda$, whereas it is equal to $-(1+\lambda)\alpha^*$ with a nonshareholders' majority and equal to $-(1+\lambda-(1/\alpha^*))$ with a shareholders' majority, the latter weight being positive when the majority is small and negative when the majority is large. Then, if we consider the proportion of shareholders having the majority, the optimal awarding rules chosen by the shareholders may appear rather counterintuitive. As a matter of fact, when $\alpha^*>(1/(1+\lambda))$, i.e. when the shareholders majority is large, firm d wins if $c_d < r_f(c_f) - (G_d(c_d)/g_d(c_d))((\alpha^*(1+\lambda)-1)/(\alpha^*(1+\lambda)))$, whereas it wins if $c_d < r_f(c_f)$ when $\alpha^*<(1/(1+\lambda))$. Then, the rule is less protectionist when the shareholders' majority is large than when it is short. Moreover, when $\alpha^*>(1/(1+\lambda))$, the greater α^*, the less protectionist the rule. When α^* tends to 1, the awarding rule tends to be the same as the rule chosen by a utilitarian government.[7] Therefore, when the proportion of shareholders increases, the domestic firm is less protected. This is due to the increasing part of the consumers surplus in the objective function of the shareholders and to the fact that they have to trade off their interests as shareholders and as consumers. Then, the lower the proportion of shareholders, the higher the distortion in the awarding rule.

The different rules can be graphically represented in the case of uniformly distributed costs. Fig. 1 represents these awarding rules in the symmetric case with c_d and c_f uniformly distributed on [1, 2], $\lambda = 1/4$. The case of a comparative-advantage domestic industry (with

[7] When all the agents are shareholders (i.e. $\alpha = 1$), the utility function of the government is utilitarian. Then, when W_2 tends to W_U, distortions are reduced.

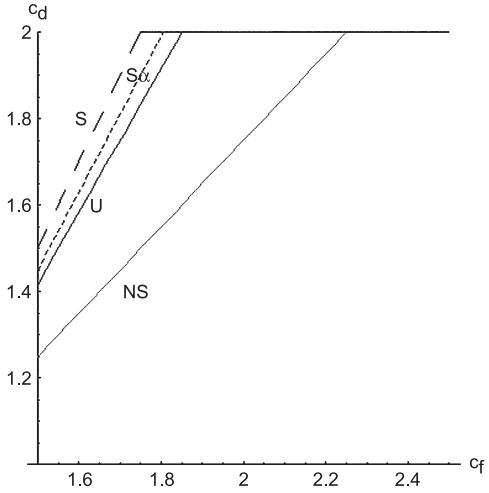

Fig. 2. Awarding rules in the case of a comparative-advantage domestic industry.

c_f uniformly distributed on [1.5, 2.5]) is represented in Fig. 2, whereas the case of a comparative-disadvantage domestic industry (with c_f uniformly distributed on [0.5, 1.5]) is represented in Fig. 3. The area under each line corresponds to the couples (c_f, c_d) for which the domestic firm wins. The different lines represent the optimal awarding rules when the objective is utilitarian (U), when the nonshareholders have the majority (NS), when the shareholders have a low majority (S) and when the shareholders have a large majority ($S\alpha$).

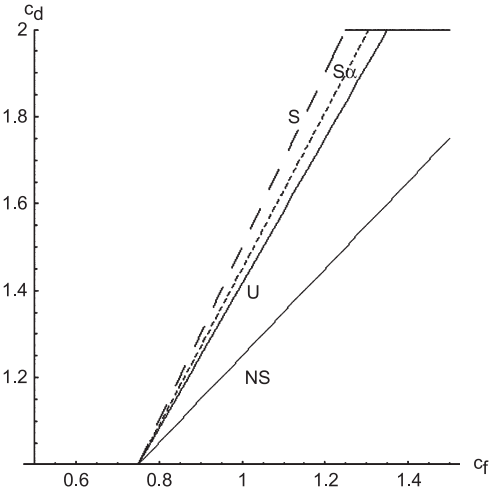

Fig. 3. Awarding rules in the case of a comparative-disadvantage domestic industry.

