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Information Asymmetry and the Problem of Transfers in Trade Negotiations and International Agencies

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This paper studies the role of transfers among groups within a country as well as among countries in a two level game of international trade negotiations. We show that in order to realize the intended transfer in the presence of asymmetric information on the states of recipients (and donors), a transfer process uses up additional resources. The difficulty of making transfers renders it less likely that a nation would find it individually rational to participate as a member of an international institution. Costly transfers render the internal and international adjustment difficult, and serve as a barrier to trade liberalization. Costly international transfers harden the resistance against trade liberalization in the (potentially) recipient country and soften it in the (potentially) donor country.

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Information Asymmetry and the Problem of Transfers in Trade Negotiations and International Agencies

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Abstract

This paper studies the role of transfers among groups within a country as well as among countries in a two level game of international trade negotiations. We show that in order to realize the intended transfer in the presence of asymmetric information on the states of recipients (and donors), a transfer process uses up additional resources. The difficulty of making transfers renders it less likely that a nation would find it individually rational to participate as a member of an international institution. Costly transfers render the internal and international adjustment difficult, and serve as a barrier to trade liberalization. Costly international transfers harden the resistance against trade liberalization in the (potentially) recipient country and soften it in the (potentially) donor country.

The theory of common agency (Bernheim and Whinston, 1986) has been successfully applied to analysis of government policies (*e.g.*, Dixit, Grossman and Helpman, 1997) and policy choice of the "euro" currency community (Dixit 2001). Under apparently reasonable assumptions of individual rationality, free transfers and incentive compatibility, the agency serves the objective of principals efficiently. A government, as an agent, will promote the welfare of its interest groups, and the European Central Bank (ECB) will serve its member countries. In most of the applications, it is simply assumed that the transfer payments among principals, as well as between a principal and the agent can be made without cost.

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If this common agency approach is to be extended to international institutions such as the International Monetary Fund (IMF), the World Bank (IBRD), the International Labor Organization (ILO) and the World Trade Organization (WTO) as the agents of nations; such institutions should be expected to serve the international community through production of public goods. In fact, the WTO faced an impasse at Cancun, and the Kyoto Protocol still faces many hurdles, including the United States' reluctance to ratify it. We suggest that this gap between theory and the performance of international organizations is due to insufficient attention to the economics of transfers in the world economy, as well as within domestic economies.

We propose a simple framework that explains why transfer payments involve additional cost under asymmetric information. We illustrate the importance of transfers as well as the incidence of difficulty in transfers in a simple two-level model of trade conflict (Putnam, 1988) involving interest groups, governments, and an international institution. In the model, the governments are agents for domestic pressure groups, and the international institution is a common agent for nations. The difficulty of making transfer payments raises questions about a potential principal in an international common agency, satisfying its participation (i.e., individual rationality) constraint. We believe the participation constraint can only be satisfied if the side payment is determinable.

Coate and Morris (1995), and Dixit and Londregan (1995) demonstrate that political, social and economic costs reduce the frequency of direct transfers. Transfers take more subtle, and therefore more costly forms. For example, outright transfers are suspect for not being clearly distinguishable from bribes, inducing both politicians and voters to prefer more indirect forms of transfers, such as projects and festivities. Lump-sum transfers to compensate for the loss of welfare arising from policy changes will involve additional costs for informational and political reasons. By concentrating on the asymmetry of information between the donors and the recipients of transfers, we construct a simple theoretical framework to show that transfer payments by a government or international organization are costly. When the government does not know exactly how much each constituent loses or how much each constituent gains from a policy action, the government is obliged to over-compensate or under-tax the entire group of constituents in order to maintain its political support. What is politically feasible for the principals often violates the budget constraint of the common agent, rendering liberalization proposals economically infeasible.

The profession is well aware of the importance of transfer payments but is still short of exploring the full implications of the ease or the difficulty of implementing them. While Dixit and Londregan (1995) explore the political economy of transfers, Dixit (1997) sets the problem aside as he proceeds to conventional optimization and distribution analysis in a transfer cost-free environment:

> The (payment) merely acts to transfer income between the parties, for example to make sure that the agent gets enough utility to make it worth

> his while to participate in this activity. The interests of all parties are best served by...(maximizing) the total surplus (Appendix, p. 160).

The quoted remark follows the tradition of identifying optimal production and assuming away the problem of redistribution (c.f. Kemp and Pezanis-Christou, 1999) The following final remark of Dixit, Grossman and Helpman (1997) suggests a new question of comparing the economists' ideal solution of nondistortionary allocation and realistic political equilibrium.

> It is conceivable that on balance the organized interests fare better in the latter (*i.e.*, *price distorted* — authors) regime, so they would unanimously endorse a constitutional rule restricting the government to inefficient redistributive policies. Thus our model suggests a new way by which distorting policies might emerge as a political equilibrium (reprinted in Grossman and Helpman 2002, pp. 41-42).

We hope that the approach we propose in this paper is a step to clarify several transfer issues along the lines they suggest. In Section 2, we present a two-country framework where each country has a decision instrument of tariff on imports. We simplify Putnam's (1988) two-level game into its bare essentials in order to highlight the basic nature of transfers. We first ask the conventional question: what can a common agency (in this case of many nations and an international agency) achieve if international transfers of income as well as domestic transfers can be made free of cost. We then explore the consequences of international or domestic, or both of these types of transfers being blocked for various reasons.

In Section 3, we provide a simple and robust basis for transfers rooted in informational asymmetry. If the government does not know the losses and gains to individual agents in the sector affected by trade liberalization, any lump sum tax and subsidy policy to redistribute income will generate dead weight costs. International transfers carry the same difficulty if the international agency does not have the knowledge about the gains and losses accruing to each nation. The nature of additional costs is like the inevitable additional cost of insurance in the presence of information asymmetry. Informational factors are partially treated, among many other factors, by Dixit and Londregan (1995); but we construct a clear-cut theoretical framework by focusing on a simple but everpresent informational asymmetry that renders the nature of difficulties in making transfers quite transparent.

In Section 4, we return to our two-level game structure and ask what happens to the common agency solutions if transfers among nations and/or transfers within a nation are costly. We assume that a part of transfer payments is lost during the process of transfer as the analysis of Section 3 suggests. Following the famous "iceberg" assumption of international trade theory, we assume that a fraction of transfer payments evaporates during the process. As this fraction rises, the results approach those derived in Section 2 where the transfers are completely blocked. Even lower

transfer costs mitigate the moves towards trade liberalization by national governments and the effectiveness of intervention by international agencies.

1 A Simple Model of Mutual Tariff Determination

Consider an international negotiation on tariff rates between two countries. An import tariff is the only instrument each country has. Partial equilibrium analysis in this setting highlights fundamental features of international economic issues and the role of transfers in trade talks and conflicts.

Let one of the two be a developing country (Country 1) and the other an industrialized country (Country 2). The developing country exports agricultural good A, and the industrialized country exports manufactured good M. The industrialized country imposes tariff $t_a$on good A, and the developing country imposes tariff t_m on good M. Export subsidies are excluded for either good. The bliss levels of the tariffs are a for the agricultural good in the industrialized country and m for the manufactured good in the developing country. Note that the choice of t_m is the only strategy for the developing Country 1, and the choice of t_a is the only strategy for the industrialized Country 2. For simplicity, the economic scales of these countries are assumed to be similar. Figure 1 shows the configuration of the world economy.

The governments of these countries minimize the sum of the losses, relative to the bliss point borne by their two productive sectors. Consumers being individually too small to influence the government, their welfare is not considered for now (this assumption is relaxed later). The national loss function for Country 1 consists of the loss to its manufacturing sector due to imports, and the loss to its agricultural sector arising from the Country 2 tariff on the agricultural good. In other words, the first term represents the damage to the manufacturing sector when the tariff deviates from the optimal level m, and the second term represents the damage to the agricultural sector when the tariff in Country 2 deviates from zero. Let us call the generic international organization of our model the International Trade Organization (ITO).[1] The benefits of joining the ITO, or of joining the club by itself, is ignored. Formally, the loss to Country 1 is written as follows[2]:

$$L_1 = \gamma_{11}(t_m - m)^2 + \gamma_{12}t_a^2, \tag{1}$$

where γ's are the positive weights of the losses to the two sectors.

Similarly, the objective function of the industrialized Country 2, is expressed as the sum of the loss of its manufacturing sector due to the tariff in Country 1 and the loss of its agricultural sector due to the deviation of the tariff on agricultural good

[1]We use the label ITO to distinguish it from the actual WTO. Needless to say, ITO is the organization that was supposed to have been born with the GATT but didn't.

[2]Krugman and Obstfeld (2003, Appendix to Chapter 9) suggest that the welfare loss is expressed by a quadratic form.

from the most desired level a:

$$L_2 = \gamma_{21} t_m^2 + \gamma_{22}(t_a - a)^2. \tag{2}$$

In the simpler case where $\gamma_{11} = \gamma_{22} = 1$,and $\gamma_{12} = \gamma_{21} = \gamma(\rangle\, 0)$:

$$\begin{aligned} L_1 &= (t_m - m)^2 + \gamma t_a^2, & (3)\\ L_2 &= \gamma t_m^2 + (t_a - a)^2. & (4) \end{aligned}$$

In the absence of ITO, Country 1, would want to make t_m equal to m, and wants the Country 2 tariff on the agricultural good to be zero. The latter is beyond the control of Country 1. Similarly, Country 2 would want to make t_a equal to a, and prefer that the tariff rate of Country 1 on the manufactured good is equal to zero. The non-cooperative behavior of the governments yields the Nash equilibrium with the tax instruments taking values $t_m = m$ and $t_a = a$, and the total loss to the world economy is $\gamma(m^2 + a^2)$.

The possibility of reducing this loss creates an opportunity for a global trade organization to perform an agency role. Grossman and Helpman (1995) discuss the situation where an international institution works 'as if' it were a common agency. They state: "While there is no identifiable common agent, the objective function...can be regarded as being that of 'as if' mediator or a surrogate world government" (reprinted in Grossman and Helpman (2002), p. 161).

We take this analogy a step further and consider an international institution as a common agency. One of the reasons Grossman and Helpman do not treat an international trade organization as a common agency may be that substantial transfer payments across countries are difficult to make. Since Dixit (2001) treats the European Central Bank as a common agency, it is only a short step to treat other international organizations as a common agency. (See Hamada, 1998, for such an attempt.) We assume that the international economic organization actually functions as a common agency. Both countries offer incentive schedules to induce the ITO to set desirable bounds for tariff levels to minimize the sum of losses for the two countries. In this section, we abstract from the question of incentive compatibility, that is, the incentive to tell the truth in order to focus on the role of transfers; the two countries are assumed to reveal honestly the marginal benefit and cost of the ITO decision.

Let us suppose that the ITO sets the maximum levels of tariffs for the two goods at T_m and T_a, constraining feasible tariff levels to $t_m \leq T_m$ and $t_a \leq T_a$. The industrial sector of Country 1 would prefer that t_m be set equal to T_m, and t_a set by Country 2 be zero. Similarly, the agricultural sector of Country 2 prefers t_a be set to T_a and the tariff rate of Country 1 on manufactured good be zero.

