# The Theory of Transfers in a Multilateral World: The Customs Union Case with Structural Adjustment*

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## Abstract

*In this paper the transfer problem is analysed in a three country, three commodity (including one non-traded good) trade model where two countries belong to a customs union. The three countries A, B and C each produce three goods and engage in an asymmetric pattern of trade. Countries A and B form a customs union and C remains outside the union. Several results are obtained. Following the tradition in the literature on transfers and the terms of trade the results are classified into three groups: orthodox, anti-orthodox and mixed. In the orthodox case, donor (recipient) impoverishment (enrichment) occurs irrespective of the favourable (adverse) movement in the terms of trade. In the anti-orthodox case, donor (recipient) enrichment (impoverishment) occurs as a consequence of the favourable movement in the term of trade. In the mixed cases, the outcomes are not clearcut. The major result that we obtain is that changes in welfare, terms of trade and the relative price of the non-trad-*

*ed good are identical in the donor and the non-participating country as a consequence of the transfer. Thus an intra union transfer has effects on the non-participating country. Consider the orthodox case. Country B (donor) makes a transfer to country A (recipient), who are both in the union. Country B's welfare falls, terms of trade deteriorate and the relative price of the non-traded good falls. Country C, the non-participating country, suffers from the same effects. Structural adjustments occur in all the three countries – output of the non-traded good changes vis-a-vis the traded good and this change in composition is identical for the donor and the non-union country. In the anti-orthodox case both the donor and the non-participant country gain from the transfer. The non-union country cannot remain passive to transfers among the union members. (JEL: F01, F02)*

## I. Introduction

During the past decade, the theory of transfer has been extended in many directions. One of the routes explored has been to consider the effects of a transfer on welfare in the presence of a market distortion ⟨see Bhagwati *et al.* [1983]⟩. Transfer problem has also been analyzed in the presence of a third agent which remains outside the transfer process. These analyses have been undertaken in the framework of universal free trade. However, transfer payments are often used by the authorities of free trade associations to redistribute income among member countries. The difficulty of settling upon a compensation scheme was one of the main obstacles to British membership to the EC ⟨see Grinolos [1984] and Reizman [1979]⟩. Despite the importance of the question for customs union agreement, it is only recently that this analysis has been transposed in the context of a customs union ⟨Flückiger [1987]⟩. In this paper the author shows that when the unilateral payment is made between two countries participating in a customs union discriminating against the rest of the world, the transfer may generate even more surprising and original results than those obtained in the traditional literature. For instance, it is shown that, in the context of economic integration, a transfer may generate an overall terms of trade deterioration. Another surprising result highlighted in Flückiger [1987] is that the well-known paradox of immiserizing transfer ⟨see Brecher and Bhagwati [1982]⟩

is more likely to arise when the transfer occurs between countries partici-
pating in a customs union than in the case of universal free trade.

The above extension of the traditional literature on transfer to the case of
customs union suffers from a significant omission, *i.e.*, the absence of a for-
mal treatment of non-traded goods. The presence of these goods is a ubiqui-
tous phenomenon. More importantly, these goods are significant as the
movement in their prices reflect structural adjustment which is exceedingly
important in most countries. This adjustment concerns itself with the com-
position of output, specifically of traded and non-traded goods. For example,
a change in terms of trade may lead to greater production of importable and
non-traded goods. Such a movement in output composition may not be
desirable from the long-term perspective of the economy as it makes the
economy inward looking. This paper analyses the changes in output that are
associated with the transfer problem in the customs union framework.[1]

We attempt to fill the above gap in the literature. Following Flückiger
[1987], a three-country, three-commodity model is considered (this may
also be regarded as a three-agent problem). The three countries, *A*, *B* and
*C*, each produce three goods: two traded and one non-traded.[2] They are
engaged in trade in an asymmetric pattern. Countries *A* and *B* form a cus-
toms union while country *C* remains outside the trading agreement. Howev-
er, country *C* trades with country *A*. In a two goods model, this figure repre-
sents the only commercial structure of interest. All other patterns are either
identical to the structure adopted or not adequate for the analysis of a cus-
toms union (if *A* and *B* do not trade with each other). It should be noted that
the traditional customs union theory has been developed on such asymmet-
rical figures of trade.[3]

It should be noted that the results obtained in our paper are specific to

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1. The relationship between transfers and structural adjustment was raised in an impor-
   tant paper by Michaely [1987]. These results were based on a trade model without
   imported intermediate goods. Hazari and Athukorala [1988] extends Michaely's
   results to a model with imported intermediate goods and established that his results
   were not valid in more general framework. To our knowledge the link between trans-
   fers and structural adjustment in the context of customs union theory has not been
   investigated.

