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Abstract:
Risks that are associated with an uncertain trading world have been dealt with using two different techniques in the literature: defensive, or insurance approaches, and preventive, or self-protection approaches. Much of the earlier work was emphasized by security issues but with the end of the Cold War attention turned toward preventive approaches. This paper argues that the incentive for loss prevention leads to some form of cooperative regional integration. Inclusion of uncertainty positively contributes to the overall customs union literature. The optimal level of integration, political or economic, is found and then using simple comparative statics, the effects of some changes in the underlying parameters of the economy on the optimal level of integration are examined. Multilateralism and regionalism are concluded to be complements.

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1 Introduction

The question of incentives for the formation of regional integration arrangements is a timely one. Nearly every country in the world is a member of, or in the process of discussing membership in, one or more regional integration arrangements. Currently, 144 countries are members of the World Trade Organization (WTO); 150 regional trade agreements are in force, most of which have been concluded within the last 10 years. Agreements concluded between developing countries account for 15% of the total.[1] This resurgence in regionalism signifies some important changes in the relationship between the principal economic actors, GATT/WTO as well as the increased advantage of regional cooperation.

While the relative merits of joining such arrangements have been debated for some time, the economic explanation for this recent proliferation remains unclear. It is not at all apparent that trade creation is an inevitable outcome of trade integration.[2] And, if that is the case, then there must be an alternative explanation for the recent proliferation of regional integration agreements (RIAs). The standpoint of this paper is that the expansion of regional integration stems from the increasing uncertainty associated with trade liberalization.

As the benefits of trade, specialization, and comparative advantage have increased, so have the risks from trade and openness in the global economy. Financial crises can no longer be contained in one country but are more frequently spread to neighbors, and across the globe.[3] Conflict interrupts trade, e.g., trade war over bananas can spread to other commodities and severely damage regional well-being. This paper argues that the incentive for loss prevention takes the form of cooperation via regional integration.

The economics literature offers two ways to deal with activities associated with uncertainty: defensive and preventive. The defensive approach is associated with the insurance literature; the preventive approach is associated with the self-protection literature.

The distinction between self-insurance and self-protection was first defined by Ehrlich and Becker (1972). Self-insurance expenditures can reduce the size of the loss while self-protection expenditures can reduce the probability of suffering a loss.[4] A substantial portion of the work dealing with uncertainty has been connected to security issues where the majority use the defensive approach by emphasizing loss minimization due to unexpected occurrences. The dominant strategy takes the form of stockpiling goods, subsidizing domestic production, or some other variety of self-insurance.

In an important contribution, Perroni and Whalley (2000) argued that regional trade agreements (RTA) are sought by small countries in order to serve as 'protection' against a global trade war, i.e., the possibility that an RTA acts as an insurance arrangement for the small country. Whalley (1998) also depicted RTAs as insurance arrangements because he argued that smaller countries seek safe-haven agreements with larger trading partners to help avoid being sideswiped by protectionist barriers imposed by the larger trading partners, even those directed at other countries, e.g., U.S. against Japan or the European Union. The above arguments result in self-insurance arrangements (to lower the size of the loss) which mask the possibility that a self-protection solution (to lower the probability of the loss) is what is actually being sought.

With the fall of the Berlin Wall, the focus of security studies has shifted from defensive to preventive. McGuire (2000) integrated the classic security argument for protection via tariff use with the alternative/complement of stockpiling.[5] However, prevention has an older root in the literature. Perhaps the earliest contribution using the preventive approach dealt with customs unions. This literature, by and large, has focused on the static welfare gains, or losses, of the members versus those of the rest of the world. Within this context, the existence of the customs union is usually taken as a given; and only

recently has the theoretical question of formation been included in this discussion.[6] Presently, this literature has further expanded to include the examination of a more general motivation for regional integration formation.

This paper seeks to provide a general explanation for the proliferation of RIA's by proposing a model of self-protection, i.e., the prevention of loss. This model unifies fundamentals from defense economics, the study of customs unions, and expected utility literatures. The results are independent of RIA type and size.