Even though our main purpose is to introduce costly transfers into the model, we start from the conventional assumption of costless transfers between nations. Suppose the ITO is the common agency of the two countries along the standard analysis by Bernheim and Whinston (1986) and Dixit-Grossman–Helpman (1997). Country 1

signals its intention by offering a schedule $-L_1+Const. = -[(t_m-m)^2+\gamma t_a^2] +Const.$ Similarly, Country 2 signals its intention by offering a schedule $-L_2 + Const. = -[(t_a - a)^2 + \gamma t_m^2] +Const.$ Then, the ITO will set the maximal allowable level of tariffs T_m and T_a by minimizing the cost.

$$L_1 + L_2 = [(T_m - m)^2 + \gamma T_a^2] + \left[\gamma T_m^2 + (T_a - a)^2\right]. \tag{5}$$

We may call it the 'Benthamite' solution by the international agency. Under the assumption of costless transfers, countries do not need to worry about the participation constraints because costless transfers will always generate a situation where individual rationality is satisfied, and the ITO will not break down. Therefore, they will set the tariff levels at permissible maximums, $t_m = T_m$ and $t_a = T_a$. The optimal tariff levels for the ITO are

$$T_m = m/(1+\gamma), \text{ and } T_a = a/(1+\gamma). \tag{6}$$

Country 1, which used to incur the loss of $L_1^0 = \gamma a^2$, will now incur the loss

$$L_1 = \frac{\gamma}{(\gamma+1)^2}(\gamma m^2 + a^2). \tag{7}$$

Country 2, which used to incur the loss of $L_2^0 = \gamma m^2$ will now incur the loss of

$$L_2 = \frac{\gamma}{(\gamma+1)^2}(m^2 + \gamma a^2). \tag{8}$$

The total world loss would be reduced from $\gamma(m^2+a^2)$ to $(\frac{\gamma}{1+\gamma})(m^2+a^2)$ by the ITO decision.

For the above solution to be a genuine common agency solution for participants who are willing to join, it must also satisfy the individual rationality constraint or the participation constraint for each country. For Country 1, the loss must be reduced unless transfer payments are made from Country 2:

$$L_1^0 - L_1 = \gamma a^2 - \frac{\gamma}{(\gamma+1)^2}(\gamma m^2 + a^2) = \frac{\gamma^2}{(\gamma+1)^2}\left[(\gamma+2)a^2 - m^2\right] \geq 0 \tag{9}$$

This inequality does not necessarily hold, however. If m, the initial optimal value, is sufficiently large, it is violated. Unless large enough transfers are made, Country 1 will lose by joining the ITO and complying with its decision unless it receives sufficiently large compensating transfers.

By the same token, the individual rationality constraint for Country 2 is violated if a is sufficiently larger than m .

$$L_2^0 - L_2 = \gamma m^2 - \frac{\gamma}{(\gamma+1)^2}(m^2 + \gamma a^2) = \frac{\gamma^2}{(\gamma+1)^2}\left[(2+\gamma)m^2 - a^2\right] \geq 0 \tag{10}$$

Figure 2A illustrates the case when both conditions (9) and (10) are satisfied, and Figures 2B and 2C show the case where either (9) or (10) is violated respectively. That is, if the degree of agricultural protection is much larger in Country 2, Country 2 will lose by following the decision of the ITO. Needless to say, one or the other or both countries will gain; but both cannot lose simultaneously from ITO's optimal decision.

Let us consider the case when Country 1 loses by joining the club. When $L_1^0 - L_1$, it is difficult for the ITO to function as a mediator, or as a common agent, unless the transfer payment $Y \geq L_1 - L_1^0$ is paid from Country 2 to 1. Whenever one country loses, some transfer payments would be required for the ITO to improve the welfare of the world.

If transfers are costless as usually assumed, the participation constraint does not raise any problem because transfers can compensate the losing party as long as there is any gain from cooperation. If we relax the assumption that governments neglect the welfare of consumers, the objective function of the ITO should include an additional term representing the benefit to consumers. Assume that consumers' surplus is fully counted in both the countries and transfers are costless. In the partial equilibrium setting, when we net out gains and losses related to tariff revenues, the total loss to the world economy is the sum of Harberger's triangles representing the distortion caused by the tariffs (the sum of shaded areas for agricultural product in Figure 3). In this linear case, it is obvious that the sum of the area of triangles is proportional to the square of tariff rate t_m. Similarly, the sum of the social loss due to the agricultural tariff is proportional to the square of tariff rate t_a.

Since the loss triangles are quadratic functions of t_m and t_a, the world trade loss will be expressed as

$$\Gamma = \mu_1 t_m^2 + \mu_2 t_a^2 = \mu_1 T_m^2 + \mu_2 T_a^2 \,, \tag{11}$$

where μ_1 and μ_2 are positive. Thus the free trade ($T_m = T_a = 0$) will achieve the optimal situation loss, $\Gamma = 0$. (These tariff levels will be obtained when the ITO takes full account of the world consumers' welfare even though each country does not take account of their own consumers' welfare.) We state the summary of this paragraph as Proposition I (at least anticipated by Dixit, Grossman, and Helpman 1997):

Proposition I: *If an International Institution (ITO) acts as a Benthamite common agency under the assumption of free transfers, the outcome will be Pareto efficient for the two governments as well as for economic interests groups in the world. If the governments of both countries represent the interest of consumers as well as producers, then under the assumption of free transfer, an international agency will achieve a Pareto optimal situation for the citizens of the world.*

Even with full representation of consumer interest, introduction of the cost of transfer and participation constraints make it difficult to achieve free trade.

1.1 Blocked international transfers

Let us consider the polar case where international transfers are impossible. Given the infrequency of such transfers, this assumption is not unreasonable. We return to the assumption that only the interests of the pressure groups (agriculture and manufacture in our example), are considered, and the interests of consumers are ignored.

If the value of m/a stays in a narrow band around unity so that

$$\sqrt{2+\gamma} > \frac{m}{a} > \sqrt{1/(2+\gamma)} \tag{12}$$

holds, the ITO's Benthamite program to minimize the sum of the world loss is within the region where no international transfers are needed. Therefore, the cost of transfers does not interfere with the functioning of the common agency and the Benthamite solution will prevail.

If the value of m/a is outside (12), namely $\frac{m}{a} > \sqrt{(2+\gamma)}$, then the ITO is obliged to minimize

$$L_1 + L_2 = [(T_m - m)^2 + \gamma T_a^2] + [\gamma T_m^2 + (T_a - a)^2], \tag{13}$$

subject to the constraint that Country 1 is not compensated by transfers. (The other constraint for Country 2, is automatically satisfied with strict inequality.) This situation is illustrated by Figure 2B:

$$L_1^0 - L_1 = \gamma a^2 - [(T_m - m)^2 + \gamma {T_a}^2] \leq 0. \tag{14}$$

We introduce the Kuhn-Tucker form and a multiplier μ.

$$L = [(T_m - m)^2 + \gamma T_a^2] + [\gamma T_m^2 + (T_a - a)^2] + \mu\{[(T_m - m)^2 + \gamma {T_a}^2] - \gamma a^2\}, \tag{15}$$

and obtain the first order conditions

$$T_m = \frac{1+\mu}{1+\gamma+\mu} m, \text{ and } T_a = \frac{1}{1+\gamma+\mu\gamma} a. \tag{16}$$

Comparing equation (6) with (16), and taking account of the mutual slack condition that multiplier μ is nonnegative when the transfer constraint (15) is binding, we can conclude that if the international transfers are blocked the tariff rate in Country 1 is higher than the case when it is free. The tariff rate in Country 2 is lower than the case of free transfer.

We can do the same exercise when $\frac{m}{a} < \sqrt{1/(2+\gamma)}$ and summarize the results as Proposition II:

When international transfers are blocked, and the ratio of a and m is far enough from unity, the ITO will stop short of minimizing the joint loss. The limit for the tariff

rate of the commodity imported by the country for which the participation constraint is binding will be higher than the level without transfer restrictions. The limit for the tariff rate of the commodity imported by the country for which the participation constraint is not binding will be lower than the level without transfer restrictions across countries.

Incidentally, we can draw the contract curve for Country 1 and Country 2. By equating the marginal rate of substitution

$$\frac{t_m - m}{\gamma t_a} = \frac{\gamma t_m}{t_a - a}.$$

Thus the contract curve is an hyperbola that is downward sloping in general, and concave to the origin if $0 < \gamma < 1$:

$$(t_m - m)(t_a - a) = \gamma^2 t_m t_a \tag{17}$$

Under the situation, t_m is equated to T_m and t_a to T_a. The reader can easily verify that (16) satisfies (17). Therefore, a point like D in Figure 2B, the intersection of the individual-rationality curve and the contract curve will be chosen.

1.2 Domestic transfers between sectors blocked

If the domestic transfers between sectors are blocked, the manufacturing sector of a country cannot receive (give) transfers from (to) the agriculture sector of the same country. Since the manufacturing sector in Country 1 insists on the level of tariff m in order to satisfy the participation constraint without transfers, and since the agricultural sector of Country 2 insists on the level of tariff a for the same reason, there is no way for the ITO to intervene. In this case international facility to transfer income between countries is of no avail. The required flows of transfers depicted in Figure 4A will not materialize.

If we consider, somewhat implausibly, that domestic transfers across sectors are blocked, but domestic transfers to and from governments and international transfers are free, it is still possible to attain the first best solution (as shown in Figure 4B). A sector that gains from trade liberalization could transfer to its own government, the government could transfer either directly to the other government (or indirectly through ITO) under the assumption of international transferability, and finally the other government can transfer to the sector that would suffer from lower tariff in the absence of transfer. More concretely, the manufacturing sector in Country 1 cannot pay its own agricultural sector, but it can contribute funds to the government of Country 1 and, through the government of Country 2, influence the manufactured good tariff in Country 2. By this device one can attain the first best solution. [3]

Proposition III:

[3] This raises the possibility of cross-national lobbying of the government in one country by the sectors of another country. See M. Endoh (2005).

If cross-sector transfers of funds are blocked within each country, then there is no possibility of improvement by the intervention of the ITO. Under a less plausible assumption of free transfers of funds to a sector in the other countries, the ITO can still achieve the best outcome.

2 A Simple Derivation of the Cost of Transfer

Our model departs from the standard common agency literature and from the trade war literature in an important way, and analyzes the difficulty of income transfers. We explicitly consider in this section the cost of transfers among pressure groups and among countries. We present a simple justification for the claim that transfers involve additional costs. We focus on the political-economy element, among many other reasons, to evaluate the cost or the dead-weight loss incurred in the transfer process. We base our arguments on the common observation that the government cannot know the magnitude of losses and gains to various parties (and ITO cannot know of the losses and gains to various member countries). Informational features were implicitly treated in Dixit and Londregan (1995), but their implications were not fully exploited because they were combined with many other features of their model. We extract a single factor concerning the asymmetry of information between individual constituencies and the central authority or politicians in their model and develop it into the cornerstone of our formulation. In this setting the central authority (or politicians) have limited information on the economic state of each member of the constituency, in contrast to the assumption in Coate and Morris (1995) that members of constituency have only limited knowledge of the politician's intentions.

It is natural to assume that each group within a country consists of many individual economic agents. Even in international organizations, the number of nations can be in scores if not hundreds. Therefore, we may reasonably assume that the national government (or the international organization) does not know the magnitude of the loss from trade negotiation incurred by each individual member of a pressure group (or each nation). Neither does the government (or the international organization) know the magnitude of the gain to each individual of a pressure group (or a nation). By assuming such asymmetry of information between government and constituents who will receive or pay a part of the lump-sum transfer, we obtain the following seldom-noticed results.

Let us start from a simple example illustrated in Figure 5. Suppose there are three manufacturers in the (developing) Country 1. Suppose under the negotiated deal price drops from $P_m^o \rightarrow P_m^1$ and supply quantity drops from 3 unit to 0 unit. The total loss of surplus to the industry is the sum of loss to each manufacturer:

$$X = (P_m^0 A_1 GH) + (A_1 A_2 EF) + (A_2 A_3 BC). \tag{18}$$

How does the government divide X among the three manufacturers if it does not have

their private information on cost or the shape of private supply functions? Consider two possibilities:

(1) Fix the price of manufactured goods at P_m^0 and restore the status before the reduction of tariffs. Consequences include price administration cost, black market and loss of opportunities to reallocate resources away from manufacturing. No producer is put out of business.