2. This set up is standard in trade theory and was pioneered by Komiya [1967].

3. See the work of Reizman [1979].

the $3 \times 2 \times 2$ and one non-traded goods in each country model. The asymmetrical commercial relations which must be adopted in this kind of model generate particular welfare and other effects. However, the asymmetry assumed in our approach represents a reasonable scenario to describe relations between Greece and the EEC (the EEC absorbs more the 54% of Greek exports; more than, three quarters of Greek non-oil imports depend on the EEC). For example, $A$ and $B$ are in a customs union like the EC and country $C$ is a third world country which is outside the union.

The three countries $A$, $B$ and $C$ produce three commodities $X^i$, $Y^i$ and $N^i$ ($i = A, B, C$). The commodities $X^i$ and $Y^i$ are traded goods and $N^i$ is the non-traded good; hence, in each country the demand for $N^i$ equals its supply to clear the market for the non-traded good. In the context of the above model, we examine the impact of a transfer between two countries participating in a customs union on terms of trade and the price of the non-traded good in all the three countries.[4]

Several results are obtained. Following the literature on transfers the terms of trade are classified into three groups: orthodox, anti-orthodox and mixed. In the orthodox case, donor (recipient) impoverishment (enrichment) occurs irrespective of the favourable (adverse) movement in the terms of trade. In the anti-orthodox case, donor (recipient) enrichment (impoverishment) occurs as a consequence of the favourable movement in the term of trade. In the mixed cases, the outcomes are not clearcut. The major result that we obtain is that changes in welfare, terms of trade and the relative price of the non-traded good are identical in the donor and the non-participating country as a consequence of the transfer. Thus an intra union transfer has effects on the non-participating country. Consider the orthodox case. Country $B$ (donor) makes a transfer to country $A$ (recipient), who are both in the union. Country $B$'s welfare falls, terms of trade deteriorate and the relative price of the non-traded good falls. Country $C$, the non-participating country, suffers from the same effects. Structural adjustments occur in all the three countries – output of the non-traded good changes vis-a-vis the traded good and this change in composition is identical for the donor and

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4. Results relating to the welfare part of this problem has been derived by Flückiger [1987]. He also provides a discussion regarding the important of intra union transfers.

the non-union country. The non-union country cannot remain passive to transfers among the union members.

## II. The Model

It is assumed that three commodities, $X$, $Y$ and $N$, are produced in all three countries. The superscript $i$ for $(i = A, B, C)$ on $X$, $Y$ and $N$ will denote the country being analyzed. The neoclassical production functions are given below:

$$X^i = X^i[K_x^i, L_x^i] \qquad (i = A, B, C) \tag{1}$$

$$Y^i = Y^i[K_y^i, L_y^i] \qquad (i = A, B, C) \tag{2}$$

$$N^i = N^i[K_N^i, L_N^i] \qquad (i = A, B, C) \tag{3}$$

where $K_j^i$, $L_j^i$ denote the capital and labour allocation to the production of $X$, $Y$ and $N$ in countries $A$, $B$ and $C$.

We shall assume that $P_X^A = P_X^B = P_X^C = 1$ hence the price of commodity $X$ has been taken as a numeraire in all the three countries. The factor returns conditions are given below:

$$w^i = X_L^i(K_X^i, L_X^i) = P_Y^i Y_L^i(K_Y^i, L_Y^i) = P_N^i N_L^i(K_N^i, L_N^i) \tag{4}$$
$$(i = A, B, C)$$

$$r^i = X_K^i(K_X^i, L_X^i) = P_Y^i Y_K^i(K_Y^i, L_Y^i) = P_N^i N_K^i(K_N^i, L_N^i) \tag{5}$$
$$(i = A, B, C)$$