For example, the degree of regional integration is most shallow in Asia. Traditionally RIAs have been less popular yet both the Association of South East Asian Nations and APEC have become much more active since the region's recent bout of 'Asian flu'.[7] The formation of an Asian Free Trade Area no longer remains a remote possibility. In Southern Africa, the degree of integration is deeper. States have sought more formal institutional mechanisms to reduce the dependence of the region on South Africa through the creation of a development community (SADCC); the ultimate goal is a customs union. In Latin America, experimentation with regional integration has included FTAs, Customs Unions, and now Mercosur where Economic Union is the aspiration.

Europe has the longest tradition and the deepest level of regional integration. There are many historical examples of self-protection in the form of cooperative agreements. Irwin (1993) contends that the 1860 Anglo-French commercial treaty was influenced by the possibility of war because of France's opposition to Austria's influence in Italy.[8] The formation of the European Community also has its roots in the aim to "prevent war and maintain peace." Trade and broader integration has created a European Union in which Germany and France at war is an impossibility.

The above examples illustrate how the degree of integration directly lowers the probability of an unforeseen event. The main finding of this paper is that countries do choose to self-protect up to a certain point. The strength of the multi-lateral trading system matters and is linked to enforcement ability and institutional development. Institutional development is, however, indeterminate in this paper albeit the relative status of a hegemon is examined. A simple simulation shows that the level of integration cannot increase indefinitely; normally, regionalism will attain an optimal level.

The paper is organized as follows: the theoretical framework and the optimal level of regional integration is found in Section 2. How changes in the underlying cost parameter might affect the optimal level of integration is explored briefly in Section 3. The main result linking multilateralism and regionalism is discussed in Section 4. Section 5 concludes.

2 A Model of Optimal Integration

In this paper, countries are treated as utility maximizers facing an uncertain outcome. A country faces the possibility of a "bad" event that may range from trade disruption to full blown trade war, or it may be the non-occurrence of a "good" event.[9] These events are generally influenced by a third more powerful country or organization, but this need not be the case. Obviously, nations concerned about actions by other countries, especially those more powerful, will respond to any perceived uncertainty.

The introduction of an expected utility model of uncertainty allows motives for formation to be more adequately explained. Contrary to the previous literature concerning customs unions and free trade areas, size is not a consideration in this model. There is also no presumption that developed countries are not influenced by a self-protection incentive for cooperation. In addition, since the focus of this inquiry is to isolate the motivation of

countries seeking to enter regional integration arrangements, the simplest model possible is constructed to highlight the choice of integration.

For simplicity, there are two states in the uncertain world. These two states are labeled trade war (T), and no trade war (N). A state of no trade war is strictly preferred to a state of trade war and, therefore, utility is state dependent. To reduce the impact of a trade war, a country may take a variety of preventive actions in order to lower the probability of the uncertain state, i.e., that of a trade war. Taking preventive actions are akin to purchasing self-protection.

As stated, a country is an expected utility maximizer and utility is state dependent. Use of the state preference approach allows us to capture the fact that the country's preferences for goods and services depend on the state of nature under which they are available. The income constraints are thus different between the two states: trade war and no trade war.[10] The degree of integration affects the probability of a trade war in a variety of ways. The probability of war decreases if: a more secured market increases regional economies of scale; development of common institutions improves the quality of markets; membership provides a dedicated market; trading clubs cut tariffs; and a most favored nation status is assured.

The country wishes to change the probability of a trade war through some political or economic integration, indexed by γ, where $\gamma = \mathbf{(0,1]}$. Here cooperation is assumed to always exist since zero levels of integration or cooperation imply autarky. ***Figure 1*** outlines the basic characteristics of integration for the purposes of this paper. Movement from one level of integration to another will be referred to as a *deepening* of integration. Note that γ captures the formation of a new RIA, whether between countries or between blocs, as well as

the deepening of an existing RIA. We are interested in obtaining the optimal level of integration, γ^*.

A cost is associated with integration. Costs are assumed to be small for low levels of integration and high for greater degrees of cooperation. Because the development of institutions serves to aid integration, the cost of cooperation also includes institutional development costs, e.g., the costs of dismantling existing institutions in favor of new ones, time costs of implementation, start-up costs of agreements, and so on. These costs may be considered purely monetary but one should not entirely ignore the possible non-pecuniary political costs.