(2) Raise a compensation fund for the sector and distribute it among the manufacturers in proportion to their pre-intervention production that is equal to amount $P_m^0 S$. Consequences of this solution include unhappy Producers 1 and 2 because they are made worse off, and a happy Producer 3 (gets more than his loss through the transfer). In an election, the government would be voted out 2 to 1, if manufacturers are its only constituency.

One can repeat the same exercise for consumers who gain from the tariff reduction. Additional complications arise because each consumer is not necessarily sensitive to small per capita changes in taxes and subsidies.

This point is reinforced by studying the case where the supply curve of an import competing industry is linear. In our example, the developing Country 1 has two sectors, agriculture and manufacture. Initially, suppose that the manufactured good is protected at the tariff rate m which is optimum for the sector. In Figure 6A, under the tariff rate m, the price is p_m^0 and the manufacturers in this country enjoy the producers' surplus $P_m^0 CN$. Suppose by agreement, the tariff rate on manufactured goods is reduced, and the price level drops to $p_m^1 < p_m^0$. Then the producer surplus is reduced to area $P_m^1 AN$. The loss to the producer of manufactures in Country 1 is the area of echelon $P_m^0 P_m^1 AC$.

On the other hand, suppose Country 1 gains from the tariff reduction for the agricultural good in the industrialized Country 2. Accordingly, assume that the price of the agricultural good increases from p_a^0 to p_a^1 ($p_a^0 < p_a^1$).Then, in Figure 6B, the producers' surplus will be increased from area $P_a^0 MA'$ in Figure 6B to area $P_a^1 MC'$. The gain to the export of agriculture good in Country 1 is thus the area of echelon $P_a^0 P_a^1 A'C'$.

The conventional argument is that transfers resolve the distributional conflict between the agriculture and the manufacturing sectors as long as the echelon of gain $P_a^0 P_a^1 A'C'$ in Figure 6B is larger than the echelon of loss $P_m^0 P_m^1 AC$. We claim in this paper, considering the political-economy of transfers under asymmetric information, the government must spend considerably more than the echelon $P_m^0 P_m^1 AC$, while it is able to collect much less than echelon $P_a^0 P_a^1 A'C'$.

Let us assume for simplicity that the government is a common agency that is motivated by the contributions that reveal true costs to groups, but that the incumbent government is determined by the majority voting rule. Then, evenly dividing the total subsidy of $P_m^0 P_m^1 AC$ among the members of the suffering manufacturing industry will leave some individuals in this industry with a net loss. If the industry casts votes to elect the incumbent government, the government must spend as lump-sum

subsidies more than the amount of $P_m^0 P_m^1 AC$. In other words, if the government gives subsidies of HP_m^0 per unit in Figure 6A, then the voters along OV in the horizontal axis will be still dissatisfied in spite of the government having spent $HP_m^0 CD$ in subsidies. In order to secure the support of all members of the industry, the government will have to increase its subsidy to the amount of tariff $(P_m^0 - P_m^1)$, and spend a total of $P_m^0 P_m^1 EC$, an amount that exceeds the total industry loss by the area of triangle CAE. This will leave the government to finance trade liberalization with a deficit of CAE which will end up in the pockets of the marginal manufacturers AE.

Similarly, in Figure 6B, if the government imposes a uniform tax on the members of the A industry to raise the total amount $P_a^0 P_a^1 A'C'$ by taxing $P_a^1 G$, again farmers belonging to WW' will be dissatisfied. To secure the votes of all the farmers, the tax will have to be reduced to zero and nothing can be collected.

Conventional explanations for the difficulty of transfer include self-interst, asymmetry of information about the reliability of the intermediary of transfer process. For example, politicians may not be trusted to transfer funds honestly (Coate and Morris, 1995). We add to these conventional explanations a third argument: the asymmetric information about the individual gains and losses to participants. Note the following features related to information asymmetry and the cost of transfers.

First, the loss from transferring income will be greatest when the recipient industry ceases to produce, and, similarly, when the compensating industry begins to produce. The loss triangle C (e.g. CAE in Figure 6A) will be the largest. A corollary to this is the fact that the same amount of tariff reduction will incur a smaller deadweight loss due to asymmetry of information if it is processed in two or more steps. Gradual tariff reduction can be less costly.

Second, when the incumbent government is strong and stable, this type of transfer cost can be small because the government can afford to lose votes in particular sectors. Government can give just enough subsidy (or gather just enough tax) so the net effect of liberalization will leave the majority to support the action. When the incumbent government is politically weak, it would be difficult for the government to yield tariff concessions.

We may summarize our findings as

Proposition IV:

When the government does not know the consequences of trade liberalization for individual constituents, the amount it can collect is smaller and the amount it must pay is larger than would be under symmetric information. Further, the magnitude of liberalization increases this gap and destabilizes political support for government.

In addition, one can prove the following

Proposition V:

If the supply curve (or the demand curve) is linear, more than half of the producers (consumers) will be dissatisfied with the transfer of the average loss per unit of production (consumption).

In Figure 7A, suppose that the initial price level is P_m^0 and it was reduced to P_m^1

such that the supply quantity is reduced by proportion θ. That is, the supply was reduced from unity (OV is normalized to 1) to $(1-\theta)$. Denote the slope of the linear supply curve as $1/b$ so that $P_m^0P_m^1 = b\theta$ and $P_m^1N = b(1-\theta)$. Accordingly, distributing transfers by averaging out the burden of the total area of echelon $P_m^0P_m^1AC$ so that every producer receives P_m^0H will leave the producers of OV' dissatisfied. (It is easy to see that in order to cancel the two shaded areas, $CD = \frac{1}{2}b\theta(2-\theta)$, $UV' = UV - V'V = \theta - \frac{1}{2}\theta(2-\theta)$.) Therefore, the proportion of dissatisfied producers is $OV' = OU + UV' = (1-\theta) + \theta - \frac{1}{2}\theta(2-\theta) = \frac{1}{2} + \frac{1}{2}(1-\theta)^2 \geq \frac{1}{2}$. The proportion of dissatisfied producers approaches 100 percent as the magnitude of tariff cut approaches zero.

Of course, this result is due to the linearity assumption of the supply curve. Figure 7B illustrates two cases. In case (a) only a small proportion of producers are properly compensated and the government loses the support of the majority. In case (b) only a small proportion of producers suffer while the others receive compensation in excess of their losses, and the government retains popular support.[4]

The abovementioned difficulty of making transfers applies to domestic as well as to international contexts. Given the problem of identifying the cost structures across countries it is hardly surprising that the incidence of international transfers is limited. This can be seen by comparing the magnitude of international transfers such as foreign aid relative to GDP, with the magnitude of money involved in domestic transfers, such as social security, food stamps, medicaid, and the Small Business Administration. It is reasonable to assume that the capability of international institutions to redistribute income is quite limited. In spite of Proposition I above, even the governments that take account of the full benefits and costs to consumers will find it difficult to achieve the Pareto efficient resource allocation in the presence of costly transfers.

Some readers may wonder why our theory is built on the simple Hayekian observation that the information in the economy is dispersed and that the benefit of a consumer or the cost of a producer is not known to others. We regard this as a strength rather than a weakness. Rothschild and Stiglitz (1976) built their theory of insurance on the assumption of information asymmetry; we use the same assumption to build a theory of transfers. The simpler the logic, the more transparent and potentially persuasive could the theory be. Difficulties of assessing benefits and costs lie at the heart of many important economic and legal problems. Formidable amounts of resources and human energy are spent on the verification of costs which are not

[4]The size of budgetary subsidy necessary to retain a majority support for liberalization depends on the actual shape of the supply function. The hypothetical assumption that politicians have to retain the support of a majority in this particular industry is used here to help understand the issue. As an illustrative example, consider supply curves (a) and (b) in Figure 7C. Let M_a and M_b be the points on the respective supply curves corresponding to quantity $S/2 - \varepsilon$ where ε is small. With supply (a), per unit subsidy of $P_0R_a = QR_a^{'}$ should satisfy the majority, although the total subsidy will exceed the total losses of the producers by area $QM_aR_a^{'}$ (shaded by horizontal lines). Similarly, with supply (b), a per unit subsidy of P_0R_b should satisfy the majority, though the total subsidy will exceed the total losses of the producers by area $QM_bR_a^{'}$ (shaded by diagonal lines). The excess amount paid to producers is small with supply (b), but it is always non-negative.

common knowledge in the legislation as well as in disputes on predatory pricing and anti-dumping cases. If the verification issues discussed in this paper were easy to resolve, there would be only a few disputes on domestic predatory pricing or international dumping. Antidumping legislation and disputes suggest that establishing consensus on cost structure across sectors and across countries cannot be taken for granted.

3 The Effect of the Difficulty of Transfers on International Negotiation

3.1 (i) Difficulties in the transfers across countries.

Let us begin with the need for, as well as the difficulty of, international transfers. If the optimal reactions expressed by equations (7) and (8) above satisfy the individual rationality conditions, individuals will participate without any transfers. Even if the participation constraints are violated, as long as the transfer payments can be made without any additional costs, reforms can be supported by the appropriate transfers. When the optimal reactions do not satisfy the participation constraints, the cost of transfers will affect the outcome of the common agency problem.

Suppose that international transfers require a fraction $\beta^*(0 < \beta^* < 1)$ of additional resource as transaction cost. $\beta^* Y$ evaporates in the process of transferring Y. We have explained the reason for this cost in Section 2.

Suppose that inequality (7) is violated and the developing Country 1 needs to receive the transfer payments. By construction both countries cannot simultaneously require transfer payments. The ITO must minimize the following cost that includes the transaction cost:

$$\Gamma = [(T_m - m)^2 + \gamma T_a^2] + [\gamma T_m^2 + (T_a - a)^2] + \beta^* C_{21} + \beta^* C_{12} \tag{19}$$

where $C_{21} = \{[(T_m - m)^2 + \gamma T_a^2] - \gamma a^2\}$ if $\{[(T_m - m)^2 + \gamma T_a^2] - \gamma a^2\} \geq 0$, and

$$= 0, \text{otherwise.}$$

$C_{12} = \{[\gamma(T_m - m)^2 + T_a^2] - \gamma m^2\}$ if $\{[\gamma(T_m - m)^2 + T_a^2] - \gamma m^2\} \geq 0$, and

$$= 0, \text{ otherwise.}$$

Note that $C_{21}$and C_{12} can both be zero, in which case the internal minimization of (3) does not interfere with the participation constraints, and the standard analysis without consideration of transfer costs remains valid (cf. Figure 2A). C_{21} and C_{12} cannot both be simultaneously positive. Because the total cost without transfer costs is already minimized over the initial conditions, at least one party is better off after

the ITO intervention and without transfers. An interesting case is when either C_{21} or C_{12} is non-negative.

Let us start with the case when C_{21} is positive, and the developing country needs to receive transfers. Then the ITO determines T_m and T_a in such a way as to minimize

$$\Gamma = [(T_m - m)^2 + \gamma T_a^2] + [\gamma T_m^2 + (T_a - a)^2] + \beta^* \{[(T_m - m)^2 + \gamma T_a^2] - \gamma a^2\}. \quad (20)$$

Minimization is achieved when

$$T_m = \frac{1+\beta^*}{1+\gamma+\beta^*} m, \text{ and } T_a = \frac{1}{1+\gamma+\beta^*\gamma} a. \quad (21)$$

As β^* approaches unity and international transfers become more difficult, T_a is left at a value a little lower than a, and T_m is left at a value a little higher than m. The ITO can do little to promote freer trade. In Figure 8, the iso-utility curves of Countries 1 and 2 are drawn as ellipses centered on $(m, 0)$ and $(0, a)$ respectively. Assuming that the initial position is (m, a), both the isoquants pass through (m, a). The ITO chooses a point C in the absence of transfer costs. In our formulation, C_1 is on the line connecting the origin to (m, a). In Figure 8, point C corresponds to equation (4) without the need for transfers. E is a point that needs transfers, taking into account the opportunity cost of moving from C and the cost of transfers. As in the case of Proposition II, (21) lies on the contract curve.[5]

Proposition VI:

When international transfers are costly, and the ratio of a and m is far from unity, the ITO will stop short of minimizing the joint loss. Compared to the case of costless transfers, ITO will set a higher upper tariff limit on imports to the country under a binding participation condition (i.e. the recipient of transfers). The upper limit on imports to the other country (i.e. the donor of transfers) will be lower than the case corresponding to costless transfers.