where for $P_Y^i$, $P_N^i$, $w^i$, $r^i$ $(i = A, B, C)$ denote the relative commodity and factor prices respectively. The terms $X_L^i$, $Y_L^i$, $N_L^i$, $Y_K^i$, $N_K^i$, denote the marginal physical products of labour and capital in the ith country.
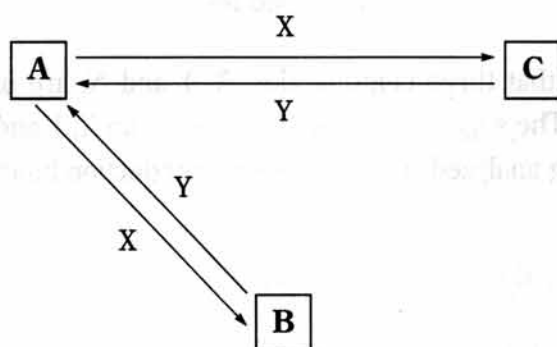
The full employment conditions require that:

$$K_X^i + K_Y^i + K_N^i = \overline{K}^i \qquad (i = A, B, C) \tag{6}$$

$$L_X^i + L_Y^i + L_N^i = \overline{L}^i \qquad (i = A, B, C) \tag{7}$$

We suppose that the trade pattern is such that countries $B$ and $C$ have no

commercial relations. Country $A$ imports $Y$ from country $B$ and $C$ and exports $X$ to countries $B$ and $C$. These commercial relations can be represented by Figure 1 below:



**Pattern of Trade**
**Figure 1**

Perfect competition and free trade between the members of the customs union prevail but country $A$ imposes a tariff on commodity $Y$ imported from country $C$.

Now suppose that the constitution of the customs union has generated unequally distributed welfare gains for the members and that country $B$ (which is the main benefactor of the commercial agreement) makes a transfer to $A$ in order to maintain country $A$'s welfare equal to non-membership level. Moreover, we assume that country $B$ collects the amount of transfer in the form of a proportional income tax and that country $A$ distributes this transfer to its citizens in the form of a proportional income subsidy.

To analyze the welfare implications of a transfer, we use an indirect social welfare function:

$$U^i = U(I^i, P^i) \quad (i = A, B, C) \tag{8}$$

where $U^i$ is the welfare level of country $i$ $(i = A, B, C)$, $I^i$ is the national income of country $i$ $(i = A, B, C)$, and $P^i$ is a vector of commodity prices in country $i$ $(i = A, B, C)$.

$$dV^i = a^i dU^i = dI^i - \sum_j C_j^i dP_j^i \quad (i = A, B, C) \tag{9}$$

where $a^i = (\partial U^i / \partial I^i)^{-1}$ is the inverse of the marginal utility of income in country $i$ ($i = A, B, C$), and $C^i_j$ is the consumption of good $j$ ($j = X, Y, N$) in country $i$ ($i = A, B, C$). Assuming that country $C$ does not impose any tariff on commodity $X$ imported from $A$ and $P^A_x = 1$, we may express the national income of countries $A, B$ and $C$ in the following way:

$$I^A = X^A + P^A_Y Y^A + P^A_N N^A - tP^C_Y E^C_Y + T \tag{10}$$

$$I^B = X^B + P^B_Y Y^B + P^B_N N^B - T \tag{11}$$

$$I^C = X^C + P^C_Y Y^C + P^C_N N^C \tag{12}$$

where $P^A_Y = P^B_Y = P^C_Y(1 + t)$

$t$ = tariff imposed by country $A$ on good $Y$ imported from $C$ only

$E^i_x = C^i_x - X^i$ and $E^i_Y = C^i_Y - Y^i$

$T$ = amount of transfer in terms of good $X$ exported by $A$. Initially $T = 0$.

This completes the specification of the three-country three-goods model of the customs union with non-traded goods.

## III. Results

As remarked earlier we are interested in examining the impact of a transfer from country $B$ to country $A$ on the relative price of the non-traded good in countries $A, B$ and $C$. The transfer payment arises on account of the customs union formed by countries $A$ and $B$ in which $A$ suffers a loss on becoming a member of the union, hence the need for compensation. This compensation takes place as a transfer from country $B$ and $A$.

Recall that in each country the market for the non-traded good clears locally:

$$D^i_N = X^i_N \quad (i = A, B, C) \tag{13}$$

The demand for the non-traded good is a function of terms of trade, the relative price of the non-traded good and income. Hence, in order to determine the change in the relative price of the non-traded good, it is necessary

to determine the change in the terms of trade and income as a consequence of the transfer.

