REGIONAL INTEGRATION AND INVESTMENT CREATION

by

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ABSTRACT

Preferential trade liberalization has gained more support in recent years from developed and developing countries, with the former hoping that such liberalization will attract more foreign investment. However, the mechanisms by which FDI inflows might increase (if at all) are poorly understood. This paper presents a model featuring firm and plant level scale economies with free entry and exit. The FDI inflows hoped for are likely only to the extent that multinationals have not already shifted production to the integrating region. Regardless, integration is likely to lead to industry rationalization that could reduce FDI if tariff-jumping was prevalent before liberalization. Computable general equilibrium simulations confirm the magnification effect of the level of external protection on investment creation or diversion, and suggest that low-protection countries have more investment creation than high-protection countries due to wage differences.

JEL Codes: F12, F15, F23
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1. Introduction

One of the more striking phenomena of the recent decade has been the willingness of developing countries to participate in and even initiate preferential trading arrangements and regional economic integration. While perhaps receiving the most attention, Mexico's accession to the US and Canada free trade agreement is but one such example. Economic cooperation among developing economies is evident in the formation of a customs union in the Southern Cone Common Market (MERCOSUR) between Argentina, Brazil, Paraguay, and Uruguay in 1995 and the strengthening ties of Association of South-East Asian Nations (ASEAN). Arguably, the primary purpose of these agreements is to support regional efforts to liberalize trade. An indirect goal, however, is to attract inflows of foreign direct investment (FDI) to the integrating region by enhancing market access and creating a more vibrant, stable, and competitive regional economic climate. In the long run, it is hoped that FDI inflows will be accompanied by foreign technology transfers that will, in turn, contribute to economic productivity and growth. Yet, the mechanisms by which regional integration will influence regional FDI are not well understood. The goal of this paper is to provide a framework for analysis and preliminary insights concerning FDI inflows when host countries engage in regional integration agreements.

Modern, or "new", regional integration theory recognizes the consequences of the industrial organization of firms.[1] Regional integration may promote "pro-competitive" effects in imperfectly competitive industries with increasing returns to scale. The relaxation of internal tariff barriers essentially expands the market size and increases the perceived market elasticity of demand. Simultaneously, firms face increased competition from rivals in partner countries. Regional welfare will tend to rise. As firms with increasing returns to scale increase output, they move down their average cost curves (a technological gain). As the environment becomes more competitive, firms reduce their price markups over marginal costs or exit the industry completely, which frees resources for other uses.

[1] Baldwin and Venables (1995) offer an excellent survey of this literature.

Yet, these models generally ignore the possibility of multinational production. As Markusen and Venables (1994) point out in the framework of "new trade theory", failing to account for multinationality may lead to erroneous predictions. Once insightful example of this possibility is the model by Ethier (1996). Traditional analyses suggest that small countries may have little to gain, and may even lose, from contemporary regional agreements in which they link up with large countries and engage in mainly unilateral reforms.[2] The Ethier model suggests that small host countries gain from integration with a large source country by influencing FDI inflows. By providing (marginally) preferential access to a large partner's final goods markets, the less developed country is able to attract FDI in intermediate production away from non-member host competitors.

Stylized facts support the view that regional integration will influence regional FDI inflows. UNCTC (1993) summarizes several studies on the impact of the formation of the European Common Market. From the inception of the Common Market to the mid-1980's, a period distinguished by reduced tariffs on intra-regional trade, US FDI into the EC increased significantly due to EC formation, British and Irish ascension to the EC may have increased DFI flows to those countries. Blomström and Kokko (1996) cite similar evidence and note that it is difficult to get precise empirical results as DFI may react to integration in a temporally asynchronous fashion. Those authors present preliminary evidence on the impact of other PTAs (CUSFTA, NAFTA, MERCOSUR) on DFI flows. While there does appear to be some impact, it is difficult to separate out the DFI due to regional integration and the DFI increases due to broader economic reform. Using survey data, Bannister, Primo Braga and Petry (1994) find that the formation of MERCOSUR positively influenced inward investment in the region, although institutional harmonization and broader economic reforms may have been influential. Thus it is clear that PTAs can have a significant impact on the geographical distribution of productive investment.

That the formation of regional integration agreements will have an influence on FDI patterns is perhaps not surprising. Yet the direction of these effects is far from evident as several layers of economic

[2] Bhagwati and Panagariya (1996) state this view elegantly.

distortion are involved. As discussed above, preferential trading agreements (PTAs) are inherently second-best, and while they do expand market size, they discriminate against non-members in rather complicated ways.[3] FDI tends to arise in imperfectly competitive markets in order to internalize economic distortions. Often, multinational firms are exploiting the services of a firm-specific asset that is non-rival in production across plants within a given firm, Caves (1996) and Markusen (1995). This asset, which is typically intangible, can be moved relatively easily across borders and so such a firm will have an incentive to jump tariff walls.[4] In this way FDI can substitute for trade as local production supplants imports, though FDI can complement trade as well via increased imports of intermediate inputs.

Our paper employs modern FDI theory to inform our understanding of the implications of regional integration agreements. We limit the scope of analysis to the impact of regionalism on horizontal FDI inflows from non-member countries. Thus our analysis is most closely applicable to regional agreements between FDI host countries, such as ASEAN or MERCOSUR. Relevant models of DFI include those of Markusen (1995), Helpman (1985), Horstmann and Markusen (1987a,b), and Markusen (1984). Horstmann and Markusen (1992) in particular shows how the structure of production can react to changes in trade policy when multinationals can jump tariff walls in a two-country setting.

We extend the basic modeling framework of Markusen and Venables (MV) in their 1994 model. Firms in the MV model experience increasing returns to scale at both the firm and plant levels. Multinational and national firms engage in monopolistic competition, with free market entry, in a two-country, general equilibrium model. Our primary contribution is to extend the dimensionality of the MV model to three countries and the impact of regional integration agreements when multinational production is endogenous.

Our model considers FDI in a general-equilibrium framework with three countries. Wages are determined in a competitive, numeraire industry. The remainder of production is by national and multinational firms in an increasing-returns-to-scale, monopolistically-competitive sector. Headquarter

[3] See Bhagwati and Panagariya (1996) for a careful discussion of these issues.

activities of national and multinational firms are concentrated in a large country located outside the integrating region while two integrating countries serve as hosts to multinational subsidiaries.

Section 2 presents the basic model. Section 3 provides partial equilibrium analysis by holding wages constant and countries identical. A number of interesting results are obtained. The potential for an increase in investment toward PTA countries depends, in part, on the level of external tariffs. If the initial MFN tariffs are very low, then the distortion is never sufficient to motivate tariff-jumping FDI. At mid-level initial tariff levels, while non-integrated markets may not be sufficiently large to attract FDI, the integrated market may attract investment. At relatively high external tariffs, much of the multinational entry occurs before the PTA and integration leads to little new investment. Another result is that the regional integration leads to some degree of rationalization and exit. Thus, while investment may flow toward the integrated region when there is little FDI before liberalization, FDI may fall when rationalization eliminates multinationals that had invested in what had been better protected markets. The model also points to the potential for trade to be diverted within firms, a result by now familiar within the literature on multinationals.

Section 4 provides general equilibrium insights that emerge from numerical simulations of the model. We find that regional integration agreements may result in either an increase or a decrease in the level of multinational activity within a member country. While RIAs are neither clearly investment creating or diverting, several predictions are forthcoming. For one, the level of external protection has a *magnification effect* on the investment creation and diversion tendencies observed in our partial equilibrium analysis. If integrating the region provides a more favorable climate for investment then the higher is the external tariff rate the greater is the incentive for tariff-jumping FDI. However, if multinationals over-invested in the non-integrated nations the RIA may lead to reverse tariff-jumping, which is exacerbated as external tariff rates increase.

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[4] The jump may take several forms. Licensing to local firms, participation in a joint venture with a local firm, or the establishment of a wholly-owned subsidiary are all options, with DFI typically implying the last.

Second, investment creation tends to favor the low tariff country at the expense of the high tariff country. In the pre-integration equilibrium multinationals flow disproportionately into high tariff countries, which draws resources out of other sectors and increases factor prices. Integration permits a more regionally-efficient distribution of multinationals as firms can service high-tariff members by exports from subsidiaries in low-tariff members. Third, there is no clear relationship between a country's comparative advantage relative within the region and investment creation. Fourth, as is the case for national firm models, the larger is the region relative to non-member countries, the greater is the responsiveness of regional multinational activity to integration. Finally, investment creation favors small member countries as they gain improved access to large countries upon integration.

2. The Model

The model consists of two goods, two internationally immobile factors, and three countries. Two of the three countries, denoted A and B, can join in a preferential trade agreement, while the rest of the world, denoted R or ROW, is excluded from participation in the agreement. There are two factors of production, labor L and capital K, which are both immobile across countries and the latter is additionally immobile across sectors. Good Y is produced under constant returns and perfect competition by combining capital, which is specific to the production of Y, and labor in a Cobb-Douglas production function. Letting K_i be the country's capital endowment and θ_i be a country-specific efficiency parameter, the output of Y is

$$Y = \theta_i L_{iy}^{\alpha} K_i^{1-\alpha}, \qquad i = A, B, R. \tag{1}$$

Y is held to be the numeraire, and free trade in Y equalizes its price across countries. Given (1), the return to each factor is its value marginal product so the equation for labor wages is

$$w_i = \alpha\theta_i (L_{iy} / K_i)^{\alpha-1}, \qquad i = A, B, R. \tag{2}$$

X is produced with increasing returns in a monopolistically competitive environment with free entry by both national R firms and multinationals with headquarters in R. For tractability of the model, it is assumed that A and B have no indigenous source of X headquarter services and produce X with R multinational subsidiaries. X production requires firm-specific fixed costs (F_R) incurred at the R headquarters, as well as plant-specific fixed costs (G_i) and constant marginal costs (c_i) incurred in the manufacturing location at country $i = (A, B, R)$. Labor is the sole input into X production and is used for both variable and fixed costs. Tariff charges between countries must be incurred by firms and are also specified as units of labor per unit of X exported. The existence of the Y-specific resource implies that an expansion of the X sector will draw labor out of the Y sector and push up the labor wage.