Let the cost associated with each level of integration be $c(\gamma)$, where $c'(\gamma) > 0$ and $c''(\gamma) > 0$. Thus, as integration increases, the costs increase at an increasing rate. Let the subjective probability of a trade war $\alpha(\gamma)$ be a function of γ, where $\alpha'(\gamma) < 0$ and $\alpha''(\gamma) > 0$. We assume that the probability of a trade war decreases as the level of integration increases, and, that as the level of integration increases, the rate of change of the probability increases. In other words, the probability of a trade war abates ***slower*** with increasing integration.

Assume that a country produces and trades $\mathbf{x}$, the numeraire good, and imports another good, $\mathbf{y}$. Quantities of $\mathbf{x}$ in a trade war and no trade war will be different. Let domestically produced $\mathbf{x}$ in a state of trade war be labeled $\mathbf{x_T}$, and in a state of no trade war, $\mathbf{x_N}$. $\mathbf{y_m}$ is the imported good and is traded at $\mathbf{p_w}$, the world price. During a trade war, $\mathbf{y}$ is no longer able to be imported and must be domestically produced so, let $\mathbf{y_D}$ be the domestically produced $\mathbf{y}$ in a trade war and $\mathbf{p_D}$, be its domestic price. $\bar{x}$ is the country's resource endowment. Changes in prices are assumed to completely reflect the transaction costs for reallocation.

For simplicity, a specific utility function: $-e^{-RW}$ is employed,[11] where R is a constant absolute risk aversion coefficient and is assumed to be greater than zero, and W represents the wealth of the country. The maximization problem is,

$$\begin{aligned} &\underset{x,y}{Max}\, E(\cdot) = \underset{x,y}{Max}\left\{\alpha(\gamma)\left[-\exp(-R(x_T^{\beta} y_D^{1-\beta}))\right] + (1-\alpha(\gamma))\left[-\exp(-R(x_N^{\theta} y_M^{1-\theta}))\right]\right\} \\ &\textit{subject to} \\ &x_T + p_D y_D = \bar{x} - c(\gamma) \qquad \textit{in the state of trade war} \\ &x_N + p_w y_M = \bar{x} - c(\gamma) \qquad \textit{in the state of no trade war} \end{aligned} \tag{1}$$

The share of consumption of the two goods in each state is represented by a Cobb-Douglas function with **0< β <1** and **0< θ <1**, where **β** is the share of **x** in a state of trade war and **θ** is the share of **x** in a state of no trade war. Because more of the imported good **y** will be consumed during the state of no trade war, it is plausible to assume that the share of **x** consumed during the state of no trade war is smaller than that during the state of trade war, therefore, **β>θ**. The world price of **y** is strictly greater than zero and is less than the domestic price of **y** in a state of trade war.

Given ***c(γ)*** and ***α(γ)***, i.e., setting **γ** constant, and solving Equation (1) with respect to ***x*** and ***y*** subject to the income constraints, we obtain a new maximization problem.

$$\begin{aligned} &\underset{\gamma}{Max}\left\{\alpha(\gamma)\left[-e^{-RT}\right] + (1-\alpha(\gamma))\left[-e^{-RN}\right]\right\} \\ &\textit{where} \\ &T = (\bar{x} - c(\gamma))\,\mathrm{B} \qquad \textit{and} \quad N = (\bar{x} - c(\gamma))\Theta \\ &\mathrm{B} = (\beta)^{\beta}\left(\frac{(1-\beta)}{p_D}\right)^{1-\beta} \quad \textit{and} \quad \Theta = (\theta)^{\theta}\left(\frac{(1-\theta)}{p_w}\right)^{1-\theta} \end{aligned} \tag{2}$$

Solving the above maximization problem with respect to **γ**, we obtain the following first order condition.

$$\alpha'(\gamma^*)\left[e^{-RT} - e^{-RN}\right] = c'(\gamma^*)\left[\alpha(\gamma^*)(-e^{-RT})(R\mathrm{B}) + (1-\alpha(\gamma^*))(-e^{-RN})(R\Theta)\right] \tag{3}$$

where T, N, B, and Θ are as above.

The first order condition yields an optimal γ^*.[12] The left hand side of Equation (3) is the marginal benefit of the activity γ, measured in the utility of the two states. The right hand side is the marginal cost weighted by the expected marginal utility of the two states. A country therefore chooses the optimal amount of integration where the marginal cost of integration equals the benefits derived from decreasing the probability of the bad; that is, the expected utility gain from a decrease in the probability of a bad outcome is equal to the expected cost of achieving cooperation weighted by the expected marginal utility of the two states.