To derive the changes in the terms of trade and income, the following global excess demand conditions are introduced:

$$E_X^A - P_Y^B E_Y^B - E_Y^C P_Y^C \equiv T$$

$$E_Y^B - P_Y^B E_Y^B - (1+t) P_Y^C E_Y^C \equiv -T$$

$$E_Y^A - E_Y^B + E_Y^C = 0$$

By using the above equations and national income conditions, Flückiger [1987] has obtained the following results:[5]

<u>Welfare</u>

$$\frac{dV^A}{dT} = \left(\frac{\partial U^A}{\partial I^A}\right)^{-1} \frac{dU^A}{dT} = -\frac{[m_Y^A - m_Y^B] [E_Y^A - tE_Y^B]}{(1+t)\Delta E_Y^A} + 1$$

$$\frac{dV^B}{dT} = \frac{-E_Y^B[m_Y^A - m_Y^B] - \Delta E_Y^A}{E_Y^A \Delta}$$

$$\frac{dV^C}{dT} = \frac{\alpha[m_Y^A - m_Y^B]}{(1+t)\Delta}$$

where $\Delta$ denotes the extended Marshall-Lerner stability condition:

$$\Delta = E_Y^A\{(1-\alpha)\eta^B + \eta^A + \alpha\eta^C - 1\} > 0$$

$$\alpha = -\frac{E_Y^C}{E_Y^A} > 0$$

$$(1-\alpha) = -\frac{E_Y^B}{E_Y^A}$$

5. It can be proved (see Flückiger [1987]) that when the commercial relations are characterized y an asymmetric pattern such as in Figure 1, the country which trades only within the union (in our case, country B) is the main benefactor of the commercial agreement. The derivation of these results are provided in the appendices.

and $m_Y^i$ the marginal propensity to consume good $Y$ in country $i$. The term $\alpha$ represents country $C$'s share of commodity $Y$ total imports by country $A$.

Terms of Trade

$$\frac{dP_Y^B}{dT} = \frac{m_Y^A - m_Y^B}{E_Y^A \Delta}$$

$$\frac{dP_Y^{*A}}{dT} = \frac{E_Y^A - tE_Y^B}{E_Y^A} \frac{dP_Y^B}{dT} + \frac{\alpha m_Y^A (P_Y^B - P_Y^C)}{P_Y^B E_Y^A}$$

$$\frac{dP_Y^C}{dT} = \frac{1}{(1+t)} \frac{dP_Y^B}{dT}$$

The above expressions are required for obtaining a solution for the change in the relative price of the non-traded goods as a consequence of the transfer from country $B$ to $A$. We shall give details of the procedure for obtaining this change for country $B$ only. Let $C_N^B$ denote the demand for the non-traded good in country $B$, hence:

$$C_N^B[P_Y^B, P_N^B, V^B] = X_N^B[P_N^B]$$

Differentiating the above equations with respect to $T$ we obtain:

$$\frac{\partial C_N^B}{\partial P_Y^B} \frac{dP_Y^B}{dT} + \frac{\partial C_N^B}{\partial P_N^B} \frac{dP_N^B}{dT} + \frac{\partial C_N^B}{\partial V^B} \frac{dV^B}{dT} = \frac{\partial X_N^B}{\partial P_N^B} \frac{dP_N^B}{dT}$$

This equation can be solved for $dP_N^B/dT$. The solution is given below:

$$\frac{dP_N^B}{dT} = -\frac{1}{Z^B}\left[ m_N^B \frac{dV^B}{dT} + \frac{\partial C_N^B}{\partial P_Y^B} \frac{dP_Y^B}{dT} \right]$$

where

$$Z^B = \left[ \frac{\partial C_N^B}{\partial P_N^B} - \frac{\partial X_N^B}{\partial P_N^B} \right] < 0$$

## Table 1

### Transfer Payments, Welfare, the Terms of Trade and the Relative Price of Non-Traded Good

| | | | Welfare | Terms of Trade | Relative Price of Non-Traded Good |
|---|---|---|---|---|---|
| Customs Union Countries | Country B (Donor) | Orthodox Case | − | − (deteriorate) | − |
| | | Anti-Orthodox Case | + | + (improve) | + |
| | | Mixed Case | − | + (improve) | − or + |
| | Country A (Recipient) | Orthodox Case | + | + | + |
| | | Anti-Orthodox Case | − | − | − |
| | | Mixed Case | + | + or − | + or − |
| Non-Customs Union Countries | Country C | Orthodox Case | − | − | − |
| | | Anti-Orthodox Case | + | + | + |