4.2. Expected welfare comparison

4.2.1. Absence of comparative advantage

To compare the welfare effects of each rule, consider firstly the case of *absence of comparative advantage* between domestic and foreign firms, i.e. the case of symmetric firms with $G_d(.)=G_f(.)=G(.)$. In this case, there is *no competition stimulation effect*. As we assume that each majority is in power half a time, we have to evaluate $\Delta W^U = W^U - (W_1^U + W_2^U)/2$ where W_1^U (respectively W_2^U) is the level of domestic utilitarian social welfare when the optimal procurement mechanism is designed by type 1 (respectively type 2) majority.

When the mechanism is designed by a utilitarian government, according to Proposition 1, a domestic firm wins if $D(c_d) \equiv c_d + (\lambda/(1+\lambda))(G(c_d)/g(c_d)) \leq r(c_f)$, which can be written $\bar{z}(c_d) \leq c_f$, with $\bar{z}(c_d) \equiv r^{-1}(D(c_d))$. If we denote $z \equiv \bar{z}^{-1}$ and $\tilde{c}_f = \bar{z}(\bar{c})$, the expected social welfare obtained under a complete constitution W^U can be written

$$W^U = S - \int_{\underline{c}}^{\bar{c}} \left((1+\lambda)c_d + \lambda \frac{G(c_d)}{g(c_d)}\right)(1 - G(\bar{z}(c_d)))g(c_d)\mathrm{d}c_d - (1+\lambda)\int_{\underline{c}}^{\tilde{c}_f} r(c_f)(1 - G(z(c_f)))g(c_f)\mathrm{d}c_f \quad (10)$$

Under a *nonshareholders majority*, according to Corollary 2, a domestic firm wins if $c_d < c_f$. Then, the expected utilitarian surplus W_1^U can be written[8]

$$W_1^U = S - 2(1+\lambda)\int_{\underline{c}}^{\bar{c}} r(c_i)(1 - G(c_i))g(c_i)\mathrm{d}c_i + \int_{\underline{c}}^{\bar{c}} (1 - G(c_i))G(c_i)\mathrm{d}c_i$$

Under a shareholders majority, according to Proposition 3, when $(1+\lambda)\alpha^* < 1$, a domestic firm wins if $\bar{r}(c_d) < c_f$, with $\bar{r} \equiv r^{-1}$. If we denote $\hat{c}_f = \bar{r}(\bar{c})$, the expected utilitarian surplus W_2^U can be written

$$W_2^U = \frac{S}{1+\lambda} - \int_{\underline{c}}^{\bar{c}} c_d(1 - G(\bar{r}(c_d)))g(c_d)\mathrm{d}c_d - \int_{\underline{c}}^{\hat{c}_f} r(c_f)(1 - G(r(c_f)))g(c_f)\mathrm{d}c_f$$

According to our assumptions, we have $r(c_i) > z(c_i) > c_i > \bar{z}(c_i) > \bar{r}(c_i)$ and $\tilde{c}_f > \hat{c}_f$. To determine the sign of ΔW^U, consider firstly that the cost of public funds λ is known ex ante (i.e. the case of a complete contract defined by the constitution). As the awarding rule defined by Proposition 1 is chosen to maximize expected utilitarian social surplus while neither of the two types of elected government do, W^U is always greater than W_1^U and W_2^U if the participation constraints of firms and consumers are satisfied in each mechanism.[9] Then,

[8] In the following, we restrict attention to the case of a small shareholders' majority ($(1+\lambda)\alpha^* < 1$).

[9] The welfare achieved by a benevolent utilitarian government is an upper bound. First, the shareholders and the non shareholders majority does not maximize welfare. Second, the constraints associated with the program for the design of the utilitarian policy are a subset of the constraints associated with the program of the shareholders majority.

$\Delta W^U>0$. The expected social surplus is greater when the awarding rule is imposed in an inflexible way by the constitution than when it is left to the discretion of politicians.