Let superscripts (n, m) denote variables associated with national and multinational firms, respectively. X_{ij}^k is defined as the sales in country j of a type-k firm based in i, $i, j = (A, B, R)$, $k = (n, m)$. The labor usage of a national firm is

$$L_{RX}^n = c_R X_{RR}^n + \sum_{j=A,B} (c_R + \tau_{Rj}) X_{Rj}^n + G_R + F_R, \tag{3}$$

where τ_{ij} is the specific tariff charge per unit of X shipped from i to j. We assume that initially each country maintains an MFN tariff structure, i.e. $\tau_{Rj} = \tau_{ij}$, $i, j = (A, B)$, $i \neq j$, implying no incentive for cross-hauling.

Multinationals consist of headquarters and manufacturing facilities in R and a single manufacturing subsidiary in either A or B. A multinational plant in country A (a mA-type firm) supplies the domestic A market and the B market with exports from A. Likewise, a mB-type multinational services A with exports from B. Multinational labor demand in country R is given

$$L_{RX}^{mi} = c_R X_{RR}^{mi} + G_R + F_R, \quad i = A, B, \tag{4}$$

and its labor demand in host countries is

(5) $$L_{AX}^{mA} = c_A X_{AA}^{mA} + (c_A + \tau_{AB}) X_{AB}^{mA} + G_A,$$

$$L_{BX}^{mB} = c_B X_{BB}^{mB} + (c_B + \tau_{BA}) X_{BA}^{mB} + G_B.$$

If the labor endowment for country i is denoted $\overline{L}_i$, then the market clearing condition for each country is

(6a) $$\overline{L}_A = L_{Ay} + m_A [c_A X_{AA}^{mA} + (c_A + \tau_{AB}) X_{AB}^{mA} + G_A],$$

(6b) $$\overline{L}_B = L_{By} + m_B [c_B X_{BB}^{mB} + (c_B + \tau_{BA}) X_{BA}^{mB} + G_B],$$

(6c) $$\overline{L}_R = L_{Ry} + n[c_R X_{RR}^{n} + \sum_{j=A,B} (c_R + \tau_{Rj}) X_{Rj}^{n} + G_R + F_R] + m_A [c_R X_{RR}^{mA} + G_R + F_R] + m_B [c_R X_{RR}^{mB} + G_R + F_R],$$

where m_i denotes the number of multinationals invested in $i = (A, B)$ and n the number of strictly national firms.

Free entry in the X sector constrains profits to zero. Thus income in each country equals the payments to factors and tariff transfers

(7) $$I_i = w_i \overline{L}_i + (1-\alpha) Y_i + \tau_{ji} X_{ji}^{kj} - \tau_{ij} X_{ij}^{ki}, \qquad k = n,m;\ i = A, B, R,\ i \neq j.$$

Denoting the consumption level of X and Y in country i as X_{ic} and Y_{ic}, Cobb-Douglas preferences of the representative consumer are given by

(8) $$U_i = X_{ic}^{\beta} Y_{ic}^{1-\beta}$$

where X_{ic} is simply the sum of sales of X in country i, $X_{ic} = nX_{Ri}^{n} + m_j X_{ji}^{mj} + m_i X_{ii}^{mi}$, $i \neq j$. Denoting p_i as the relative price of X in country i, the Marshallian demands are derived from (8)

(9) $$X_{ic} = \beta I_i / p_i, \qquad Y_{ic} = (1-\beta) I_i .$$

Pricing in the X market will be determined by the condition that marginal revenue equals marginal cost. Given demand, this will entail price set as a markup over (constant) marginal cost. Denote the markup e_{ij}^{k} in country j as that of a type k firm producing in country i. Cournot conduct is assumed by firms in the X sector, implying marginal cost markups equal market share divided by own-price elasticity of demand. Recognizing that Cobb-Douglas preferences yield own-price elasticities of unity, the markup is simply equal to each firm's market share,

(10) $$e_{ij}^{k} = \frac{X_{ij}^{k}}{X_{ic}} = \frac{p_j X_{ij}^{k}}{\beta I_j} .$$

The relevant pricing equations are[5]

(11) $$p_R(1 - e_{RR}^{k}) \leq w_R c_R \qquad [X_{RR}^{n}],$$

(12) $$p_i(1 - e_{Ri}^{n}) \leq w_R(c_R + \tau_{Ri}) \qquad [X_{Ri}^{n}],\ i = A, B,$$

(13) $$p_i(1 - e_{ii}^{mi}) \leq w_i c_i \qquad [X_{ii}^{mi}],\ i = A, B,$$

(14) $$p_j(1 - e_{ij}^{mi}) \leq w_i(c_i + \tau_{ij}) \qquad [X_{ij}^{mi}],\ i, j = A, B,\ i \neq j.$$

Putting (10) together with (11)-(14), we can obtain relations for outputs in terms of prices,

(15) $$X_{RR}^{k} \geq \beta I_R \frac{p_R - w_R c_R}{p_R^2},$$

[5] These equations are written in complementary-slackness form with the relevant variable in brackets. Of course, if that variable should be positive then the relevant equation holds with equality.

(16) $$X_{Ri}^{n} \geq \beta I_i \frac{p_i - w_R(c_R + \tau_{Ri})}{p_i^2}, \qquad i = A, B,$$

(17) $$X_{ii}^{mi} \geq \beta I_i \frac{p_i - w_i c_i}{p_i^2}, \qquad i = A, B,$$

(18) $$X_{ij}^{mi} \geq \beta I_j \frac{p_j - w_i(c_i + \tau_{ij})}{p_j^2}, \qquad i, j = A, B, \ i \neq j.$$

The zero profit condition is equivalent to the requirement that markup revenues be equal to fixed costs;

(19) $$p_R e_{RR}^{n} X_{RR}^{n} + p_A e_{RA}^{n} X_{RA}^{n} + p_B e_{RB}^{n} X_{RB}^{n} \leq w_R(G_R + F_R) \qquad [n],$$

(20) $$p_R e_{RR}^{mA} X_{RR}^{mA} + p_A e_{AA}^{mA} X_{AA}^{mA} + p_B e_{AB}^{mA} X_{AB}^{mA} \leq w_R(G_R + F_R) + w_A G_A \qquad [m_A],$$

(21) $$p_R e_{RR}^{mB} X_{RR}^{mB} + p_A e_{BA}^{mB} X_{BA}^{mB} + p_B e_{BB}^{mB} X_{BB}^{mB} \leq w_R(G_R + F_R) + w_B G_B \qquad [m_B].$$

Substituting X from (15)-(18) and the markup from (10) and considering the case when all outputs are positive, conditions (19)-(21) become

(22) $$\beta\left[I_R\left(\frac{p_R - w_R c_R}{p_R}\right)^2 + \sum_{i=A,B} I_i\left(\frac{p_i - w_R(c_R + \tau_{Ri})}{p_i}\right)^2\right] \leq w_R(G_R + F_R) \qquad [n],$$

(23) $$\beta\left[\sum_{i=R,A} I_i\left(\frac{p_i - w_i c_i}{p_c}\right)^2 + I_B\left(\frac{p_B - w_A(c_A + \tau_{AB})}{p_B}\right)^2\right] \leq w_R(G_R + F_R) + w_A G_A \qquad [m_A],$$

(24) $$\beta\left[\sum_{i=R,B} I_i\left(\frac{p_i - w_i c_i}{p_c}\right)^2 + I_A\left(\frac{p_A - w_B(c_B + \tau_{BA})}{p_A}\right)^2\right] \leq w_R(G_R + F_R) + w_B G_B \qquad [m_B].$$

Trade must balance, giving us the conditions

(25) $$Y_{ic} - Y_i = nX_{Ri}^{n}(p_i - \tau_{Ri}) + m_j X_{ji}^{mj}(p_i - \tau_{ji}), \qquad i, j = A, B, \ i \neq j.$$

The X sector is thus defined with the number of each firm type given in (22)-(24), outputs given by the nine inequalities in (15)-(18), goods and factor prices given in (9) and (6) respectively. Income levels from (7) and labor demand in the Y sector from (2) serve to close the model.

Formation of a PTA

Suppose that countries A and B form a preferential trade area such that the tariff between them is eliminated and consumers are able to arbitrage across the two regions. Trade in goods within the PTA is integrated ($\tau_{AB} = \tau_{BA} = 0$), but factors remain internationally immobile. A multinational can now service both markets A and B from a single plant in either country A or B while exports from R-national firms remain subject to non-member external tariffs. We assume that strict rules of origin preclude a national firm from cross-hauling, or supplying the high-tariff PTA partner with exports shipped via the low-tariff partner.