3.2 (ii) Difficulties in transfers across sectors within countries.

Difficulties in transferring income from one interest group to another within a country create problems similar to those associated with transferring income from one country to another. Suppose the manufacturing sector in Country 1 and the agriculture sector in Country 2 are the two groups that are affected unfavorably by the ITO decisions. Our analysis of information asymmetry in the process of transfers extends to the reason for dead weight loss associated with transfers.

[5] In its simplest formulation, the Nash bargaining solution falls on the contract curve that is located on the 45 degree line from (m, a) with the assumption $\gamma_{12} = \gamma_{21} = \gamma$ within the no-transfer required zone, and there is no problem of transfers. Of course, the Nash Bargaining Solution does not necessarily maximize the sum of benefits and is dominated in most cases by the common agency solution when transfers are costless.

Assume that fraction β_1 of the transfer within Country 1 and fraction β_2 of the transfer within Country 2 are needed as additional resources to keep the balance in political economy. The conditional non-linear programming can be reduced to a fairly simple problem of minimizing the cost. For example, if manufacturers in Country 1 and farmers in Country 2 are to be compensated by transfers, the ITO will end up choosing T_m and T_a to minimize

$$\Gamma = [(T_m - m)^2 + \gamma T_a^2] + [\gamma T_m^2 + (T_a - a)^2] + \beta_1 (T_m - m)^2 + \beta_2 (T_a - a)^2, \quad (22)$$

which gives the optimal solutions for the ITO:

$$T_m = \frac{1 + \beta_1}{1 + \gamma + \beta_1} m, \text{ and } T_a = \frac{1 + \beta_2}{1 + \gamma + \beta_2} a. \quad (23)$$

The degree of resistance to reduce tariffs is related to the difficulty of transfers within a country. Then one can state

Proposition VII:

Cost of transfers across sectors of a country raises the upper limits of T_m and T_a. The greater the difficulty of transfer to a certain sector, closer does the tariff of the sector remain to the initial (optimal to the sector) tariff level.

One could interpret this as an example of the generalized nature of the two-level game (Putnam, 1998). When it is more difficult to make structural adjustments (transfers) in a country, it can retain a higher tariff on import and exploit the other country. Not surprisingly, in international negations, every government has incentives to exaggerate its domestic hurdles and opposition to liberalization.

3.3 When Both International and Domestic Transfers are costly

Instead of going into the general formulation, let us illustrate by an example the minimization problem of taking into account both the cost of domestic transfer and the cost of international transfer. The ITO's choice of tariff bounds must overcome the difficulties in international as well as domestic transfers. Country 1 needs to receive international transfers (with iceberg cost ratio β^*), the manufacturing sector in Country 1 needs to receive domestic transfers (with cost ratio β_1) from its agricultural sector, and the agricultural sector in Country 2 needs to receive domestic transfers from its manufacturing sector (with iceberg cost ratio β_2). Then the optimal upper limits of tariffs that the ITO imposes will become:

$$T_m = \frac{1 + \beta_1 + \beta^*}{1 + \gamma + \beta_1 + \beta^*} m, \text{ and } T_a = \frac{1 + \beta_2}{1 + \gamma + \beta_2 + \beta^* \gamma} a \quad (24)$$

Interpretations of these results are similar to those in previous sections.

4 Concluding Remarks

Using partial equilibrium analysis, we attempt to extend the logic of common agency to international institutions. We find that an analysis of mechanisms for implementing transfer payments is essential for understanding the functioning of an international organization. Such analylsis is critical if we consider the individual rationality constraint. The cost involved in making transfers can be derived in a simple setting where the government does not know the gains and losses to individual constituents caused by its trade or other policy decisions.

Our trade model of tariff determination is simplified in the number of sectors as well as the availability of policy instruments, and depends on the partial equilibrium framework. Simplicity, however, allows us to demonstrate the basic logic associated with transfers in the model of an international agency. Satisfaction of participation constraints are closely related to the difficulty of making transfers. The interaction between the transfer possibilities across nations and those within a nation presents many interesting issues.[6] Saijo and Yamoto (1999) open a new dimension in the analysis of international negotiations by considering the relationship between incentive compatibility of supplying public goods and participation constraints, although it is yet to be seen how our approach might be related to each other.

The possible effect of improving the incentives under information asymmetry is studied by Karla Hoff (1994), and Hoff and Andrew Lyon (1995). They are among the few who carefully deal with the interaction between redistribution theory and information asymmetry. They show that even efficiency distorting transfers may enhance the production efficiency by alleviating the incentive compatibility constraint. We do not deny those positive aspects of transfers. The main message of this paper is, however, that under asymmetric information a transfer itself may impose on us, through the political-economy process, a substantial burden in addition to the amount of the intended transfer. To borrow the metaphor from Hoff and Lyon, the bucket may not be leaking but deciding exactly where to drip is a problem.

Several policy issues arise from our analysis. The reason for the possible impasse in an international negotiation can be analyzed by considering the ease or the difficulty of transferring income in developing countries. Even if the total pie is larger under a free trade regime administered by an international institution like the WTO, many developing countries may be frustrated if they do not get an adequate share of the pie. In the analysis of these matters, one has to take into account the public good benefit of creating common trade rules. The participation of countries creates a kind of public goods that are not considered in this paper. If we consider this public good nature of participation, we can understand why the threat of exit by a group of

[6] The similar properties will be generalized, we conjecture, to a general equilibrium model of trade talks. Grossman and Helpman (1995), for example, analyse the case where a combination of tariff-rate movements can achieve the same effects as transfers do.

countries can be effective.[7]

By the same token, the debate between Samuelson (2004) and Bhagwati-Panagaria-Srinivasan (2004) is related to the situation where the total pie of the world economy increases by technical progress in developing countries but the welfare of developed countries is cut. If there is a will as well as a way to implement transfers from countries that gain to the losing countries, technical progress is always a blessing. It is often hard to find the will to make contributions which are viewed as a matter of charity. The main point of this paper is that implementing transfers is not as easy as we often assume. Hamada and Sunder (2005) contrast attitudes of economists, who are usually enthusiastic about the free trade doctrine, and politicians who are mostly reluctant to accept the doctrine. They present evidence from laboratory experiments on the difficulty of implementing potential Pareto improvements through voluntary transfer payments.

The gains and losses to individual constituents are inherently private and cannot be reliably communicated to others or to a central authority. Hayek (1945) emphatically pointed to this fundamental problem of dispersed information in society about the time Hicks (1939) and Kaldor (1939) put forward their welfare criterion:

> ...the "data" from which the economic calculus starts are never for the whole society "given" to a single mind which could work out the implications, and can never be so given.
>
> The particular character of the problem of a rational economic order is determined precisely by the fact that the knowledge of the circumstances of which we must make use never exists in concentrated or integrated form, but solely as the dispersed bits of incomplete and frequently contradictory knowledge which all the separate individuals possess. The ecoomic problem of society is thus not merely a problem of how to allocate "given" resources–if "given" is taken to mean given to a single mind which deliberately solves the problem set by these "data." It is rather a problem of how to secure the best use of resources known to any of the members of society, for ends whose relative importance only these individuals know. Or, to put it briefly, it is a problem of the utilization of knowledge not given to any one in its totality (pp. 519-520).

Markets can have the remarkable power of inducing individuals to reveal information which is private to them, as each of them pursues its self-interest under conflicting motives to cooperate as well as compete, all at once. Hayek (1945) argued and Plott and Sunder (1988) present evidence that under appropriate conditions, the sum of the information in private hands can appear as knowledge common to all participants in

[7]In the experience after the Cancun meeting of the WTO, for example, the formation of the Group of 20 of middle-income countries led by Brazil, India and others seems to have worked as a useful threat to open the agricultural market in advanced countries

a market. In implementing a scheme of transfers, competitive motives may frustrate the attempts to achieve the Hayekian miracle of information aggregation.

Without questioning the logic of advocating free trade or the logic of common agency, we question the validity and consequences of assuming the automatic and effortless transfer payments among individuals, groups and nations. It is not our intention to recommend that policy makers ignore distributional justice, or to oppose transfer of wealth from the rich to the poor driven by humanitarian motives. We only point out the plain fact that, under information asymmetry, it is difficult and/or costly to accomplish intended transfers. This will probably necessitate us to change our views on the functioning of international organizations.

We hope that our analysis has shown the importance of studying transfer processes in the international as well as the domestic economy in general. Rather than abstracting away from transfer issues by casually assuming the possibility of free transfers, we need to explore the causes and the consequences of costly transfers. We need to examine the intrinsic relationship between the difficulty of transfers and asymmetric information.