However, the interests of consumers and of the domestic firm are opposite. When the social value S is sufficiently great, the domestic firm prefers delegation whereas consumers prefer the rule imposed rigidly by the constitution. Under a shareholders' majority, the optimal mechanism must take the nonnegativity of the consumers net surplus into account. From Eq. (A.2), the expected profit of the domestic firm is increasing in S when the shareholders are in power. For high values of S, they can redistribute much money from the nonshareholders into profit for the domestic firm. Consequently, for values of S greater than a threshold S^*, the expected domestic profit will be higher under delegation than under an inflexible rule (see Appendix B for a proof). Then, when the social value of the project for the consumers is higher than a threshold S^*, the expected profit of the domestic firm is greater when the awarding rule is left to the discretion of politicians. As $\Delta W^U>0$, for $S>S^*$, the expected consumers surplus must be lower under shifting governments than with the inflexible rule whenever the opposite holds for domestic expected profits. These results are summarized in Proposition 4.

Proposition 4. *The expected social welfare obtained by an inflexible rule imposed by a complete constitution is always greater than when it is left to the discretion of politicians. For sufficiently high values of the public contract for the consumers, the expected profit of the domestic firm is greater when the rule is left to the discretion of majorities in power whereas the expected utility of consumers is lower.*

If we assume now that the social cost of public funds is unknown ex ante, the utilitarian government must choose the awarding rule based on the expectation $E\lambda$ of λ. Following Boyer and Laffont (1999), the value of λ can be either a proxy for specific economic conditions that the government is better equipped to observe or can refer to complex economic conditions which cannot be written in a constitutional contract. When the rule is left to the discretion of the government, it may design the optimal mechanism on the basis of the true value of λ. Then, we have to compare ex ante $W^U = W^U(E\lambda)$ with $\underset{\lambda}{E}\left(\frac{W_1^U + W_2^U}{2}\right)$. Uncertainty at the time the inflexible rule is to be written adds a cost to the inflexible rule. Depending on the nature of this uncertainty (i.e. depending on the distribution of λ), the inflexible rule may be better or worse compared to no such rule. No general result can be obtained without specifying $G(.)$ and the distribution of λ. For instance, it can be shown that Proposition 4 holds when costs are uniformly distributed and when λ is a Beta distributed random variable for the whole family of Beta distributions.

4.2.2. The case of comparative advantage

Consider now the *asymmetric case*. The optimal rules defined by Proposition 1 imply that the government should offer preferences to local comparative-disadvantage industries and to foreign comparative-disadvantage industries. As a country is unlikely to have a comparative disadvantage in all industries, the optimal mechanism is not a "buy national" policy. The optimal rule designed by a nonshareholders majority implies also a discrimination in favor of domestic (respectively foreign) bidders with a comparative disadvan-

tage. However, the optimal rule designed by a shareholders majority implies always a discrimination in favor of the domestic firm. To evaluate the welfare effects of the different rules, we have to compare the levels of social welfare obtained with each rule in an economy where there are comparative-advantage and comparative-disadvantage industries. To simplify, assume that the distribution of the domestic firm cost and the distribution of the foreign firm cost are related by a spread preserving change in mean. As previously, under a *complete constitution*, $\Delta W^U > 0\ \forall\lambda$. However, the sign of $\Delta\bar{S}$ and ΔU depends now on the values of S and λ and also on the nature of the asymmetries, that may vary from one industry to another, as well as on the relative importance of comparative advantage industries. Therefore, no general result can be obtained. However, it is possible to exhibit an example (cf. Appendix C) to show how the previous analysis is modified.

In the case of a *comparative-disadvantage domestic firm*, with c_d uniformly distributed on [1,2] and c_f uniformly distributed on $[1-a,\ 2-a]$ with $a<(1/(1+\lambda))$, the expected profit of the domestic firm is greater under delegation for $S>((23+19\lambda)/12)+((1+\lambda)a(a^2-18a-24)/48)$ where $((23+19\lambda)/12)$ is the threshold above which the domestic firm prefers delegation in the symmetric case. As $((1+\lambda)a(a^2-18a-24)/48)<0$, the disadvantaged domestic firm prefers a delegated rule for a value of S lower than in the symmetric case. This is due to the fact that the competition stimulation effect works in the same direction as the favoritism effect. In the case of a comparative-advantage domestic firm, with c_d uniformly distributed on [1, 2] and c_f uniformly distributed on $[1+a,\ 2+a]$, the expected profit of the domestic firm is greater under delegation for $S>((23+19\lambda)/12)+((1+\lambda)a(a^2(-3+4\lambda+12\lambda^2)+(24-a)(1+2\lambda)^2)/48(1+2\lambda)^2)$. As the sign of the last term is positive, the advantage domestic firm prefers a delegated rule for a value of S higher than in the symmetric case. As the competition stimulation effect and the favoritism effect work in opposite direction, a comparative advantage domestic industry prefers more often the inflexible awarding rule.