Let p_u be the integrated, post-union price in A and B. We rewrite the pricing expressions (11)-(14) as

(26) $p_R(1 - e^k_{RR}) \le w_R c_R \qquad [X^k_{RR}], \qquad k = n, m,$

(27) $p_u(1 - e^n_{Ri}) \le w_R(c_R + \tau_{Ri}) \qquad [X^n_{Ri}], \qquad i = A, B,$

(28) $p_u(1 - e^{mi}_{ij}) \le w_i c_i \qquad [X^{mi}_{ij}], \qquad i, j = A, B.$

and the zero profits restrictions (19)-(21) as

(29) $p_R e^n_{RR} X^n_{RR} + p_u[e^n_{RA} X^n_{RA} + e^n_{RB} X^n_{RB}] \le w_R(G_R + F_R) \qquad [n],$

(30) $p_R e^{mA}_{RR} X^{mA}_{RR} + p_u[e^{mA}_{AA} X^{mA}_{AA} + e^{mA}_{AB} X^{mA}_{AB}] \le w_R(G_R + F_R) + w_A G_A \qquad [m_A],$

(31) $p_R e^{mB}_{RR} X^{mB}_{RR} + p_u[e^{mB}_{BA} X^{mB}_{BA} + e^{mB}_{BB} X^{mB}_{BB}] \le w_R(G_R + F_R) + w_B G_B \qquad [m_B].$

As before we can substitute in for e and X to get the following expressions for the zero-profit condition,

$$(32)\quad \beta\left[I_R\left(\frac{p_R - w_R c_R}{p_R}\right)^2 + \sum_{A,B} I_i\left(\frac{p_u - w_R(c_R + \tau_{Ri})}{p_u}\right)^2\right] \le w_R(G_R + F_R) \qquad [n],$$

$$(33)\quad \beta\left[I_R\left(\frac{p_R - w_R c_R}{p_R}\right)^2 + (I_A + I_B)\left(\frac{p_u - w_A c_A}{p_u}\right)^2\right] \le w_R(G_R + F_R) + w_A G_A \qquad [m_A],$$

$$(34)\quad \beta\left[I_R\left(\frac{p_R - w_R c_R}{p_R}\right)^2 + (I_A + I_B)\left(\frac{p_u - w_B c_B}{p_u}\right)^2\right] \le w_R(G_R + F_R) + w_B G_B \qquad [m_B].$$

3. Analysis of Partial Equilibrium

The systems of zero profit conditions (22)-(24) and (32)-(34) do not yield tractable solutions. In this section, we provide some insights with a simplified, partial-equilibrium model where wages and national incomes are exogenous. Setting $\alpha = 1$ in (1) is sufficient to fix wages w_i in each country at the value of the efficiency parameter θ_i and make national income equal to $w_i \overline{L_i}$.

3.1 Multi-country framework

The systems of equations (22)-(24) and (32)-(34) can be generalized to handle any finite number of countries. We present the problem initially in this more general form and then proceed to work with the special cases of two countries and then three countries as specified in our formal model. A fixed number of countries are identical in terms of endowments and wages. Let r countries maintain free trade consistent with zero tariffs while u countries adhere to a distorted trade regime. Each u country sets an identical external tariff τ, which is levied on an MFN basis. Assume also that all firms, national or multinational, are headquartered in type-r countries.

Under these assumptions, r countries will have a common price p_r. To keep the dimensionality of the problem tractable we assume that if multinationals exist, all subsidiary plants are evenly distributed across the distorted u economies such that they will have a common price p_u. The zero-profit condition for a national firm (n) becomes

$$(35) \qquad \beta I_r r\left(\frac{p_r - wc}{p_r}\right)^2 + \beta I_u u\left(\frac{p_u - w(c+\tau)}{p_u}\right)^2 \leq w(G+F).$$

Rewriting (35) as

$$(36) \qquad \frac{\left((p_r - wc)/p_r\right)^2}{\left(\frac{w(G+F)}{\beta I_r r}\right)} + \frac{\left((p_u - w(c+\tau))/p_u\right)^2}{\left(\frac{w(G+F)}{\beta I_u u}\right)} \leq 1$$

describes an ellipsoid in markups space of dimensionality equal to the number of countries. Due to our symmetry assumptions (36) can be represented on a two-dimensional price plane as a figure very similar to an ellipse with a slight distortion. The center of the locus in (p_u, p_r) space is located at $(w(c+\tau), wc)$, the horizontal diameter is proportional to $2(w(G+F)/\beta I_u u)^{1/2}$ and the vertical diameter is proportional to $2(w(G+F)/\beta I_r r)^{1/2}$. The price pairs that satisfy (35) and (36) are located on and within the ellipsoid.

A multinational that establishes a plant in each of q type-u countries, a type-m_d firm, has a zero-profit condition[6]

$$(37) \qquad \frac{\left((p_r - wc)/p_r\right)^2}{\left(\frac{w((q+1)G+F)}{\beta I_r r}\right)} + \frac{\left((p_u - wc)/p_u\right)^2}{\left(\frac{w((q+1)G+F)}{\beta I_u q}\right)} + \frac{\left((p_u - w(c+\tau))/p_u\right)^2}{\left(\frac{w((q+1)G+F)}{\beta I_u (u-q)}\right)} \leq 1.$$

[6] The shape of this ellipsoid is sensitive to the external tariff in a way that for the national firm is not. Its center is located at $(w(c+\tau/2), wc)$, and both diameters shrink as the tariff rate increases.

Now suppose that all u countries form a customs union. Under these circumstances a multinational will never maintain more than a single subsidiary in the union. The zero-profit locus for such a type-m_u firm is

$$(38) \qquad \frac{\left((p_r - wc)/p_r\right)^2}{\left(\frac{w(2G+F)}{\beta I_r r}\right)} + \frac{\left((p_u - wc)/p_u\right)^2}{\left(\frac{w(2G+F)}{\beta I_u u}\right)} \leq 1.$$

The $\pi_{mu} = 0$ locus is insensitive to the level of the external tariff and has its center at (wc, wc). In all cases, we shall only concern ourselves with the region of the ellipsoidal surface consistent with positive markups in all markets for type-m_u firms, as in Figure 1.

3.2 Two Country Framework

It is useful to review the two-country system of Markusen and Venables (1994), which can be replicated here by assuming that $r = u$ where all type-u countries form a customs union.[7] The $\pi_n = 0$ locus is given by (36) and the $\pi_{mu} = 0$ locus is given by (38). The locus for multinationals differs from that of national firms in that its center located at (wc, wc) is closer to the p_r axis, and its horizontal and vertical diameters are both larger.[8] Consider the northwest section of the ellipsoids as illustrated in Figure 2. The zero-profit locus for multinationals is drawn for the symmetric case under which the slope of the locus along the 45° line is equal to –1. The zero profit locus for national firms will have a flatter slope as their profits are impacted less by changes in the union price than in the external price due to tariffs.

Characterization of equilibrium prices requires the inclusion of demand and supply conditions. In an equilibrium with only national firms, supply and demand market clearing conditions require that

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[7] This section is a condensed version of that found in Markusen and Venables (1994), and additional exposition and various sorts asymmetry are presented there. Those authors allow for firms to be headquartered in the union, which can impact the subsequent analysis for some parameter values, particularly if one wishes to consider the exogenous exclusion of multinationals as a counterfactual. We note here our great debt to their initial work.

[8] Note that if τ is set to zero, then the zero-profit locus for national firms is everywhere inside that for multinationals due to lower fixed costs and no multinationals will exist in equilibrium.

shown in Markusen and Venables (1994), if the initial situation is one of complete symmetry between the union and ROW countries save tariffs and if tariff levels are sufficiently high then only multinationals exist. As income is transferred from the union to non-union countries, holding world income constant, each zero-profit locus is rotated counter-clockwise about the intersection of that locus and n or m_u (such as points N and M, respectively, in Figure 2), corresponding to the relevant mono-firm ray for that locus. This rotation is actually an increase in the horizontal diameter and decrease in the vertical diameter of both zero-profit loci. Given sufficient transfers, the two loci will intersect somewhere between n and m_u and national firms will enter. As income disparity grows the regime will again eventually shift to one that permits only national firms in the rest of the world, a result that holds even if firms are permitted to establish headquarters in the union.

3.3 Three Country Framework

Returning to a three-country world, assume *A* and *B* are potential union partners and are symmetric with a common price, p_u. The graphical representation of m_d firms is something of an intermediate case between national firms and m_u firms. Increasing the MFN tariffs in the pre-union case reduces both diameters of the $\pi_{md} = 0$ locus and moves the center east. A sample curve is illustrated in Figure 2. For this three-country case the price ratio consistent with only multinationals in the pre-PTA equilibrium is given by $p_r / p_u = c_r / (c_u + t/2)$.

How then do the initial tariffs influence the possible change in firm configuration brought on by a PTA? Let's start from the degenerate case of full multilateral free trade with all tariffs set to zero. In this case, the $\pi_n = 0$ locus lies everywhere inside the $\pi_{md} = 0$ and $\pi_{mu} = 0$ loci, no multinationals will exist before or after the PTA and all demand for *X* in *A* and *B* will be met by imports from ROW. Now let the external tariff levels of *A* and *B* increase. This impacts the $\pi_{md} = 0$ locus as described above. The $\pi_n = 0$ locus shifts to the right at a greater pace than does the $\pi_{md} = 0$ locus as the former is more sensitive to the tariff

level. As the tariff increases from zero, the $\pi_n = 0$ locus will eventually intersect the $\pi_{mu} = 0$ locus. There will be no change in the production regime until this intersection occurs above n, as in Figure 3a. At the tariff level at which this occurs, there will be no multinationals in the pre-union situation but there will be after the PTA. In these cases there is clear investment creation, as the expanded market resulting from the PTA justifies the fixed cost of investment.

As tariff levels increase, the $\pi_n = 0$ locus will come to intersect the $\pi_{md} = 0$ locus as well, but analogous to before there will not be any multinationals in the pre-PTA situation until this intersection occurs above n, as illustrated in Figure 3b. It is not immediately obvious from the graphical analysis whether national firms will exist in the post-PTA equilibrium at the tariff level at which multinationals just become active in the pre-PTA equilibrium. Simple numerical comparisons of (36), (37) and (38) suggest a range of tariff levels for which multinationals dominate production following the PTA, but are non-existent before the PTA. At tariff levels where multinationals become active in the pre-PTA equilibrium, national firms will not exist in the post-PTA equilibrium. As tariff levels continue to increase the proportion of pre-PTA multinationals, relative to national firms, continues to increase until the tariff is high enough that national firms are not supported in equilibrium either before or after the PTA. As the gap between line m_d and n is less than the gap between m_u and n, national firms are squeezed out of equilibrium over a smaller range of tariff change (though at higher tariff levels) before the PTA than after.