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Figure 1

International Tariff Interaction

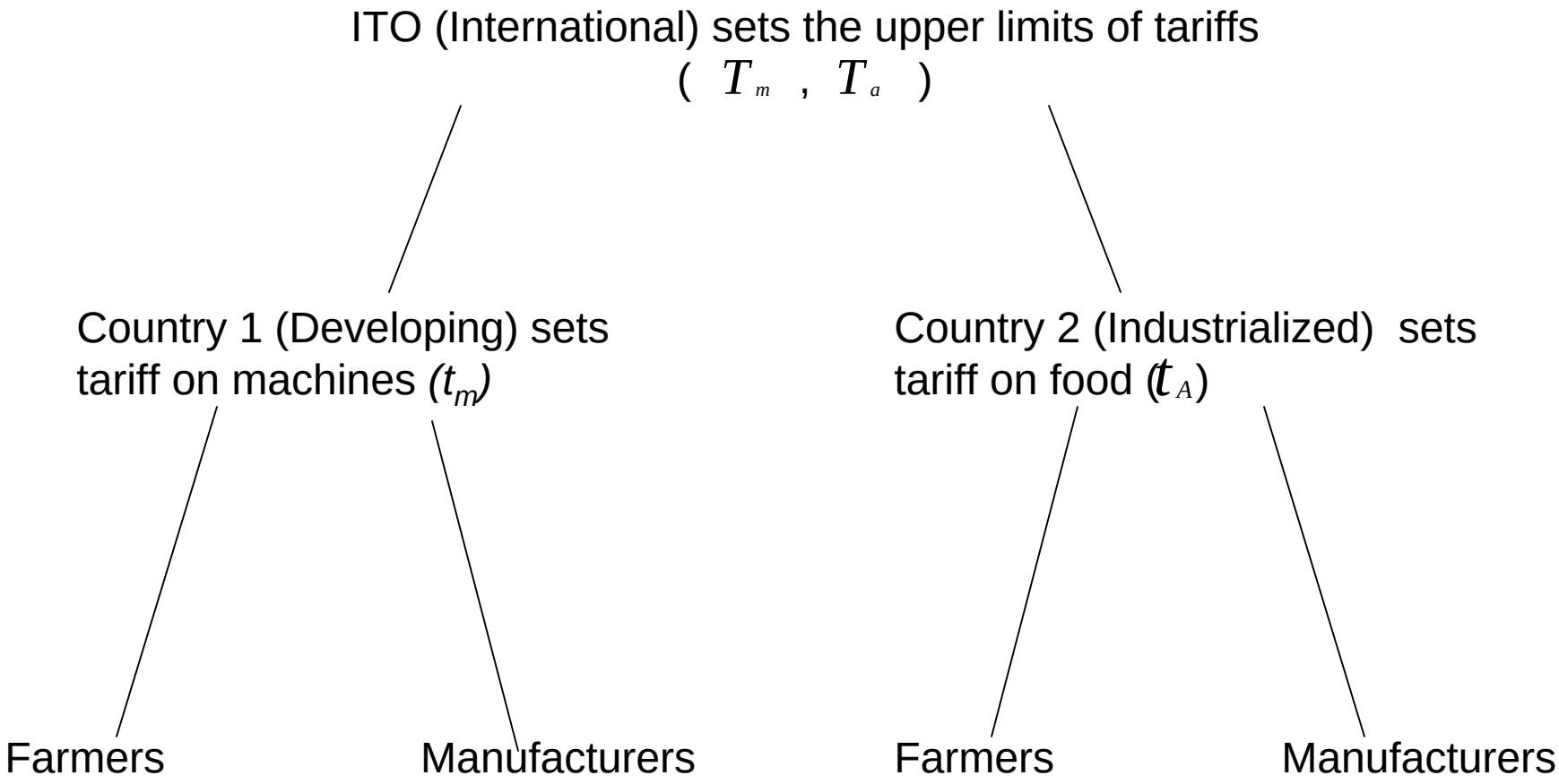


Figure 2A

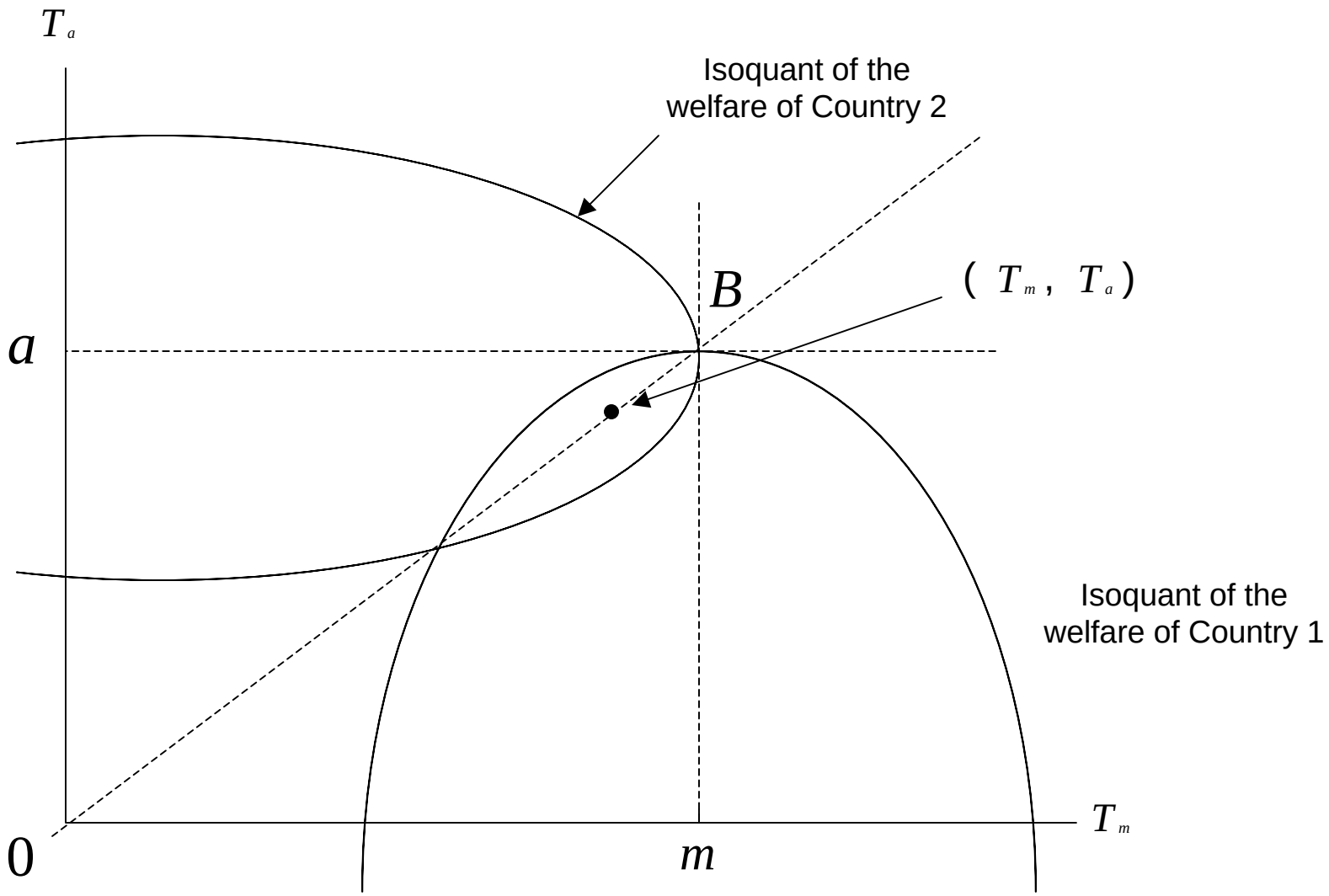

T_a
Isoquant of the
welfare of Country 2
B
(T_m, T_a)
a
Isoquant of the
welfare of Country 1
T_m
0
m