In a similar manner, the expressions for countries $A$ and $C$ can be derived. These are given below:

$$\frac{dP_N^A}{dT} = -\frac{1}{Z^A}\left[ m_N^A \frac{dV^A}{dT} + \frac{\partial C_N^A}{\partial P_Y^{*A}} \frac{dP_Y^{*A}}{dT} \right]$$

$$\frac{dP_N^C}{dT} = -\frac{1}{Z^C}\left[ m_N^C \frac{dV^C}{dT} + \frac{\partial C_N^C}{\partial P_Y^C} \frac{dP_Y^C}{dT} \right]$$

It is clear that these changes can be of any sign. In order to give some meaning to these results we present them in the form of a table and then comment on them. All the results are presented in the table below.

Table 1 is organized in terms of the three cases: orthodox, anti-orthodox and mixed cases. We shall first discuss the orthodox case. In this situation the donor country, $B$, suffers a welfare loss and its terms of trade deteriorate. The relative price of the non-traded good falls. The transfer receiving country, $A$, gains in welfare and its terms of trade improve. The price of the non-traded good increases in the transfer-receiving country. Thus, within

the customs union, the structural adjustment in the transferring and the recipient country are in the opposite direction - the donor country expanding the output of the importable and contracting that of the exportable and the non-traded good; the recipient country expanding the output of the exportable and the non-traded good. These are traditional results as far as the movement in the composition of output of traded goods is concerned. This paper incorporates the change in the output of non-traded goods to the above results. As non-traded goods and services are fairly important in any economy it is important to incorporate the change in their output.

Country $C$ which is not a member of the union is also affected by the transfer. This is because it trades with country $A$. Its export-import pattern is similar to that of $B$, the donor country. Hence, if the terms of trade deteriorate for country $B$, they also decline for country $C$. In the orthodox case, the non-participating country, $C$, suffers a loss in welfare, a deterioration in the term of trade and a decline in the relative price of the non-traded good. The composition of output in the non-participating country changes in the same manner as in the donor country.

We now consider the anti-orthodox terms of trade outcome. In this particular case the donor country gains in welfare and its terms of trade improve. The recipient country, $A$ (which is part of the customs union) suffers a loss in welfare and its terms of trade deteriorate. In the donor country the relative price of the non-traded good increases while in the recipient country it falls. Changes in the composition of output occur in both the donor and the recipient countries. In the former country the output of the non-traded goods and exportable goods increases at the expense of the importable good. In the transfer receiving country the output of the importable goods expands vis-a-via the exportable and the non-traded good (whose price falls). Thus, the recipient country becomes 'inward looking' while the 'donor country' outward looking. The former term implying output adjustment away from a position of laissez-faire and the latter terms implying output adjustments towards the free trade position.

Country $C$, which is not part of the customs union also adjusts an account of the transfers from $B$ to $A$. It suffers effects as the donor country, experiencing an increase in real income, an improvement in the term of trade and an increase in the relative price of the non-traded good. The structural

adjustment as shown by the composition of output is identical in the donor and the non-participating country. The anti-orthodox case is interesting as it shows donor and non-participating enrichment and recipients impoverishment along with changes in output of the non-traded goods.

Before concluding our discussion, it should be noted (from the table) that there also exists another scenario for the donor and recipient country. Thus us the case in which welfare falls for the donor and rises for the recipient, but the terms of trade move in the anti-orthodox manner. No firm conclusion can be drawn regarding the relative price of the non-traded in this particular case.

## IV. Conclusions

This paper has analyzed the effects of an intra which transfers on welfare terms of trade and composition of output in the member and non-member countries. It has introduced a non-traded good in both the participating and the non-participating countries. The paper shows that the donor and the non-participating country are affected in the same manner. In both the orthodox and the anti-orthodox cases the structural adjustment in the recipient country is opposite to that in the donor and the non-participating country. Many countries are concerned with changes in the composition of that output (structural adjustment). Our paper makes it clear that the non-participating country must take the formation of customs union seriously as parametric changes in these countries affect the non-member countries. While this effect is noted in Viner [1950] it has not been analyzed in the framework of non-traded goods which allow for a more comprehensive treatment of output changes. This research can be extended into many directions. For example, efficiency wages could be introduced in all of the three countries. This would allow for an analysis of unemployment in all the three countries. Country $C$, could pursue policies to protect itself and these may also be analyzed in our framework. Finally, an interesting area of research could be the incorporation of imperfect competition in the customs union theory with non-traded goods.