To summarize, at very low tariff levels the tariff distortion for symmetric countries is insufficient to motivate investment by multinationals. At "middle" tariff levels the distortion is insufficient to motivate investment that permits duty-free access to any single union country, but is sufficient to spur investment when there is duty-free access to the union as a whole. At higher tariff levels, the distortion is sufficient to encourage investment in any single union country regardless of the existence of a PTA.

The PTA has consequences for the number of firms in equilibrium. By assumption each firm, regardless of type, maintains a plant in ROW and ROW is constrained to have no X imports. Thus the

output and markup of every firm in ROW is identical and p_r indicates the number of firms. With constant marginal costs, increases in p_r increases the markup e_{RR} which implies via (10) that market share must increase for each firm. Given a fixed total expenditure share on X an increase in market share can only occur if some firms are forced to exit. The total number of firms is thus strictly decreasing in p_r.

Consider Figure 2 once more which shows $\pi_{md} = 0$ and $\pi_{mu} = 0$ loci. As shown, any tariff level supportive of post-PTA multinationals must entail an increase in p_r, and thus a decrease in the total number of firms, upon PTA formation. Suppose that the $\pi_n = 0$ locus is such that there are no m_d firms. Then pre-PTA prices must lie along n. PTA formation moves the new price equilibrium either to the intersection of the $\pi_{mu} = 0$ and $\pi_n = 0$ loci or to point M. Given the curvature of the $\pi_n = 0$ locus, both possibilities require an increase in p_r. The PTA, while in this case associated with perhaps substantial investment creation (in the sense of increased investment in the union), also implies some rationalization of production which we might expect of a model containing scale economies in the presence of tariff distortion, a sort of investment diversion. Note that this same price increase and rationalization implies a welfare loss for ROW in partial equilibrium.

Suppose that the pre-PTA equilibrium permits only multinationals. It is perhaps conceivable that that price equilibrium could require higher prices than those at M. However, the m_d line is sufficiently low that this is extremely unlikely in the symmetric case, and PTA formation would still increase p_r. In this case, there would be no investment creation. The number of firms decreases, and since each firm maintains exactly one plant in the union the number of plants in the union must also fall. We end up with the rather strong result that the PTA always reduces the total number of firms, while the number of plants in the union will increase for small tariff levels, but decrease for higher tariffs.

The potential for trade diversion and trade creation has been of interest since Viner's introduction of the terms, so it is worthwhile to ask how trade flows are impacted.[9] Recall that national firms export from the rest of the world but multinationals export from union countries. At very low initial tariffs multinationals never emerge and trade patterns are unaffected. At higher initial tariff levels multinationals only emerge upon PTA formation. PTA formation then entails some trade diversion as the exports from national firms are supplanted by the production of multinationals domestically and in the union partner. This necessarily implies some trade creation as multinationals engage in intra-union exporting. While not specifically captured in our model, both the trade diversion and creation could be the result of a sort of intra-firm trade deflection, as a national firm could establish a subsidiary in the union and replace its exports to a union country from ROW with exports from the union partner. It is not clear what happens to total trade flows.

Eventually national firms are entirely displaced from the post-PTA equilibrium and the amount of trade diversion reaches its maximum, as does the amount of investment in the union brought about by the PTA. At still higher initial tariff levels, multinational firms already exist so there will be less trade diversion and the amount of trade diversion upon PTA formation will fall (as will investment creation). At tariff levels where only multinationals exist both before and after the PTA there is no trade between ROW and the union before or after trade, so there will be no trade diversion. There will still be some trade creation as intra-union barriers to trade are lowered.

4. General Equilibrium

The general equilibrium analysis is complicated by endogeneity of factor prices and national income. Multinational entry, as well as expansion of existing multinational production, will draw labor out of the Y sector which increases the marginal product of labor in Y when combined with sector-specific

[9] The results discussed here are quite sensitive to the exogenous exclusion of national firms based within the PTA. The existence of such firms, particularly under the Cournot conduct assumption, would substantially mitigate the trade effects of the PTA.

capital. Given a fixed number of X plants, X output is positively related to the wage. Likewise holding aggregate X supply fixed, the number of X plants (and hence fixed plant costs) is also positively correlated with labor costs.

The formation of a PTA has an effect on regional investment much like that described by the Horstmann and Markusen (1986) model of trade liberalization with national firms. The relaxation of internal tariff barriers essentially expands the market size and thus increases the quantity of X supplied by existing multinational plants. This implies an efficiency gain in welfare as with increasing returns to scale at the plant level, each firm moves down its average cost curve. As the market size grows, new multinational plants may also be attracted to the integrated region. The *market expansion* effect provides an incentive for *investment creation*. Offsetting this effect of the PTA is the increased competition each multinational plant faces when confronted with sales from multinationals in the partner country. Regional integration promotes regional competition between multinationals and leads to an exit of regionally-redundant firms or *investment diversion*. As an exit of firms frees resources from plant fixed costs, this implies an opportunity for *procompetitive gains* of the Horstmann and Markusen variety. An important distinction between our model and that of Horstmann and Markusen is that we assume multinational production is inherently second best as it arises, in part, in order to jump tariff barriers.[10] An additional determinant of multinationality is the level of protection provided by the external tariff.

While we were able to obtain limited analytical solutions to the general equilibrium problem, these were largely intractable due to nonlinearities in the system and the possibility of corner solutions. To characterize the general equilibrium in the presence of these complications, we simulate the model and perform numeric comparative statics exercises.[11] In each experiment, a pre-union equilibrium and a post-union equilibrium is computed, and compared, as parameters of interest are varied. This technique allows us to conduct computional comparative statics evaluations on simulated investment creation (and

[10] Of course, another justification for multinational production that is consistent with our model is the existence of transportation costs and non-tariff barriers to trade.

diversion), which we measure as a positive (negative) percentage change in multinational plants in a country or $d m_i / m_{i0}$ where m_{i0} is the number of multinational plants before the formation of the PTA.[12] Many possible scenarios are imaginable and we limit our scope of inquiry to a few illustrative and interesting cases.

4.1. Common External Tariffs

In the first set of experiments, A and B are assumed to maintain common external union tariffs both with and without a PTA. This situation approaches that of a customs union with the exception that, in practice, tariffs are rarely harmonized prior to the formation of a union. The counterfactual experiment is useful, however, in decomposing the investment effects of the formation of a PTA while hold external rates of protection essentially fixed. Assume both A and B have identical endowments, technologies, and preferences. Unless otherwise noted, R is assumed to be three times as large as either A or B and relatively Labor abundant, permitting R to service headquarter fixed costs for a large number of national and multinational firms. Simulations demonstrate the impact of changes in external tariff rates, partner size and relative factor endowments, and the size of the member region relative to the rest of the world. Results are given in Figures 4 to 6.

4.11. Comparative Advantage

A rough measure of a country's comparative advantage is its endowment of labor relative to Y-specific capital. In the first exercise (Figure 4), we define country i's relative labor endowment as a factor (l_{iL}) of benchmark national income with factor prices scaled to one. A's and R's labor endowment is constant at $l_{AL} = 0.50$ and $l_{RL} = 0.75$. B's labor stock is varied over a range while the endowment of the Y-specific factor is computed as a residual to maintain a constant benchmark national income,

[11] We employ Rutherford's PATH algorithm and non-linear complimentary solver MPSGE.

$$K_B = [I_B - \sum_k^{n,mA} \sum_j^{W,A} X_{jB}^k \tau_{jB}]^*[1-l_{BL}]$$

to maintain a constant benchmark national income equivalent to A's ($I_A = I_B$). As X production is relatively labor-intensive, B moves from comparative disadvantage in X production, relative to both A and R, for very low levels of l_{BL} to a comparative advantage in X as we move along horizontal axis of Figure 4.[13] The vertical axis measures the change in firm number in A and B (Panels 1 and 2, respectively) resulting from the formation of a PTA. Each curve represents firm entry and exit responses at a specified common external tariff.

Several observations are of interest. First as the level of external protection increases, the motivation for either investment creation or diversion is exacerbated. This result is consistent across all customs union counterfactuals. Raising the tariff barrier increases the incentive for multinational firm entry in the AB region in both the pre- and post-union environment.

Second, the rate of change in the level of multinational production depends on the comparative advantage of the partner country, but in a complicated manner. This experiment considered parameter values for which the customs union involves investment creation in country A over the relevant labor endowments of B. Yet an ambiguous relationship emerges between the *change* in percentage change in A multinational plants and B's relative labor endowment, ∂ (d m_A / m_{A0})/ ∂ l_{RL}. For very low B labor endowments, as l_{BL} increases investment creation in both A and B occurs at an increasing rate, though at a more accelerated rate in A indicating A's superior ability to respond to the expanded market. A turning point occurs at roughly the endowment factor $l_{BL} = 0.2$. Thereafter there is a negative relationship between l_{BL} and A's investment creation ($d\ m_A/m_{A0}$) while B's investment creation increases rapidly in l_{BL}. In this region (roughly $0.2 < l_{BL} < 0.35$), marginal improvements B's comparative advantage in X allow B

[12] In order to obtain unique solutions, we impose an additional restriction on the general model. It is assumed that consumers differentiate X products by firm type (n, m_A, m_B) at an elasticity of substitution that approaches that of perfect substitutes. This allows us to rule out computational equilibria with extreme crosshauling.
[13] Note that R is assumed to have the highest comparative advantage in X with a Labor multiplier of l_{RL}=0.90.

multinationals to better exploit the growing market size which, in turn, generates increased competition for *A* firms.

As *A* and *B* converge ($0.35 < l_{BL} < 0.65$), *A* investment creation plateaus while *B*'s multinational entry grows at a diminished rate. This appears to indicate, on *B*'s part, higher investment levels in the pre-union protected market and hence less room for investment creation in the integrated market. As external tariffs rise, the tariff-jumping motivation for direct foreign investment is enhanced. Where *B's* relative endowment levels approach *R's*, the regime shift to a PTA will tend to dampen this incentive for investment as multinationals in *A* can service the region duty free. Free preferential trade encourages rationalization of production and an exit of redundant multinational plants that existed, prior to the agreement, in order to jump tariff barriers.