Figure 2B

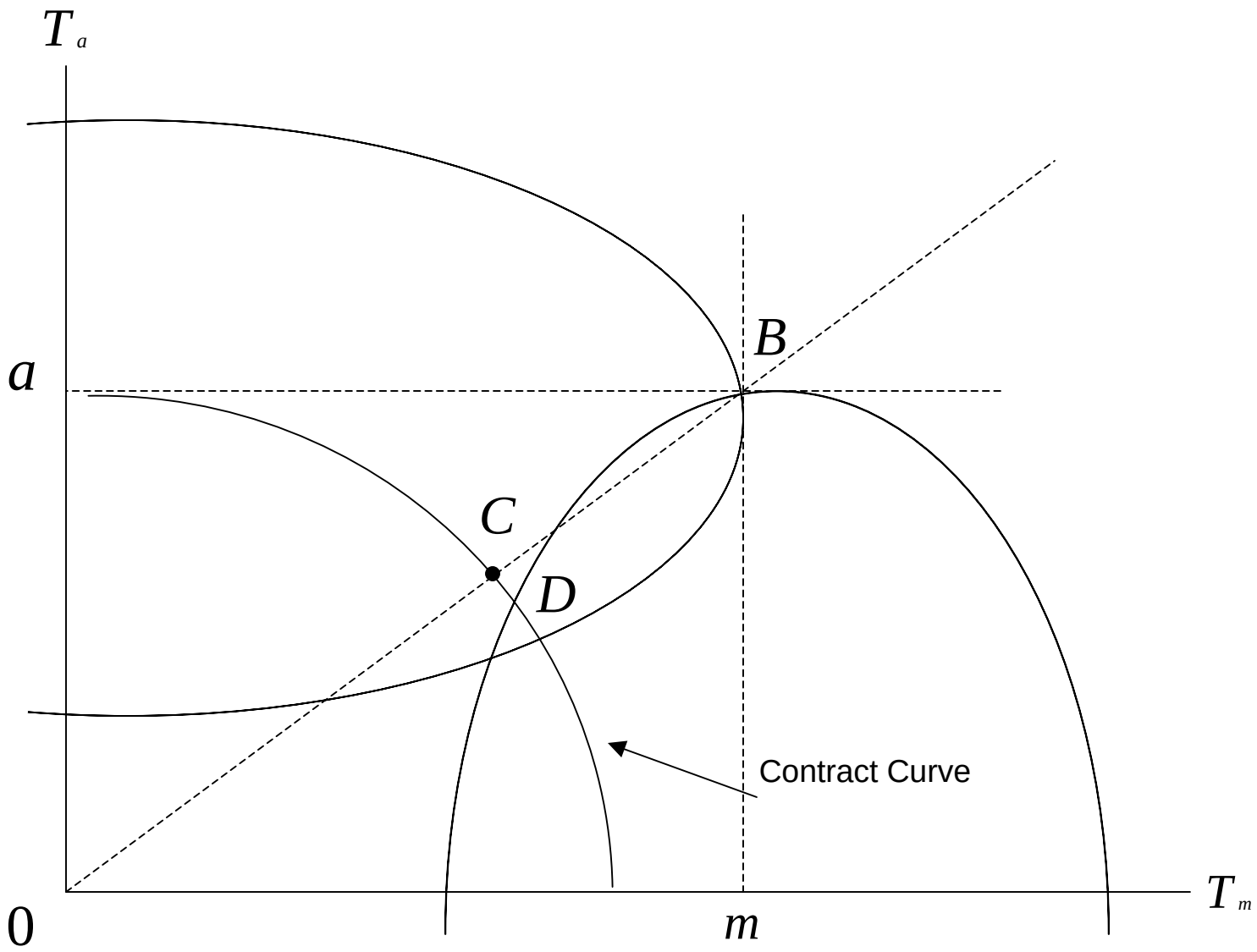


Figure 2C

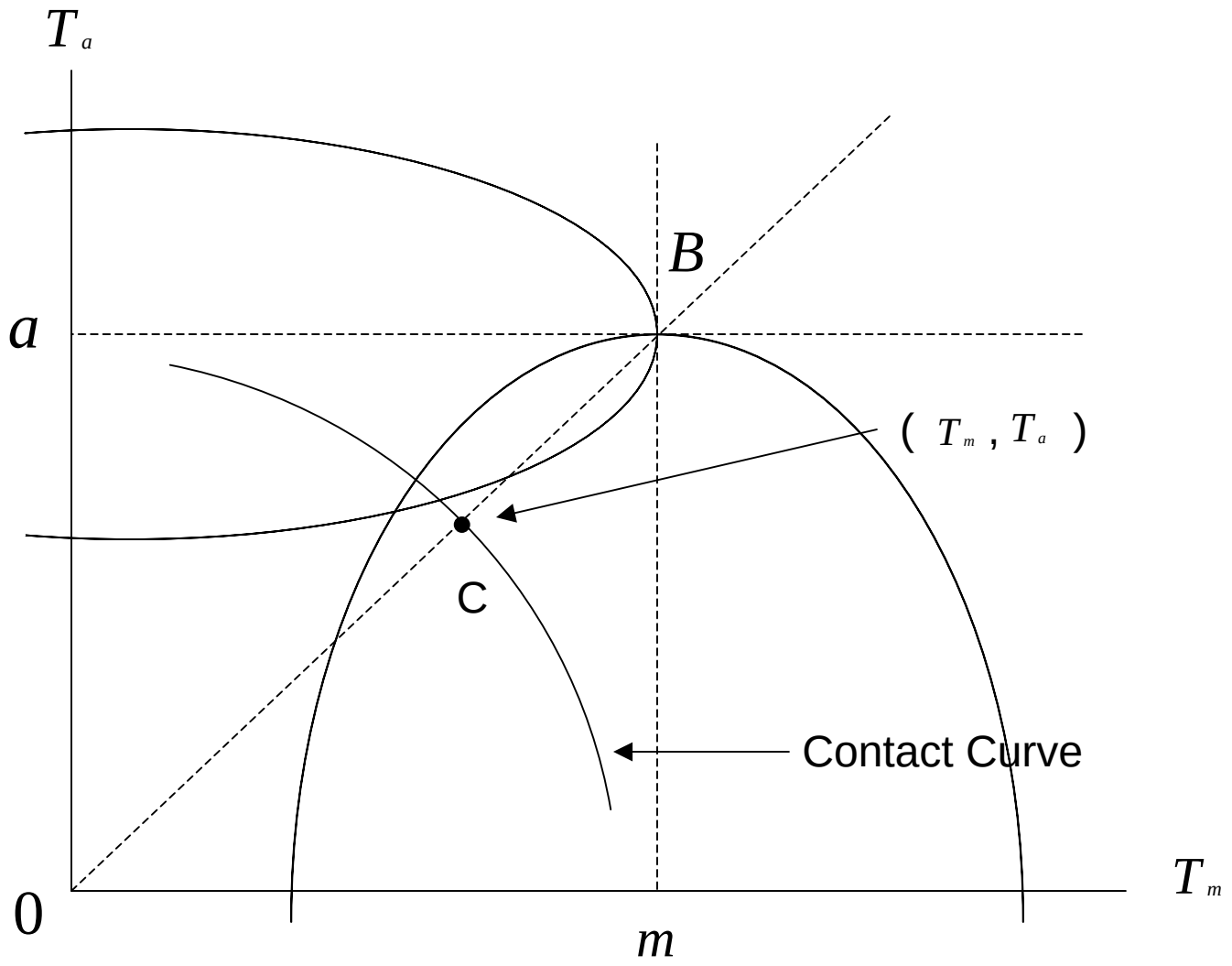


Figure 3

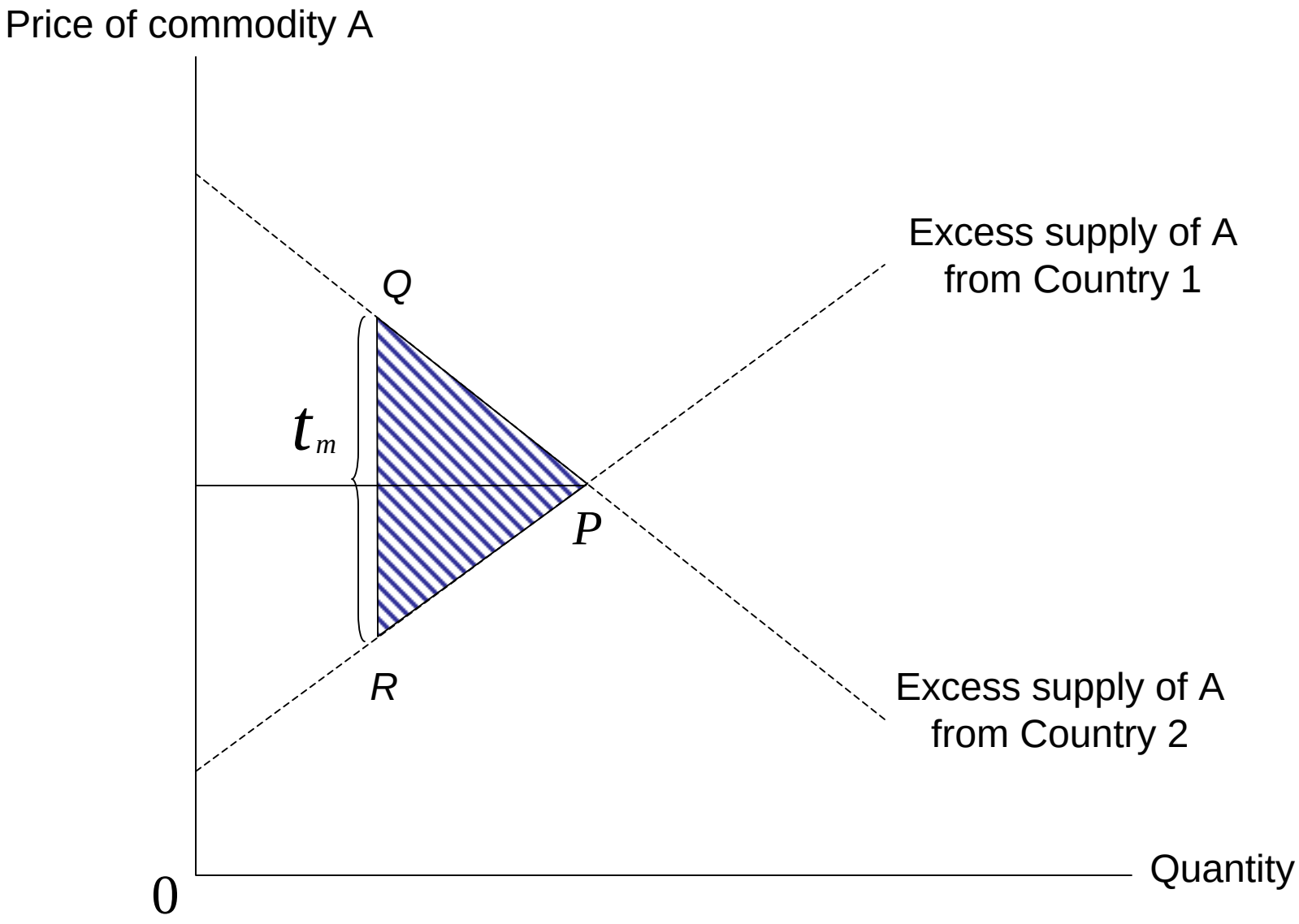

Price of commodity A
Excess supply of A
from Country 1
Q
t_m
P
R
Excess supply of A
from Country 2
Quantity
0