5. Conclusion

In this paper, we have explained the formation of protectionist policy in the award of public procurement contracts. As a benchmark, we have characterized the optimal awarding rule designed by a benevolent utilitarian government. Then, we have considered the rule that would be optimal for a shareholders' majority and for a nonshareholders' majority. As it is intuitive, the awarding mechanism designed by a shareholders' majority is more protectionist than the rule designed by a nonshareholders' majority. However, we have shown that a majority of shareholders has to trade-off its interest as shareholder and as consumer. Therefore, the preferential treatment given to a domestic firm decreases when the proportion of shareholders increases. Then, we have characterized the expected social welfare associated with each mechanism to answer the questions: should the awarding rule be imposed in an inflexible way by the constitution or left to the discretion of the politicians? Which group of agents benefits from delegation? As the expected social surplus associated with the rule designed by a political majority is always lower than the expected social surplus obtained with a utilitarian rule, when we consider the random

majority approach, delegation is always dominated by the inflexible rule in the case of a complete constitution. This result holds in the absence of competitive advantage and also when there is comparative advantage or comparative disadvantage for the domestic firm. When the social cost of public funds is unknown ex ante, uncertainty at the time the inflexible rule is to be written adds a cost to the inflexible rule, whereas shifting governments may design the optimal mechanism on the true value of λ. Depending on the nature of this uncertainty, the inflexible rule may be better or worse compared to no such rule. Moreover, we have proven that the interests of the consumers and domestic firms are opposite: when the social value of the public contract is high, domestic firms expected profit is higher when the awarding rule is left to the discretion of politicians whereas the expected utility of the consumers is higher when the rule is imposed rigidly by the constitution. In the asymmetric case, we have shown that a comparative-disadvantage domestic industry (respectively a comparative-advantage domestic industry) prefers a delegated awarding rule for a lower (respectively greater) value of S.

Thus, positive analysis can give a rationale to a public procurement policy discriminating against foreign suppliers. It shows how it may be difficult to subject government procurement to international competition. The prevalence of buy national policies in many countries could be explained by this political economy approach. However, such policies neglect an externality phenomenon: when a government in a country discriminates between suppliers on the basis of the degree of foreign ownership or on the basis of the country of production of the good or service, there is an incentive for governments in other countries to design also protectionist policies. Then, although partial equilibrium analysis could justify "buy national" policies, this practice should be eliminated by the WTO's Agreement.

The analysis of this paper can be extended in a number of directions. First, the implementability of the optimal mechanism must be addressed. Mougeot and Naegelen (1998) have shown that a complex modified first (or second) price auction can implement the optimal outcome in an analogous framework. However, the implementability of a constitutional inflexible rule is not straighforward (see Vagstad, 1995). Second, influences behind protectionist policies such as the infant industry argument are absent in this paper and require dynamic modelling that takes re-election constraints into account. Third, a more realistic context is two levels of governance: a central authority (as the European Union) and regional governments. As foreign firms could be out-of-region firms, the welfare cost of protectionist regional procurement rules would become apparent at the central level. Alternative institutional assumptions should be considered, such as a utilitarian central government with random majority at the regional levels. As noted by Laffont (1996), the research agenda opened by this line of research is huge. The analysis of this paper should be pursued to encompass more general and more realistic contexts.

Acknowledgements

We are grateful to two anonymous referees for comments on an earlier version of the paper. The usual disclaimer applies.