4.12. Relative Partner Size

Alternatively, countries may have similar relative endowments but may differ in absolute size. In Figure 5, potential partner countries (*A* and *B*) are assumed to be identical in terms of *relative* factor endowments and technologies. *B*'s absolute size (measured as the pre-union value of endowments), however, varies as a proportion of *A*'s factor endowment along the horizontal axis of Figure 5 while investment creation, or the percentage change in multinational plants, is measured on the vertical axis. Again, variations in the external tariff rate are represented by shifts in the investment creation curves.

A clear and unambiguous pattern emerges. The larger is *B* relative to *A*, the lower is the opportunity for investment creation in *B* and the greater is investment creation in *A*. As discussed by Baldwin and Venables (1995) in the case of national firms, upon integration multinationals are able to serve the region from plants located in either *A* or *B*. This favors investment creation in the smaller country as they gain improved access to markets in the large country. For the large country, the gain in market access is relatively small while the increased competition from foreign plants may be substantial. In addition, the larger is *B* the relatively greater the number of multinationals producing in *B* prior to

integration. Integration leads to a redistribution of production in favor of the small country as its plants have more to gain in terms of enhanced market access. Indeed for sufficiently low tariff levels and large B country size, the formation of a customs union is accompanied by investment diversion in B.

4.13. Size of the Integrating Region Relative to ROW

A third numerical exercise considers the impact of the PTA size relative to R on regional investment by simulating increases in R's endowments holding relative endowments (K_R/L_R) constant. Potential partner countries (A and B) are assumed to be identical in terms of national income, relative factor endowments, technology, and preferences, and external tariffs on X imports. We examine the effect of changes in external tariff rates and R's size on post-PTA FDI in Figure 6.

A clear trend is evident. The number of multinational plants in each country is increasing in relative PTA size at an increasing rate, or equivalently decreasing in ROW size at a decreasing rate. The relatively larger is the integrated region, the greater the market-access incentive for ROW firms to jump the tariff barrier through DFI. Second, multinationality appears to be increasing in the external tariff rate. This indicates that for these parameter values, the incentive to jump tariff barriers is more pronounced when A and B engage free regional trade then when they do not. The percentage change in firms within the union appears to converge across tariff levels as ROW size expands.

4.2. Free Trade Agreements

The second set of experiments models an additional level of distortion as external tariffs differ between A and B. The policy regime shift resembles the formation of a free trade agreement (FTA). A and B initially set independent MFN tariffs on imports from all trading partners. Upon formation of a FTA, A and B eliminate tariffs internally but maintain sovereign external tariffs on imports from R. Rules of origin require complete local content in the manufacturing of X to qualify for preferential access to FTA markets. This eliminates the possibility of cross-hauling as R is not able to service the high-tariff country with

exports deflected through the low-tariff country. While the results are largely comparable to those obtained in counterfactuals with a common external tariffs, they are included for completeness in Figures 7 to 9.

In each diagram, the analysis differs from Figures 4 to 6 in that each investment creation curve represents firm entry and exit responses at a unique *relative* tariff rate (τ_{RA}/τ_{RB}).[14] While multinational responses are similar to those observed with common external tariffs, one important distinction exists. The higher is the tariff in A relative to B, the greater is investment creation (or lower is diversion) in B and the lower is investment creation (or greater is diversion) in A. The tariff wedge implies a over-investment in the high tariff country, which drives up labor prices in the non-integrated equilibrium. The formation of a FTA tends to redistribute investment more evenly throughout the region until factor prices are equalized.

5. Concluding Remarks

In a general equilibrium model with endogenous foreign direct investment, we analyze a regional agreement between host countries. Results differ in important ways from those obtained in similar models which ignore FDI. First, it is unclear whether FDI inflows will rise or fall upon the formation of a preferential trading arrangement. Second, the level of external tariff has a magnification effect on investment creation and investment diversion. Third, upon integration investment is redistributed within the region towards the smaller, lower-tariff countries. Fourth, the larger is the region relative to the rest of the world, the greater will be investment creation.

[14] In each case, B's tariff is held constant at $\tau_{RB} = 0.02$.

Figure 1

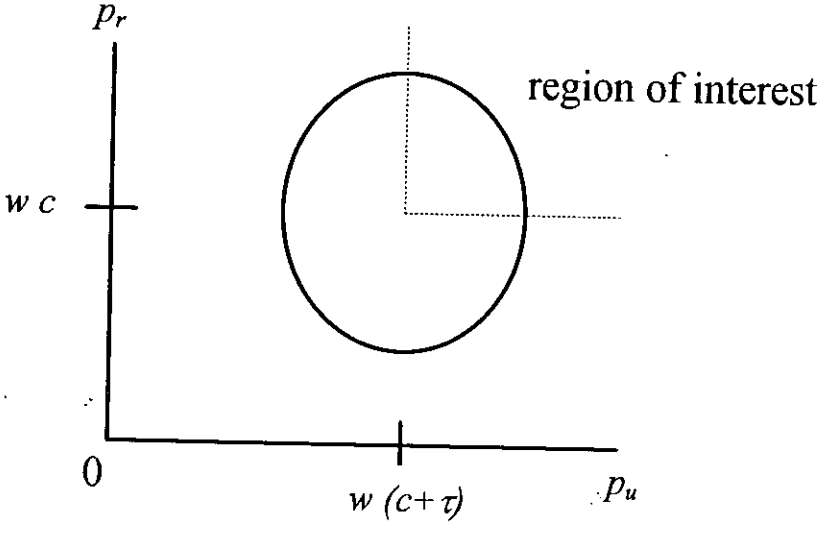


Figure 2

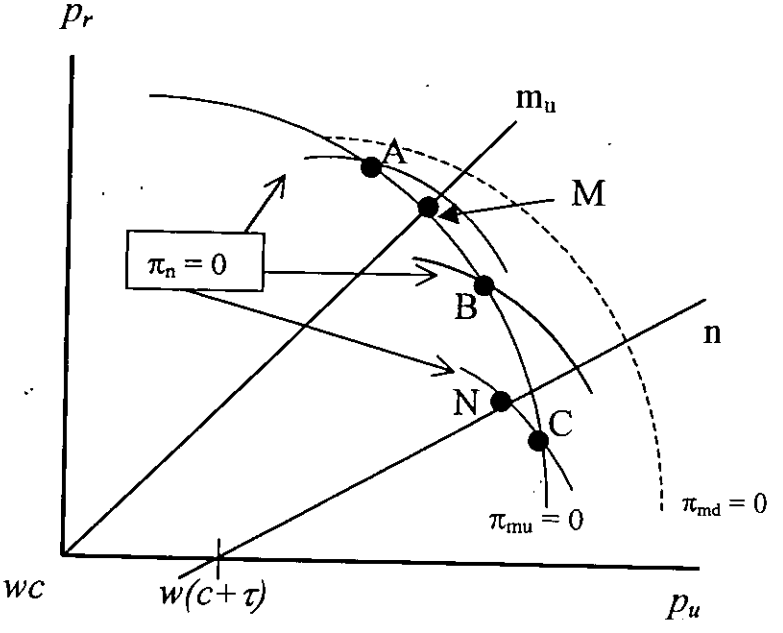


Figure 3

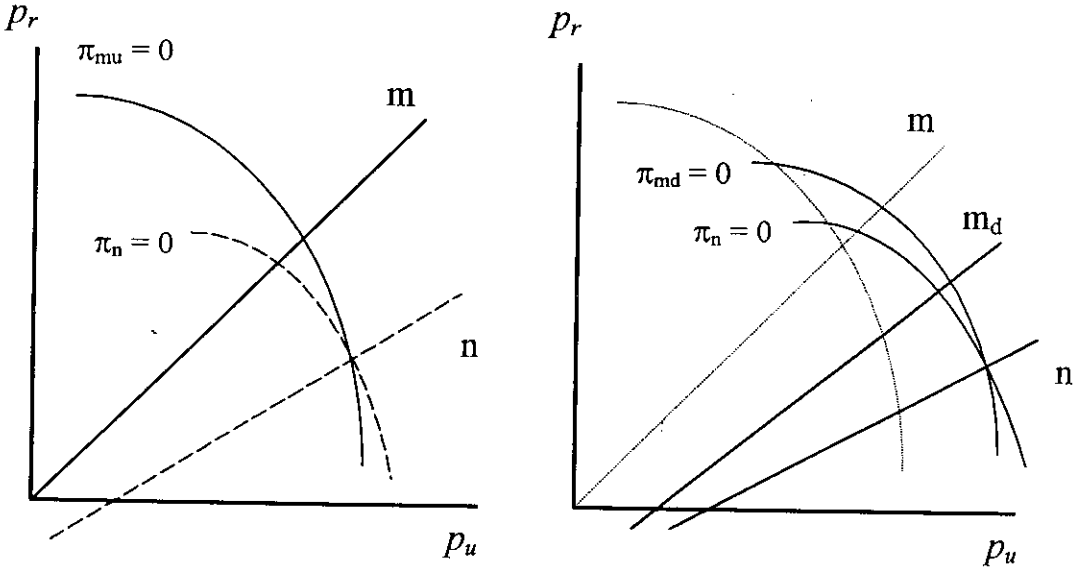
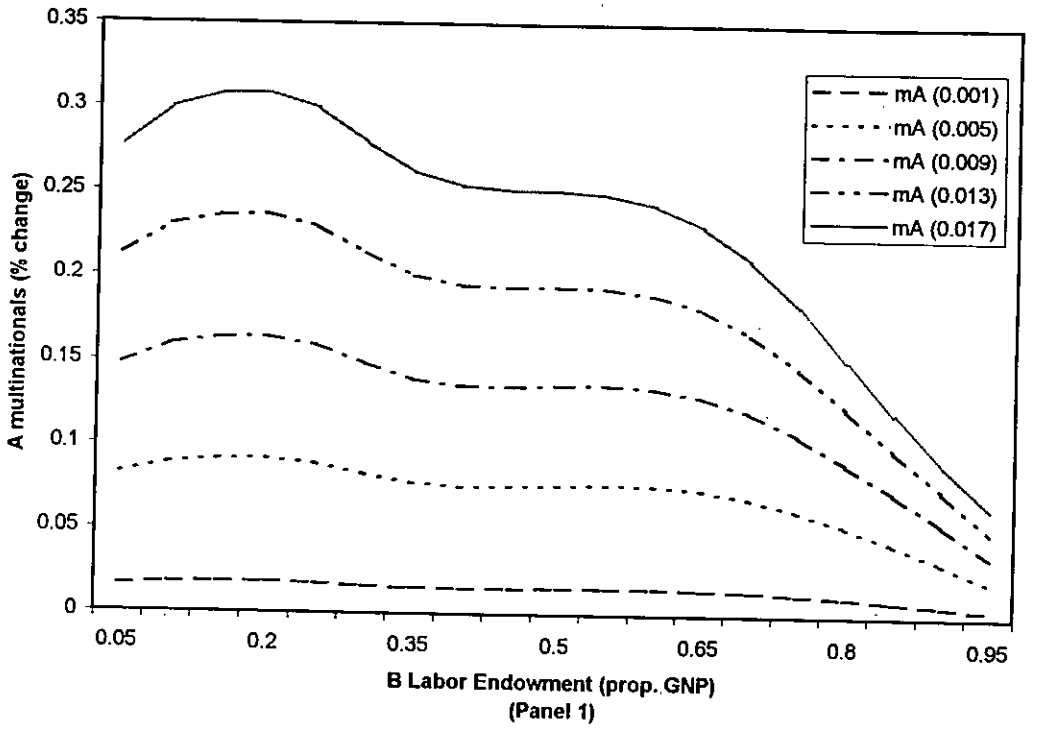