Figure 4A

International Tariff Interaction

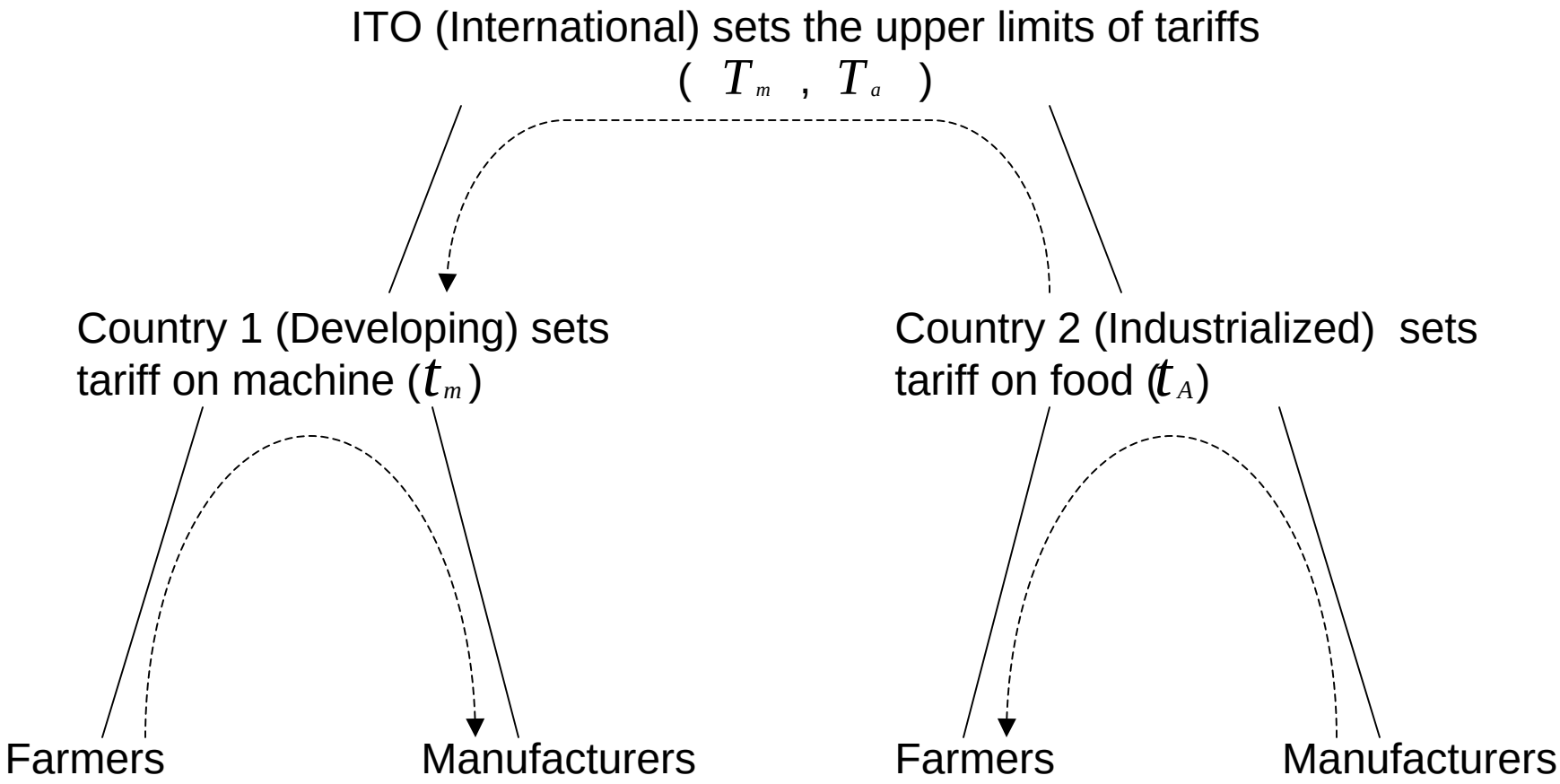


Figure 4B

International Tariff Interaction

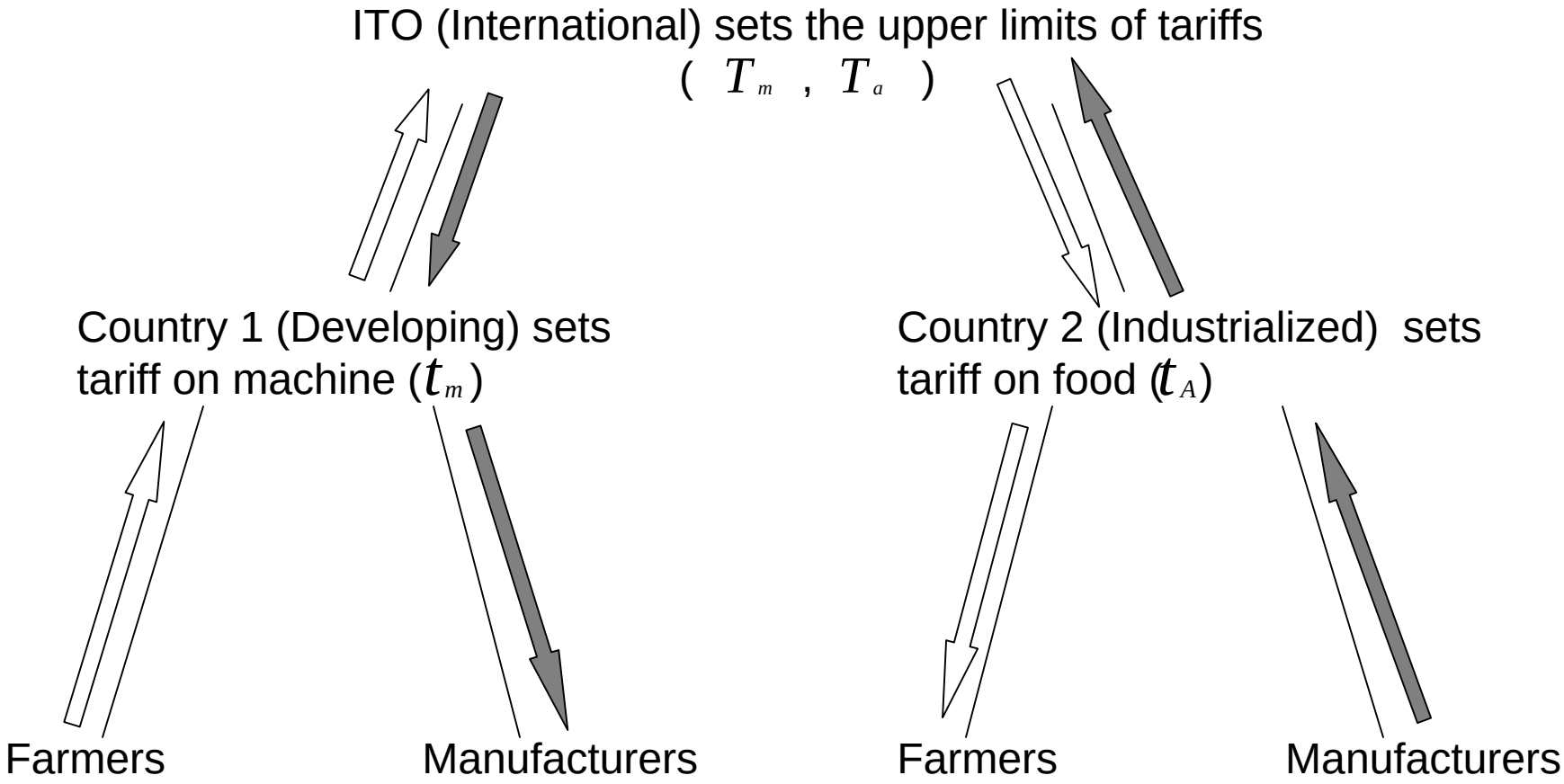


Figure 5

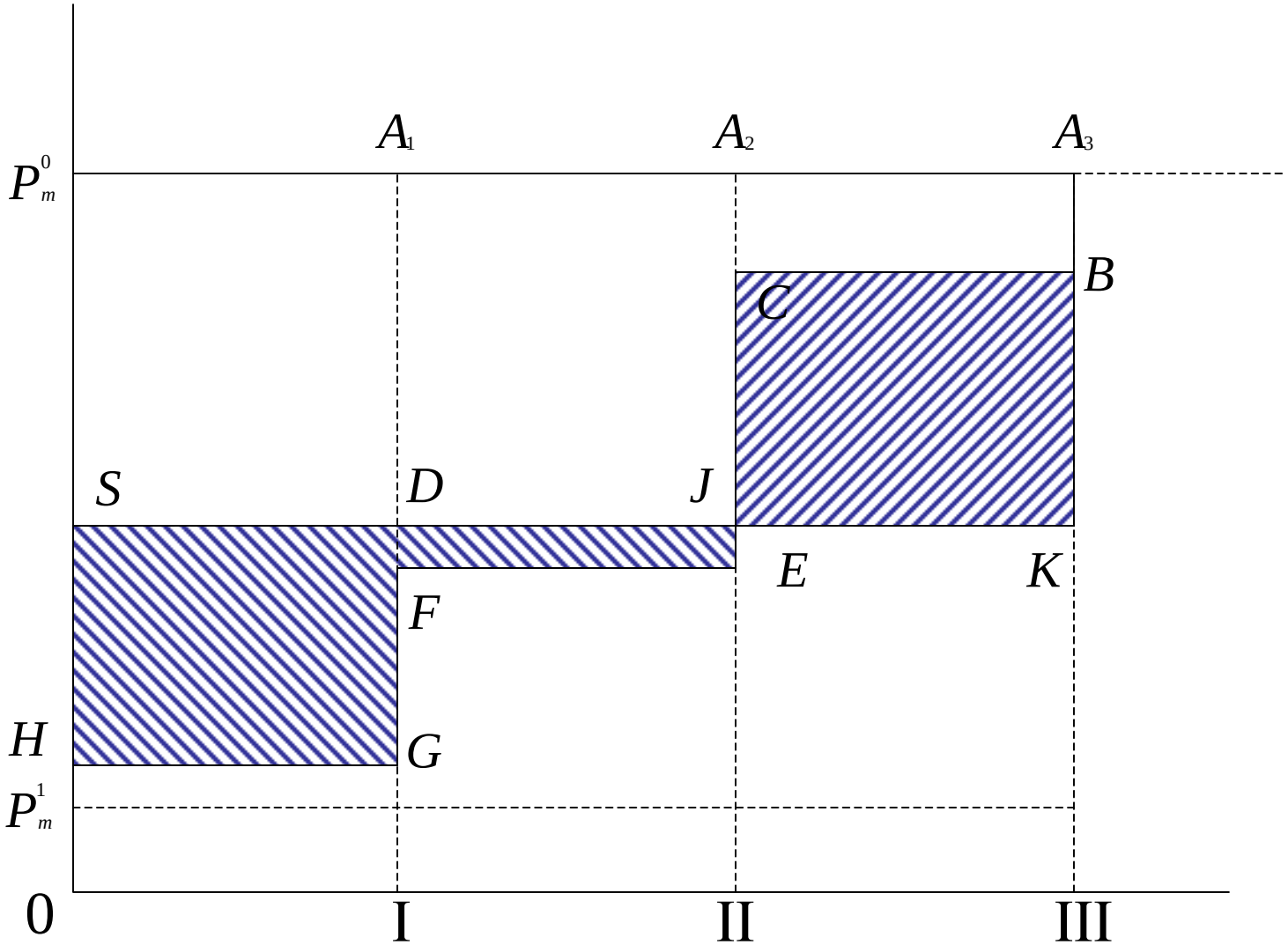
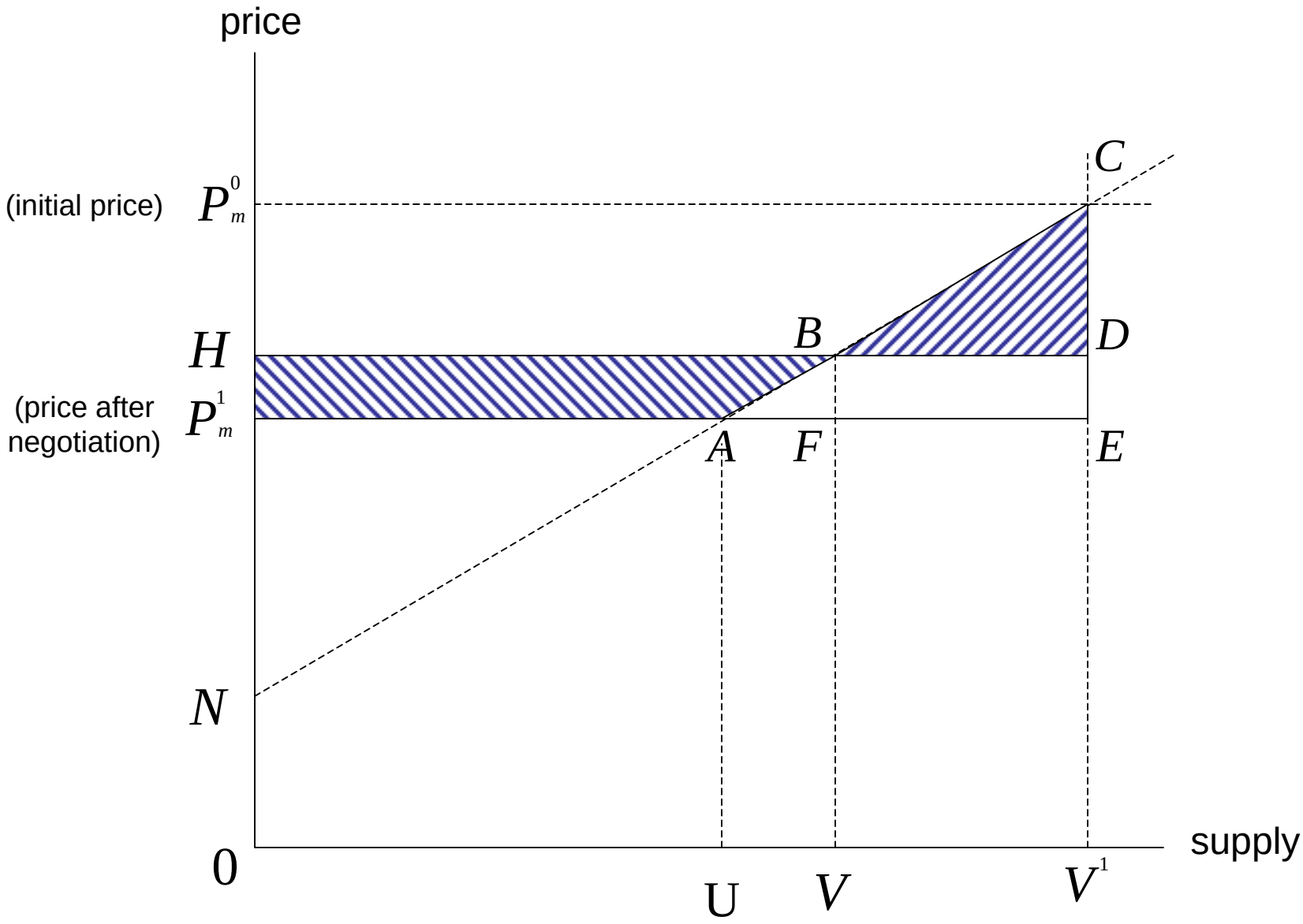
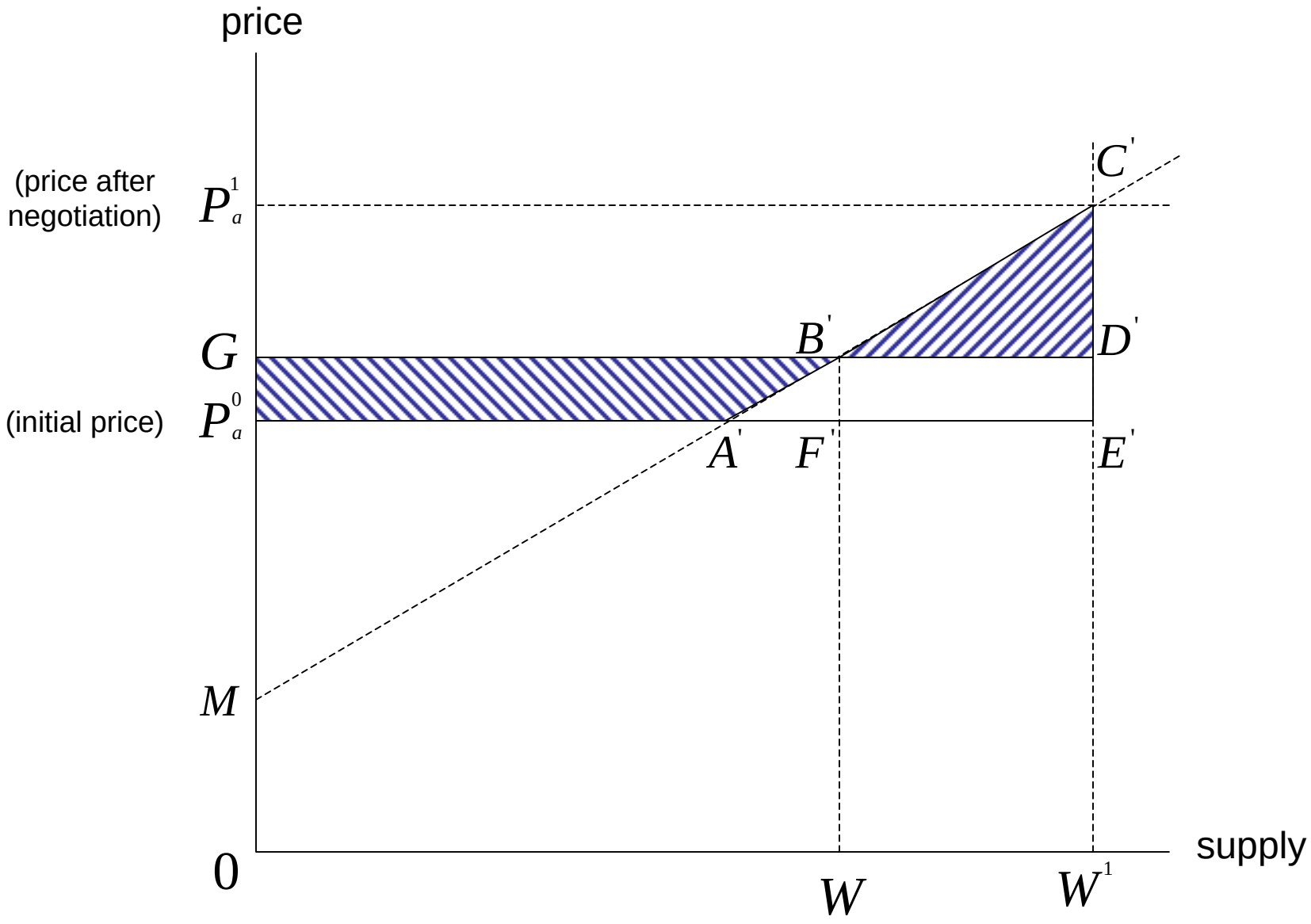