Appendix A. Proof of Proposition 3

Applying the envelope theorem to the maximization of Eq. (2), we obtain

$$E_{c_{-i}}(t_i(c_i, c_{-1})) = U_i(\bar{c}_i) + c_i E_{c_{-i}}(p_i(c_i, c_{-i})) + \int_{c_i}^{\bar{c}_i} Q_i(s_i)\mathrm{d}s_i \quad \forall c_i,\ \forall i$$

with $Q_i(s_i) = \underset{c_{-i}}{E}\, p_i(s_i, c_{-i})$ and after integration with respect to c_i,

$$\int_\Delta t_i(c)g(c)\mathrm{d}c = U_i(\bar{c}_i) + \int_\Delta r_i(c_i)p_i(c)g(c)\mathrm{d}c$$

Considering firm d, we obtain

$$U_\mathrm{d}(\bar{c}_\mathrm{d}) = \left(\int_\Delta t_\mathrm{d}(c)g(c)\mathrm{d}c - \int_\Delta r_\mathrm{d}(c_\mathrm{d})p_\mathrm{d}(c)g(c)\mathrm{d}c\right) \tag{A.1}$$

From Eq. (3),

$$\int_\Delta t_\mathrm{d}(c)g(c)\mathrm{d}c \le \int_\Delta \left\{\frac{S}{1+\lambda}(p_\mathrm{d}(c) + p_\mathrm{f}(c)) - t_\mathrm{f}(c)\right\} g(c)\mathrm{d}c \tag{A.2}$$

As W_2 is maximized if $U_\mathrm{d}(\bar{c}_\mathrm{d})$ is maximized, and hence if $\int_\Delta t_\mathrm{d}(c)g(c)\mathrm{d}c$ is maximized, the latest must be equal to the right-hand term in Eq. (A.2). Applying Eq. (A.1) to firm f and considering $U_\mathrm{f}(\bar{c}_\mathrm{f}) = 0$, we obtain

$$\int_\Delta t_\mathrm{f}(c)g(c)\mathrm{d}c = \int_\Delta r_\mathrm{f}(c_\mathrm{f})p_\mathrm{f}(c)g(c)\mathrm{d}c$$

and

$$\begin{aligned} U_\mathrm{d}(\bar{c}_\mathrm{d}) = {} & \int_\Delta \frac{S}{1+\lambda}(p_\mathrm{d}(c) + p_\mathrm{f}(c))g(c)\mathrm{d}c - \int_\Delta r_\mathrm{d}(c_\mathrm{d})p_\mathrm{d}(c)g(c)\mathrm{d}c \\ & - \int_\Delta r_\mathrm{f}(c_\mathrm{f})p_\mathrm{f}(c)g(c)\mathrm{d}c \end{aligned} \tag{A.3}$$

We can note that the participation constraint of firm d whose cost is $\bar{c}_\mathrm{d}$ is equivalent to Eq. (3). W_2 can be rewritten

$$\begin{aligned} W_2 = {} & (1 - (1+\lambda)\alpha^*)\left\{\int_\Delta \frac{S}{1+\lambda}(p_\mathrm{d}(c) + p_\mathrm{f}(c))g(c)\mathrm{d}c - \int_\Delta r_\mathrm{d}(c_\mathrm{d})p_\mathrm{d}(c)g(c)\mathrm{d}c \right. \\ & \left. - \int_\Delta r_\mathrm{f}(c_\mathrm{f})p_\mathrm{f}(c)g(c)\mathrm{d}c\right\} + \alpha^* \int_\Delta (S - (1+\lambda)c_\mathrm{d} \\ & - (1 + \lambda - 1/\alpha^*)\frac{G_\mathrm{d}(c_\mathrm{d})}{g_\mathrm{d}(c_\mathrm{d})})p_\mathrm{d}(c)g(c)\mathrm{d}c + \alpha^* \int_\Delta (S - (1+\lambda)r_\mathrm{f}(c_\mathrm{f}))p_\mathrm{f}(c)g(c)\mathrm{d}c \end{aligned}$$

and after rearranging

$$W_2 = \int_{\Delta}\left(\frac{S}{(1+\lambda)} - c_{\mathrm{d}}\right)p_{\mathrm{d}}(c)g(c)\mathrm{d}c + \int_{\Delta}\left(\frac{S}{(1+\lambda)} - r_{\mathrm{f}}(c_{\mathrm{f}})\right)p_{\mathrm{f}}(c)g(c)\mathrm{d}c$$