Figure 4: Investment Creation and Comparative Advantage with Customs Union



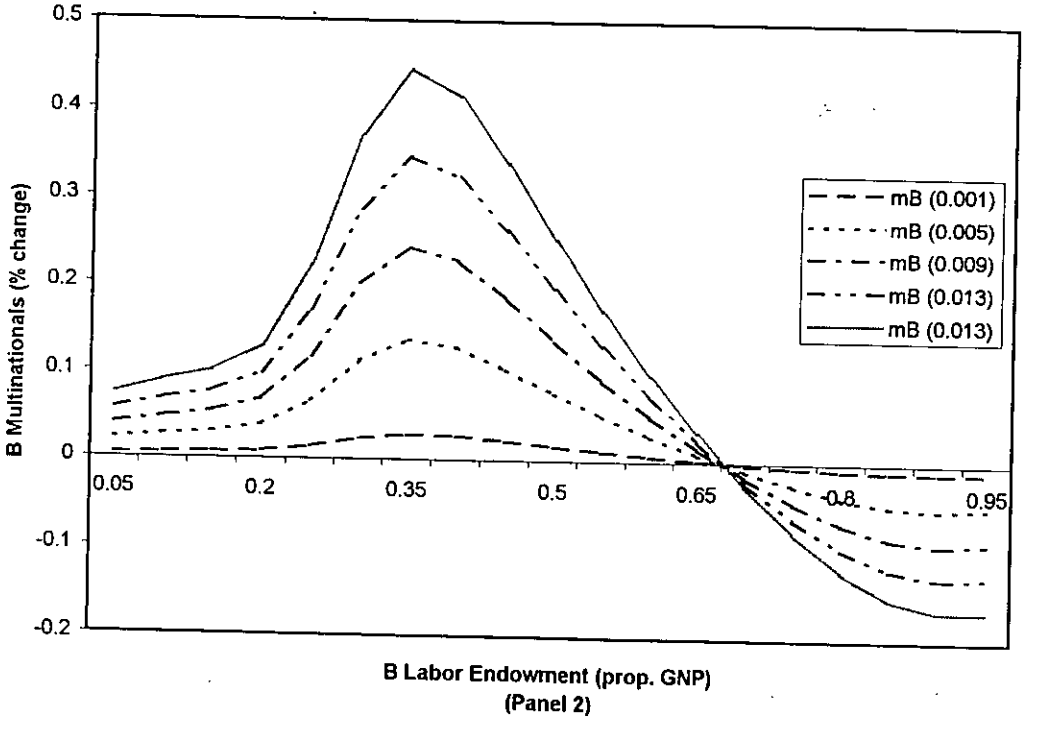
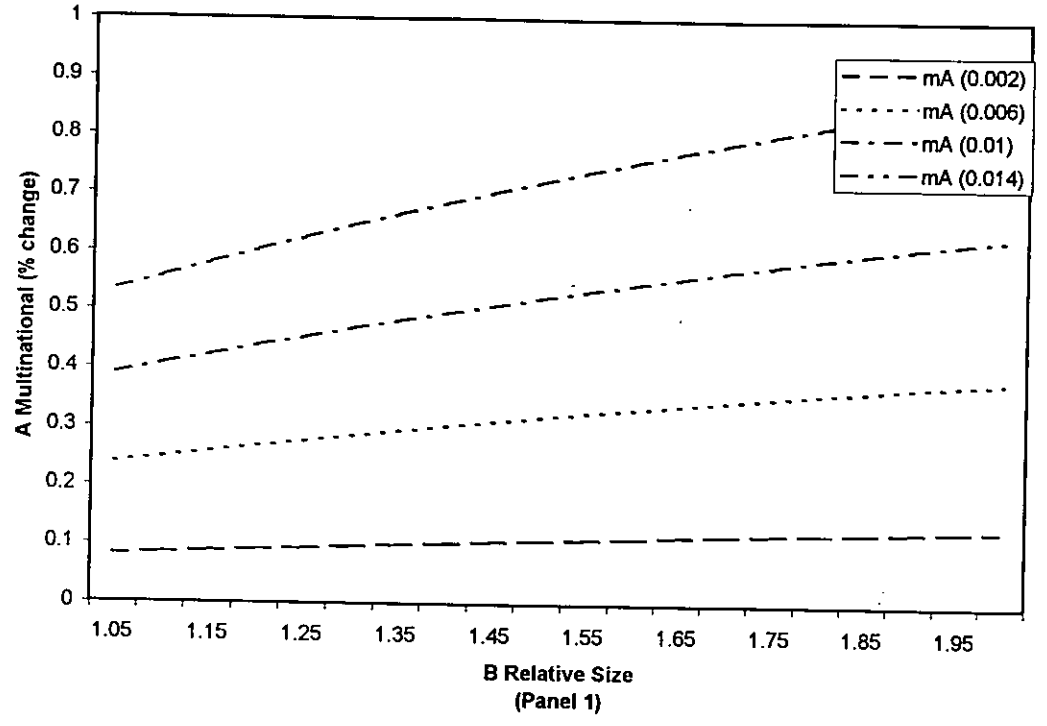


Figure 5: B Size and Investment Creation with Customs Union



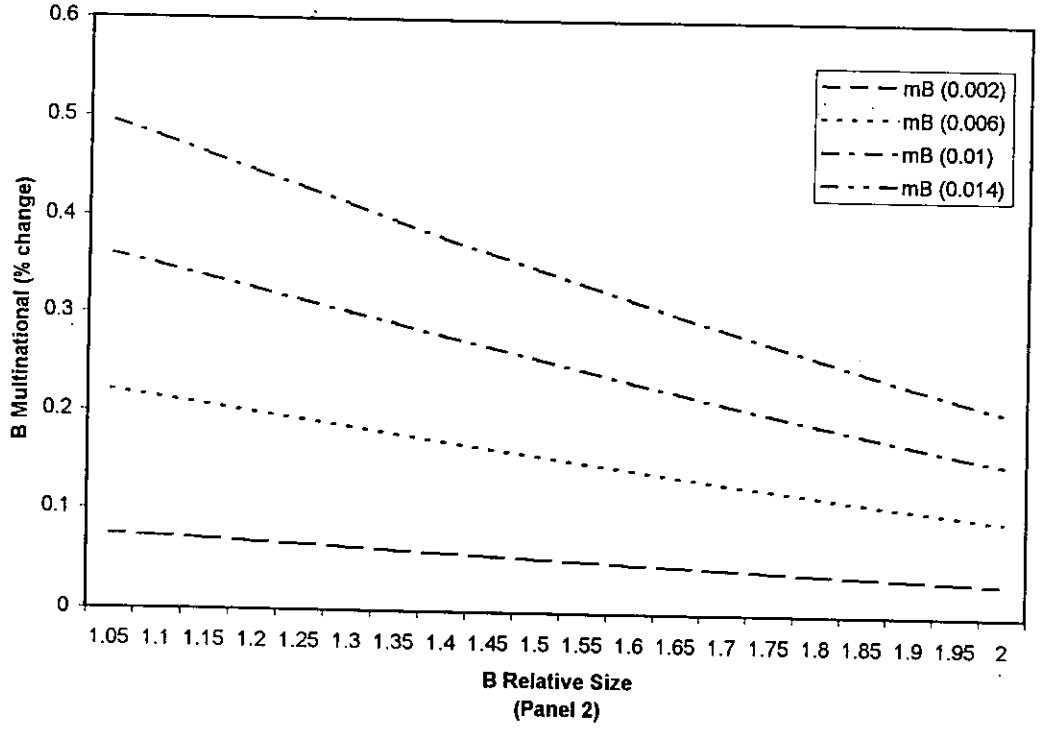
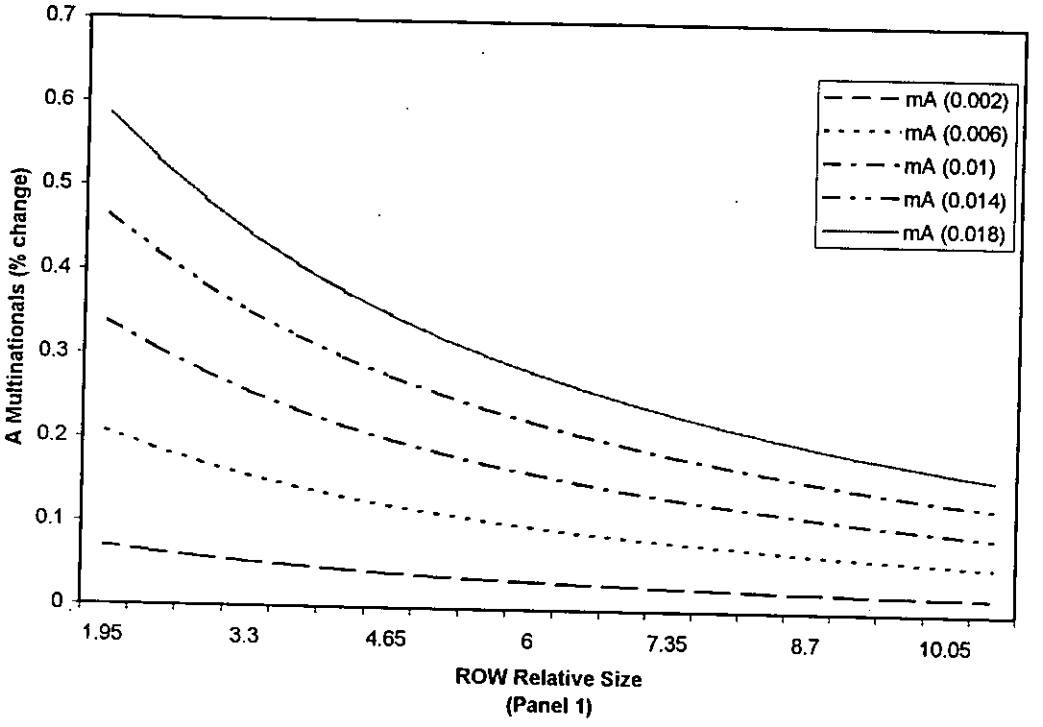