Figure 6A Manufacture



Two shaded areas cancel each other

Figure 6B Agriculture



Two shaded areas cancel each other

Figure 7A

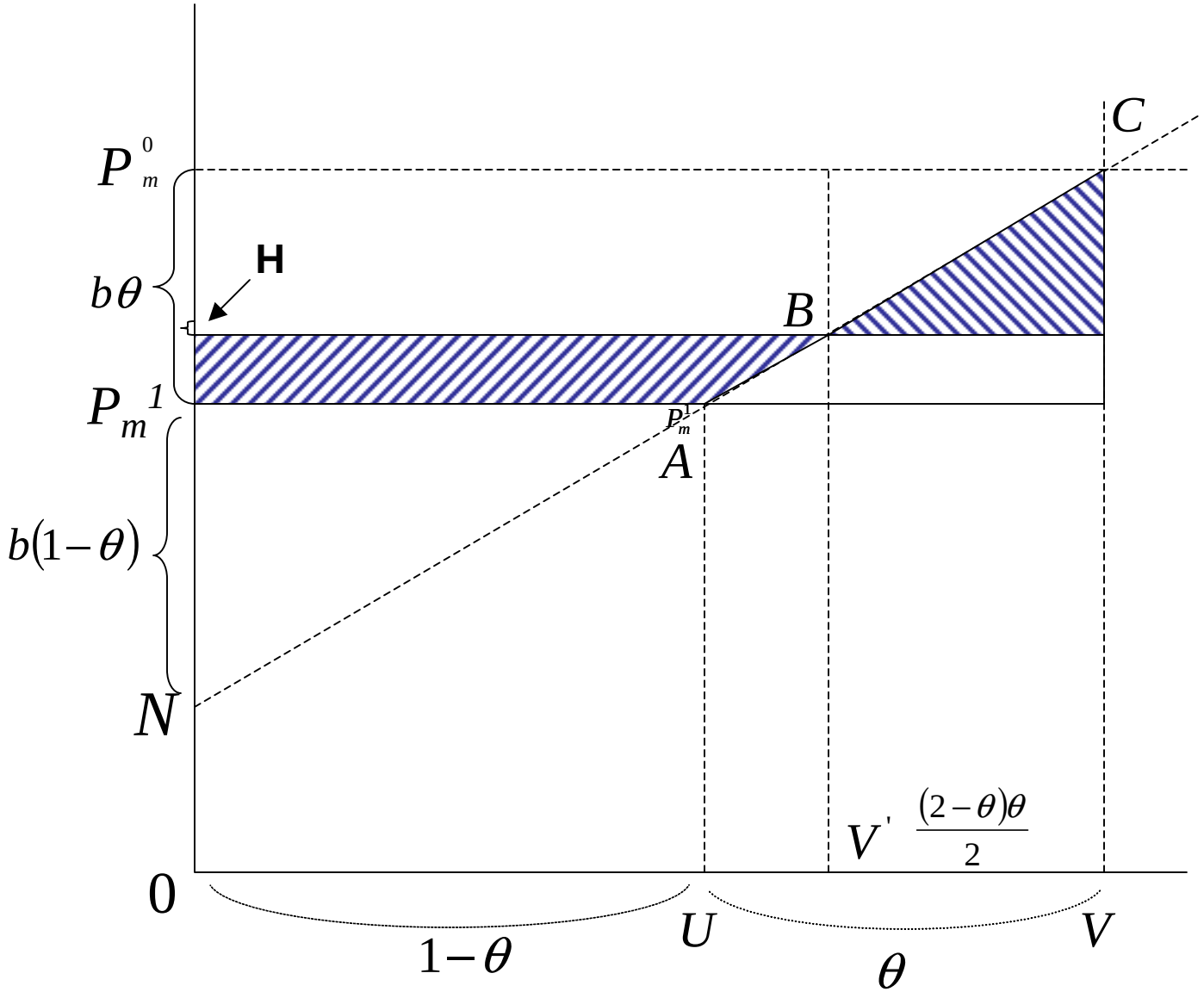

P_m^0
$b\theta$
H
P_m^1
$b(1-\theta)$
N
C
B
P_m^1
A
V'
$\frac{(2-\theta)\theta}{2}$
0
$1-\theta$
U
θ
V

Figure 7B

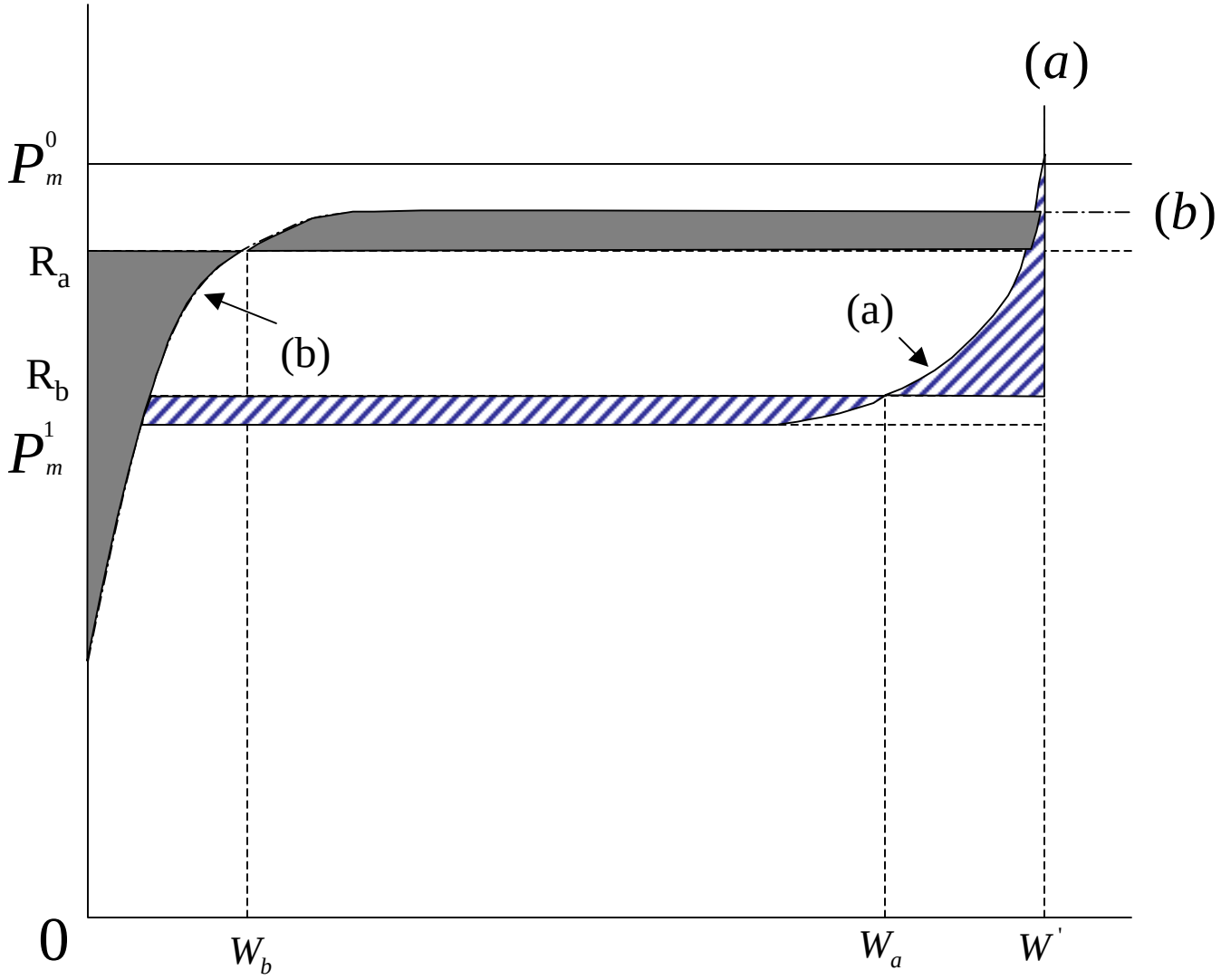


Figure 7c

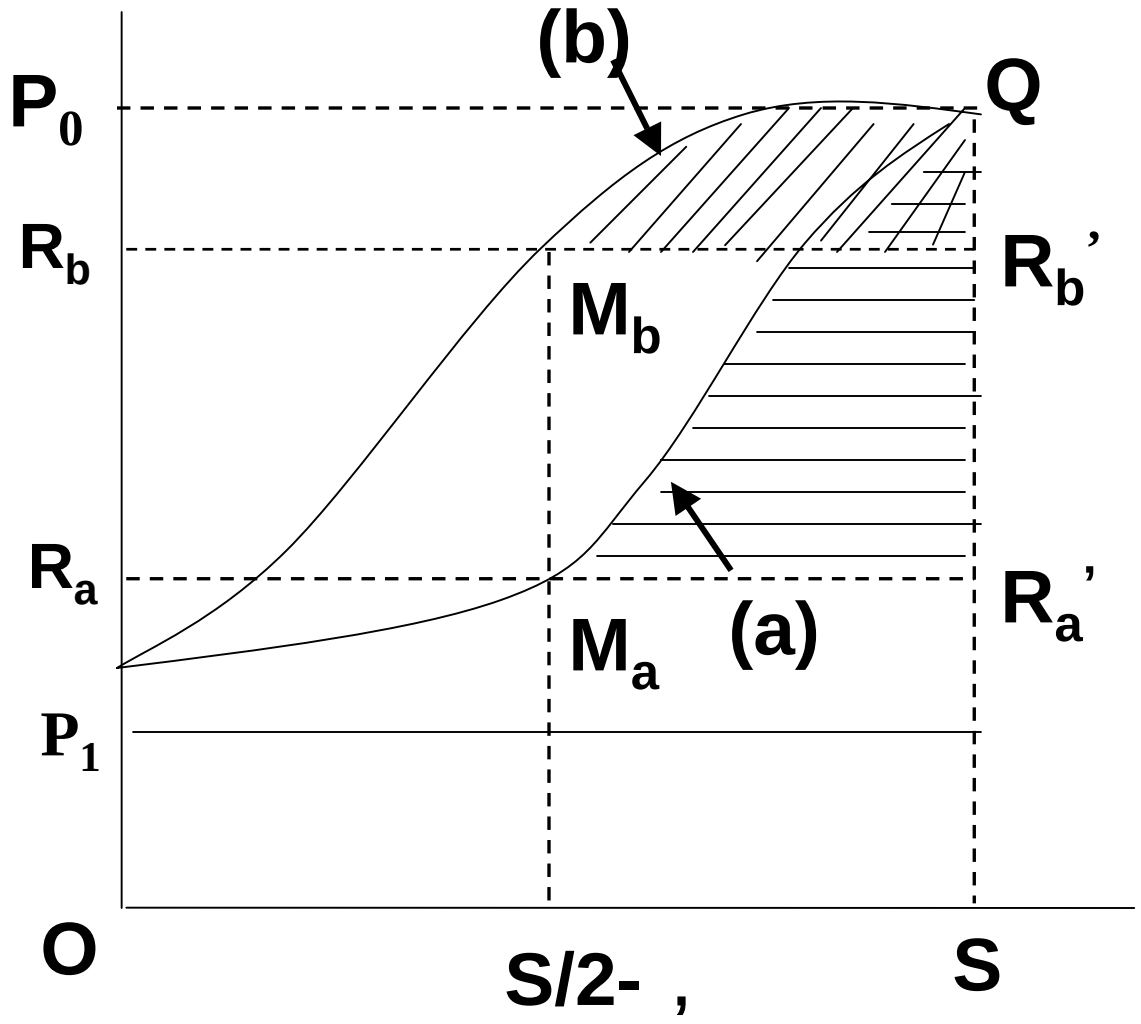


Figure 8