Then, we obtain Proposition 3. □

Appendix B. Proof of Proposition 4

When the awarding rule is designed by a utilitarian government, the net surplus of the consumers is

$$\begin{aligned}\bar{S}^U = S &- \int_{\underline{c}}^{\bar{c}} (1+\lambda) r_{\mathrm{d}}(c_{\mathrm{d}})(1 - G(\bar{z}(c_{\mathrm{d}})))g(c_{\mathrm{d}})\mathrm{d}c_{\mathrm{d}} \\ &- \int_{\underline{c}}^{\check{c}_{\mathrm{f}}} (1+\lambda) r(c_{\mathrm{f}})(1 - G(z(c_{\mathrm{f}})))g(c_{\mathrm{f}})\mathrm{d}c_{\mathrm{f}} \end{aligned} \tag{B.1}$$

and the domestic firm expected profit is equal to

$$\bar{U}^U = \int_{\underline{c}}^{\bar{c}} G(c_{\mathrm{d}})(1 - G(\bar{z}(c_{\mathrm{d}})))g(c_{\mathrm{d}})\mathrm{d}c_{\mathrm{d}} \tag{B.2}$$

Under a *nonshareholders' majority*, the net surplus of the consumers is

$$\bar{S}^1 = S - 2\int_{\underline{c}}^{\bar{c}} (1+\lambda) r(c_i)(1 - G(c_i))g(c_i)\mathrm{d}c_i \tag{B.3}$$

and the domestic firm expected profit is equal to

$$\bar{U}^1 = \int_{\underline{c}}^{\bar{c}} (1 - G(c_i))G(c_i)\mathrm{d}c_i \tag{B.4}$$

Under a shareholders' majority, $\bar{S}^2 = 0$ and the domestic firm expected profit $\bar{U}^2$ is equal to W_2^U. Then,

$$\begin{aligned}\Delta U = \bar{U}^U - \frac{\bar{U}^1 + \bar{U}^2}{2} = \frac{1}{2}\Bigg[&\frac{-S}{1+\lambda} + \int_{\underline{c}}^{\bar{c}} (G(c_{\mathrm{d}})[1 - 2G(\bar{z}(c_{\mathrm{d}})) + G(c_{\mathrm{d}})] \\ &+ c_{\mathrm{d}}(1 - G(\bar{r}(c_{\mathrm{d}})))g(c_{\mathrm{d}})\mathrm{d}c_{\mathrm{d}} + \int_{\underline{c}}^{\check{c}_{\mathrm{f}}} r(c_{\mathrm{f}})(1 - G(r(c_{\mathrm{f}})))g(c_{\mathrm{f}})\mathrm{d}c_{\mathrm{f}}\Bigg]\end{aligned}$$

The sign of ΔU depends on the values of S, λ, $\bar{r}(.)$, $\bar{z}(.)$, $r(.)$ and cannot be determined without specifying $G(.)$. However, as firm $\bar{c}_{\mathrm{d}}$ participation constraint (Eq. (A.2)) must be satisfied, $\Delta U < 0$ when S is sufficiently great. □

Appendix C. Comparative advantages

Assume that the distribution of domestic costs and the distribution of foreign costs are related by a spread preserving change in mean such that on average a domestic firm has a higher (respectively lower) cost than a foreign firm. Moreover, as in Branco (1994), we assume that there are only two candidates, a domestic and a foreign firm in each industry.

In the case of a comparative-disadvantage domestic industry, let us assume that the cost c_d is uniformly distributed on [1,2] and the cost c_f uniformly distributed on $[1-a, 2-a]$.[10]). The awarding rule defined by a utilitarian *government* is such that

$$p_d^u(c) = 1 \text{ if } c_d \leq \frac{2(1+\lambda)c_f + a(1+\lambda) - 1}{1+2\lambda} \text{ for } c_f \in \left[1 - \frac{a}{2}, \frac{3+4\lambda - a(1+\lambda)}{2(1+\lambda)}\right]$$

$$p_d^u(c) = 1 \ \forall c_d \text{ for } c_f \in \left[\frac{3+4\lambda - a(1+\lambda)}{2(1+\lambda)}, 2-a\right]$$

$$p_f^u(c) = 1 \text{ for } c_f \in \left[1-a, 1-\frac{a}{2}\right] \forall c_d$$

and

$$W^{U-} = W^U + \frac{a(a+a\lambda+1+2\lambda)}{4}$$

$$\bar{S}^{U-} = \bar{S}^U + \frac{a(1+\lambda)(2+a)}{4}$$

$$\bar{U}_d^{U-} = \bar{U}_d^U - \frac{a}{4}$$

where W^U, $\bar{S}^U$, $\bar{U}_d^U$ are, respectively the utilitarian surplus, the consumers' surplus and the domestic firm's profit obtained in the symmetric case.