Figure 6: ROW Size Relative to Integrated Region
Investment Creation with Customs Union



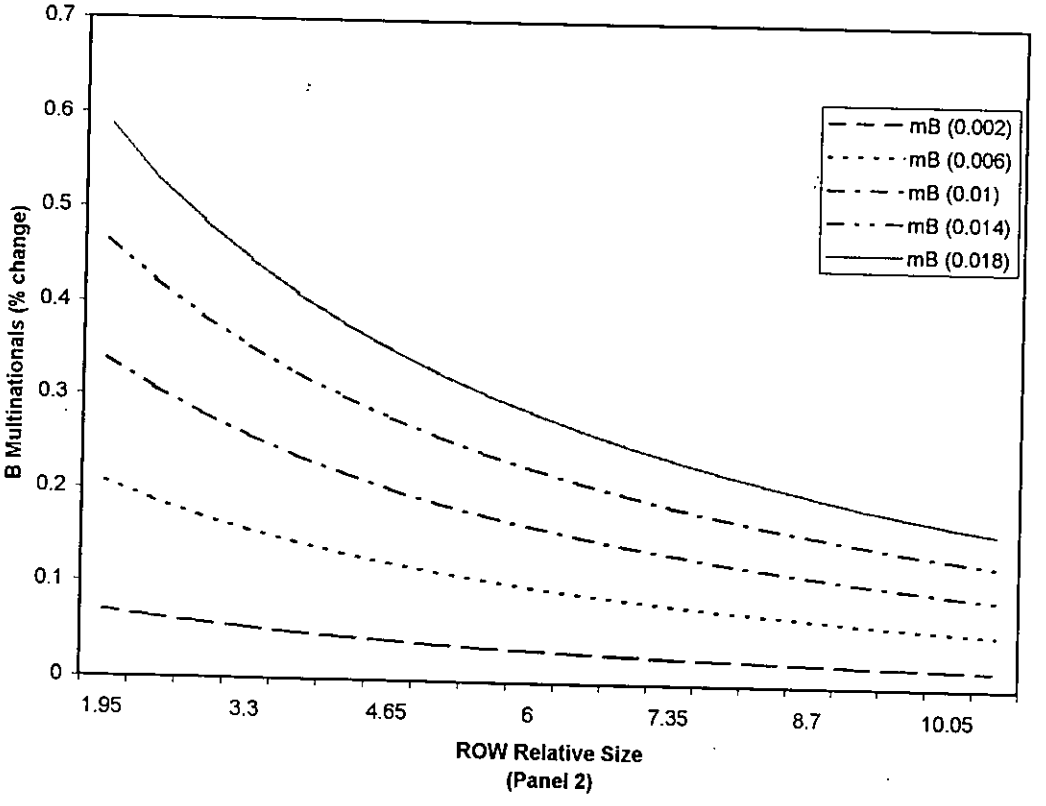
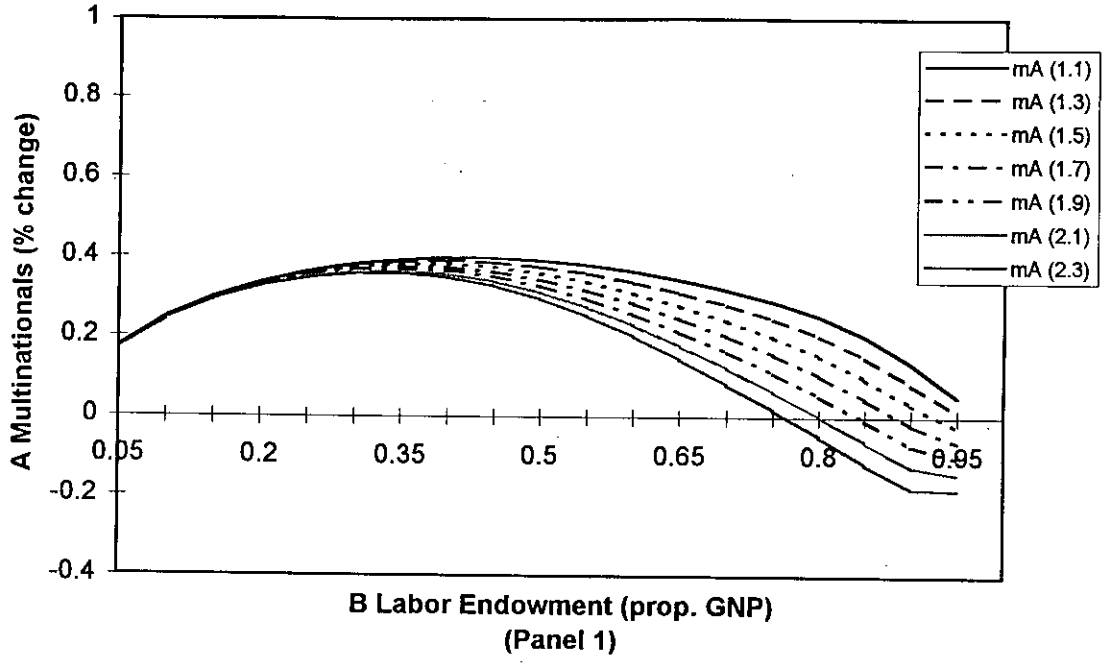
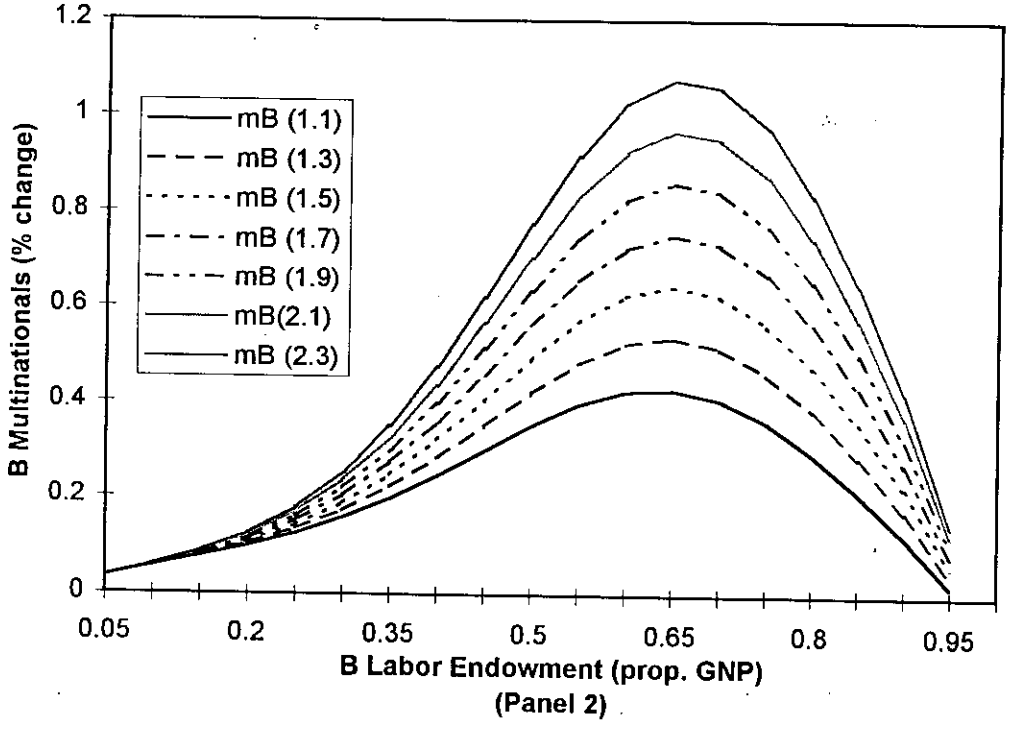


Figure 7: Comparative Advantage and Investment Creation with Free Trade Agreement