## Appendix A
## Terms of Trade Effect

Differentiating the equations of the global excess demand conditions given on page 138 with respect to $T$ and $P_Y^B$, we get:

$$dP_Y^B\left\{\left(\delta E_X^B / \delta P_Y^B\right) - E_Y^A - P_Y^B\left(\delta E_Y^A / \delta P_Y^B\right) - P_Y^C\left(\delta E_Y^C / \delta P_Y^C\right)\right\} =$$

$$-dT\left\{1 - \left(\delta C_X^B / \delta(I_B - T)\right) - P_Y^B\left(\delta C_Y^A / \delta(I_A + T)\right)\right\}$$

This expression can be rewritten as:

$$dP_Y^B E_Y^A\left\{-\left(\delta E_X^B / \delta P_Y^B\right)\left(P_Y^B E_Y^B / E_X^B\right)\left(1 / E_Y^A\right) - 1 - \left(P_Y^B / E_Y^A\right)\left(\delta E_Y^A / \delta P_Y^B\right)\right.$$

$$\left. -\left(P_Y^C / E_Y^C\right)\left(E_Y^C / E_Y^A\right)\left(\delta E_X^C / \delta P_Y^C\right)\right\}$$

$$= -dT\left\{1 - \left(\delta C_X^B / \delta(I_B - T)\right) - P_Y^B\left(\delta C_Y^A / \delta(I_A + T)\right)\right\}$$

Rearranging terms, we get:

$$dP_Y^B E_Y^A\left\{(1 - \alpha)\eta_X^B + \eta_Y^A \alpha\eta_X^C - 1\right\} = -dT\left\{1 - m_{XB} - m_{YA}\right\}$$

Then,

$$dP_Y^B / dT = (m_{YA} - m_{YB}) / E_Y^A\Delta$$

where $\Delta = (1 - \alpha)\eta_X^B + \eta_Y^A + \alpha\eta_X^C - 1$

Using the expression $dP_Y^C / dT$ can be derived easily as it is equal to $dP_Y^B / dT(1/1+t)$.

It should be noted that country $A$'s terms of trade may be defined as a weighted average of the international and intracommunity term of trade. That is:

$$P^{*A} = \alpha P_Y^C + (1 - \alpha)P_Y^B$$

Thus:

$$dP^{*A} / dT = \left(dP_Y^B / dT\right)(1-\alpha) + \left(dP_Y^C / dT\right)\alpha + \left(P_Y^C / P_Y^B\right)(d\alpha / dT)$$

where $d\alpha / dT = \left(E_Y^C m_{YA}\right) / \left(P_Y^B (E_Y^A)^2\right) < 0$

Substituting and collecting terms, we get:

$$dP_Y^A / dT = \left\{\left(m_{YA} - m_{YB}\right)\left(E_Y^A - tE_Y^B\right)\right\} / \left\{\Delta\left(E_Y^A\right)^2 (1+t)\right\}$$

$$+ \left\{\alpha m_{YA}\left(P_Y^B - P_Y^C\right) / E_Y^A P_Y^B\right\} = \left\{\left(E_Y^A - tE_Y^B\right) / (1+t)\right\}$$

## Appendix B
## Welfare Effects

In order to express the welfare modifications induced by the transfer, we use equations (9) and (10) and we get, for country $A$:

$$dV_A / dT = E_Y^B(dP_Y^B / dT) + E_Y^C(dP_Y^C / dT) - \alpha t P_Y^C(dE_Y^A / dT)$$

$$+ E_Y^A P_Y^C(d\alpha / dT)t + 1$$

$$= -E_Y^A(dP^{*A} / dT) + \alpha t P_Y^C(dE_Y^A / dT) + 1$$

Rearranging terms, we obtain:

$$dV_A / dT = \left\{-\left(m_{YA} - m_{YB}\right)\left(E_Y^A - tE_Y^B\right) / (1+t)E_Y^A\Delta\right\} + 1$$

In the same way, we obtain for countries $B$ and $C$, the following expressions:

$$dV_B / dT = \left\{-E_Y^B\left(m_{YA} - m_{YB}\right) - E_Y^A\Delta\right\} E_Y^A\Delta \qquad \text{for country } B$$

$$dV_C / dT = \alpha\left\{\left(m_{YA} - m_{YB}\right) / (1+t)\Delta\right\} \qquad \text{for country C}$$

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