When *type 1 agents have the majority*, the awarding rule is such that

$$p_d^1(c) = 1 \text{ if } c_d \leq c_f + \frac{a}{2} \text{ for } c_f \in \left[1 - \frac{a}{2}, 2-a\right] \text{ and } c_d \in \left[1, 2 - \frac{a}{2}\right]$$

$$p_d^1(c) = 0 \forall c_f \text{ for } c_d \in \left[2 - \frac{a}{2}, 2\right]$$

$$p_d^1(c) = 0 \forall c_d \text{ for } c_f \in \left[1-a, 1-\frac{a}{2}\right]$$

[10] With $a < (1/(1+\lambda))$. This assumption ensures that $\frac{(3+4\lambda-a(1+\lambda)}{2(1+\lambda)} < 2 - a$.

Thus

$$W_1^{U-} = W_1^U - \frac{a(2\lambda(a^2-6a-12)+3(a^2-6a-4))}{48}$$

$$\bar{S}_1^- = \bar{S}_1 + \frac{(12a+6a^2-a^3)(1+\lambda)}{24}$$

$$\bar{U}_d^{1-} = \bar{U}_d^1 - \frac{a^3-6a^2+12a}{48}$$

When *type 2 agents have the majority*, the awarding rule is such that

$$p_d^2(c) = 1 \text{ if } c_d \leq 2c_f - (1-a) \text{ for } c_f \in \left[1-\frac{a}{2}, \frac{3-a}{2}\right]$$

$$p_d^2(c) = 1 \forall c_d \text{ for } c_f \in \left[\frac{3-a}{2}, 2-a\right]$$

$$p_d^2(c) = 0 \forall c_d \text{ for } c_f \in \left[1-a, 1-\frac{a}{2}\right]$$

and

$$W_2^{U-} = W_2^U + \frac{a(1+a)}{4}$$

$$\bar{S}_2^- = 0$$

$$\bar{U}_d^{2-} = W_2^{U-}$$

Therefore, we have $\Delta W^- = \Delta W + (a/96)(-6a+3a^2+24\lambda+12a\lambda+2a\lambda^2)$ with $\Delta W^- > \Delta W$ for $\lambda > 0.082$.

Let's consider now the case of a *comparative-advantage domestic industry* and assume that the cost c_d is uniformly distributed on [1,2] and the cost c_f uniformly distributed on $[1+a, 2+a]$ with $a < (1/(1+\lambda))$. The awarding rule defined by a *utilitarian* government implies that

$$p_d^u(c) = 1 \text{ if } c_d \in \left[1, \frac{a(1+\lambda)+1+2\lambda}{1+2\lambda}\right] \forall c_f$$

$$p_d^u(c) = 1 \forall c_d \text{ for } c_f \in \left[\frac{3+4\lambda+a(1+2\lambda)}{2(1+\lambda)}, 2+a\right]$$

Then, in a comparative-advantage industry, we have

$$W^{U+} = W^{U} - \frac{a^3(1+\lambda)^2 - 3a^2(1+\lambda)(1+2\lambda) + 3a(1+2\lambda)^2}{12(1+2\lambda)}$$

$$\bar{S}^{U+} = \bar{S}^{U} - \frac{2a^3\lambda(1+\lambda)^3 - 3a^2(1-3\lambda+2\lambda^2)^3 + 6a(1+3\lambda+2\lambda^2)^2}{12(1+2\lambda)^2(1+\lambda)}$$

$$\bar{U}_{\mathrm{d}}^{U+} = \bar{U}_{\mathrm{d}}^{U} + \frac{a}{4} - \frac{a^3(1+\lambda)^2}{12(1+2\lambda)^2}$$