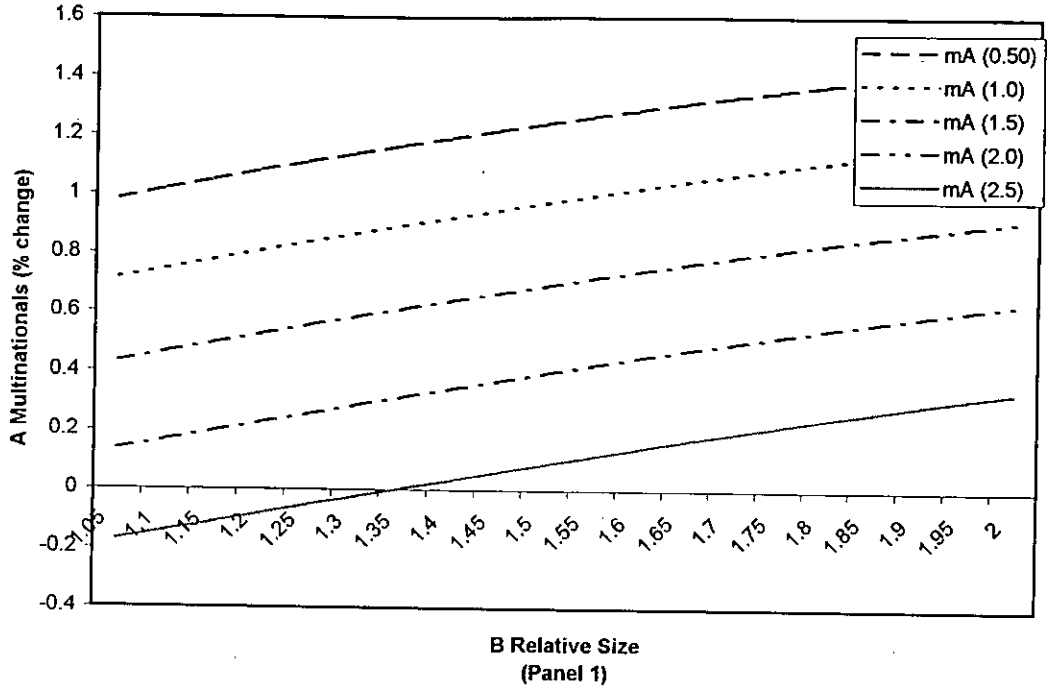


(Panel 1)

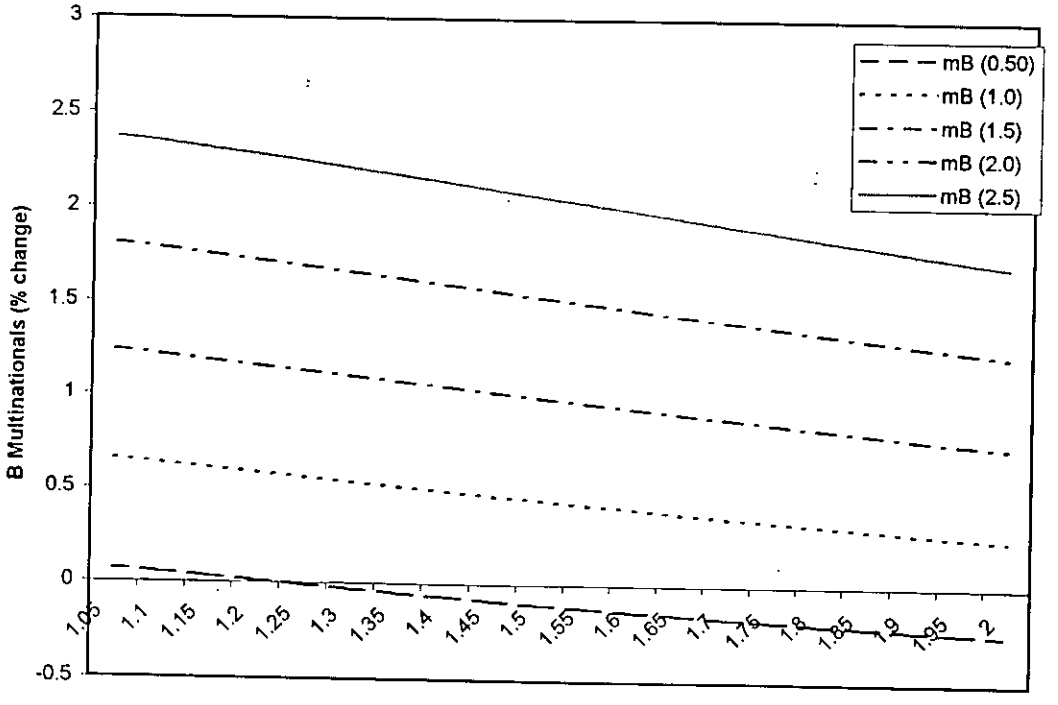


(Panel 2)

Figure 8: Investment Creation and B Size with a Free Trade Agreement

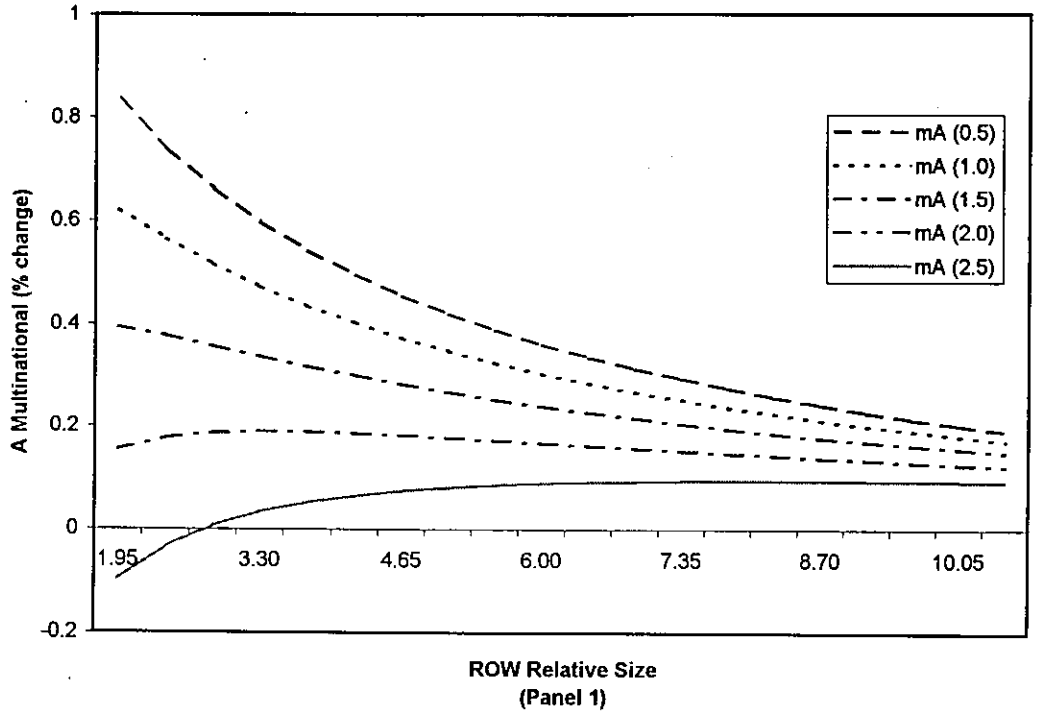


(Panel 1)

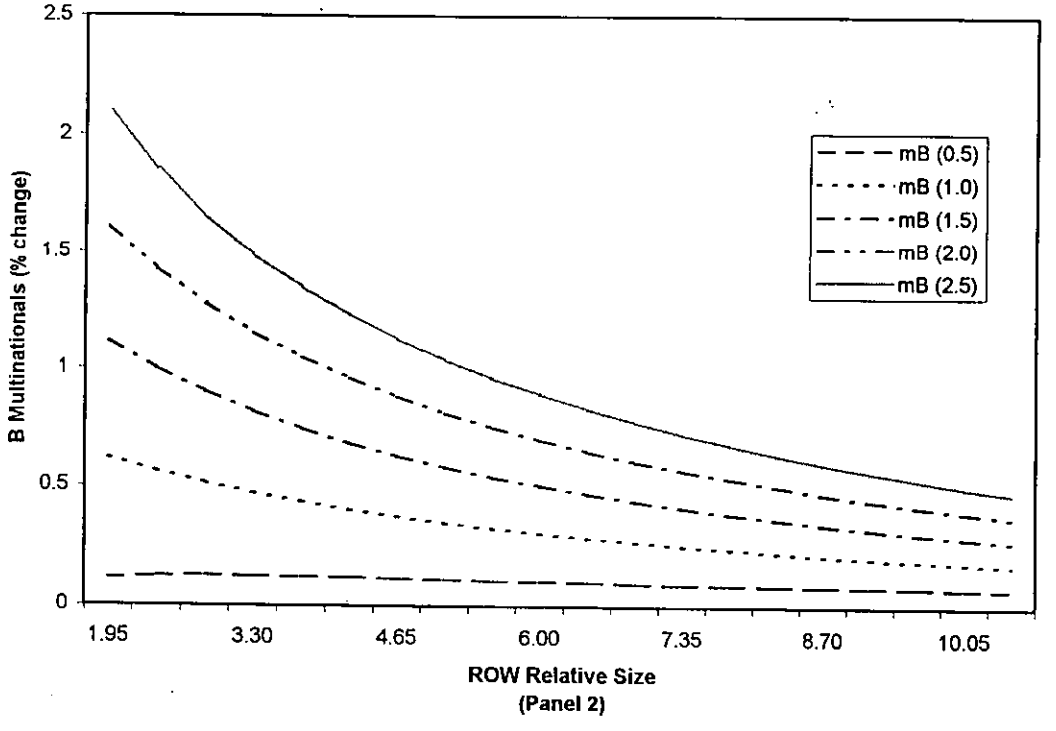


(Panel 2)

Figure 9: ROW Size Relative to Integrated Region with Free Trade Agreement



ROW Relative Size
(Panel 1)



ROW Relative Size
(Panel 2)

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