When *type1 agents have the majority*, the awarding rule implies

$$p_{\mathrm{d}}^{1}(c) = 1 \text{ if } c_{\mathrm{d}} \leq c_{\mathrm{f}} - \frac{a}{2} \text{ for } c_{\mathrm{f}} \in \left[1+a, 2+\frac{a}{2}\right] \text{ and } c_{\mathrm{d}} \in \left[1+\frac{a}{2}, 2\right]$$

$$p_{\mathrm{d}}^{1}(c) = 1 \ \forall c_{\mathrm{f}} \text{ for } c_{\mathrm{d}} \in \left[1, 1+\frac{a}{2}\right]$$

$$p_{\mathrm{d}}^{1}(c) = 1 \ \forall c_{\mathrm{d}} \text{ for } c_{\mathrm{f}} \in \left[2+\frac{a}{2}, 2+a\right]$$

and

$$W_{\mathrm{l}}^{U+} = W_{\mathrm{l}}^{U} - \frac{a(2(1+\lambda)(a^2-6a-12)+12-a^2)}{48}$$

$$\bar{S}_{\mathrm{l}}^{+} = \bar{S}_{\mathrm{l}} - \frac{(12a-6a^2+a^3)}{24}$$

$$\bar{U}_{\mathrm{d}}^{1+} = \bar{U}_{\mathrm{d}}^{1} - \frac{a^3-12a}{48}$$

When *type 2 agents have the majority*, the awarding rule is such that

$$p_{\mathrm{d}}^{2}(c) = 1 \text{ if } c_{\mathrm{d}} \leq 2c_{\mathrm{f}} - (1+a) \text{ for } c_{\mathrm{f}} \in \left[1+a, \frac{3+a}{2}\right] \text{ and } c_{\mathrm{d}} \in [1+a, 2]$$

$$p_{\mathrm{d}}^{2}(c) = 1 \forall c_{\mathrm{d}} \text{ for } c_{\mathrm{f}} \in \left[\frac{3+a}{2}, 2+a\right]$$

$$p_{\mathrm{d}}^{2}(c) = 1 \forall c_{\mathrm{f}} \text{ for } c_{\mathrm{d}} \in [1, 1+a]$$

and

$$W_2^{U+} = W_2^U - \frac{3a - 3a^2 + a^3}{12}$$

$$\bar{S}_2^+ = 0$$

$$\bar{U}_{\mathrm{d}}^{2+} = W_2^{U+}$$

Therefore, $\Delta W^+ = \Delta W + (a(-24 - 3a^2 + 4\lambda(-a^2 + 3a - 30) + 4\lambda^2(-a^2 - 6a + 36))/96(1 + 2\lambda)) < \Delta W$.

References

Ballard, C., Shoven, J., Whalley, J., 1985. General equilibrium computations of the marginal welfare costs of taxes in the United States. American Economic Review 75, 128–138.

Boyer, M., Laffont, J.J., 1999. Towards a political theory of the emergence of environmental incentive regulation. Rand Journal of Economics 30, 137–157.

Branco, F., 1994. Favoring domestic firms in procurement contracts. Journal of International Economics 37, 65–80.

Brander, J.A., Spencer, B., 1981. Tariffs and the extraction of foreign monopoly rents under potential entry. Canadian Journal of Economics 14, 371–389.

Hoeckman, B.M., Mavroidis, P.C. (Eds.), 1997. Law and Policy in Public Purchasing: The WTO Agreement on Government Procurement. University of Michigan Press, Ann Arbor, MI.

Laffont, J.J., 1996. Industrial policy and politics. International Journal of Industrial Organization 14, 1–27.

McAfee, P., McMillan, J., 1989. Government procurement and international trade. Journal of International Economics 26, 291–308.

Naegelen, F., Mougeot, M., 1998. Discriminatory public procurement policy and cost reduction incentives. Journal of Public Economics 67, 349–367.

Snow, A., Warren, R.S., 1996. The marginal welfare cost of public funds: theory and estimates. Journal of Public Economics 61, 289–305.

Trionfetti, F., 2000. Discriminatory public procurement and international trade. World Economy 23, 57–76.

Vagstad, S., 1995. Promoting fair competition in public procurement. Journal of Public Economics 58, 283–307.