Having found the optimal level of integration, I now turn to investigating how changes in some of the underlying parameters of the economy might affect the optimal level. These parameters include: prices of goods, the country's resource endowment, the country's risk aversion coefficient, institutional arrangements as well as the cost of integration and the probability of a trade war. Below, a change in the cost of integration is briefly examined. Section 4 presents the main result of this paper derived from investigating the impact of an increase in the subjective probability of a trade war on the optimal level of integration.

3 The Cost of Integration

Sectoral agreements incur costs of negotiation; they entail increased use of governing institutions to monitor the agreement as well as the establishment of new institutions to aid in tariff reduction or distribution. This is especially true for the establishment of a customs union. Since a customs union entails a common external tariff, there must be an established organization to govern transfer payments and distribution of the tariff income. In many cases,

e.g., the case of the previous East African Community, this proved to be very costly to assume and often provides a source of contention for the participating countries.

Consequently, as a country deepens its commitment to integration, the costs associated with the establishment of increasingly powerful oversight institutions would rise. In addition to the monetary cost of integration, we would also expect an increase in non-pecuniary institutional costs. Specifically, as integration deepens, governments often incur political costs associated with integration derived from loss of sovereignty over international trading decisions. With an increase in pecuniary and non-pecuniary institutional costs we expect a country would exhibit less demand for integration.

Proposition 1: An increase in the institutional costs of integration will decrease the level of self-protection through integration.

In order to examine the relationship between the cost of integration, an exogenous shift parameter, **τ** is introduced. Let the cost of integration now be represented by **c(γ(τ); τ)**. It is now possible to examine how a change in the exogenous parameter will affect the optimal level of integration. From Equation 3, it is easily shown that $\frac{d\gamma}{d\tau} = -\frac{Z}{S}$ where ***Z*** is the following:

$$Z = -\alpha'(\gamma)\frac{dc}{d\tau}\left(e^{-RT}(R\mathrm{B}) - e^{-RN}(R\Theta)\right) + c'(\gamma;\tau)\frac{dc}{d\tau}\left\{\left[\alpha(\gamma)\left(-e^{-RT}(R\mathrm{B})\right) + \left(1-\alpha(\gamma)\right)\left(-e^{-RN}\right)(R\Theta)\right] + \left[\alpha(\gamma)\left(-e^{-RT}(R\mathrm{B})^2\right) + \left(1-\alpha(\gamma)\right)\left(-e^{-RN}\right)(R\Theta)^2\right]\right\} \quad (4)$$

and **S < 0** is the second order condition shown in the appendix.

Examining the above, it is easily shown that all three terms are negative. The first term represents the marginal benefit of integration activities in utility terms following a decrease in the probability of an unwanted event. The second term is the marginal cost weighted by expected marginal utility of the two states. And, the third term is the marginal

cost weighted by expected marginal utility with a squared term. Since Z and S are both negative, therefore $\frac{d\gamma}{d\tau}$ is negative. Thus, as a consequence of a small increase in the underlying cost parameter of institutional costs, the optimal level of self-protection through integration decreases. This is consistent with intuition and, therefore, **Proposition 1** holds.

4 Multilateralism vs. Regionalism

The WTO regulates the trading relationships between states; its main function is to provide a stable and predictable environment despite national policy differences within which trade and investment can grow. Regional integration arrangements (RIAs) have contributed to a more rules based approach to trade relations. They have done so by offering more effective enforcement and compliance provisions than are available at the multilateral level. RIAs can facilitate multilateral agreements and thus enhance the market power of those countries concerned. They are GATT consistent and can coexist while promoting free trade and complementing multilateralism.

The old regionalism of the 1960s was formed in the Cold War context. The bipolarity of the Cold War was reproduced within regions. The new regionalism is taking shape in a multipolar world. Bhagwati (1996) has termed this the "new regionalism vs. old regionalism." The decline of U.S. hegemony and the fall of the Berlin Wall has created a vacuum in which the new regionalism developed.

Gowa and Mansfield (1993) define bipolar coalitions as those which are the products of system structure. In a bipolar system, realignment is impossible since allies are firmly locked into their respective coalitions. In contrast, a multipolar system is the result of choices between several possible alternatives. The assertion is that alliance stability can become

problematic as each pole seeks to transfer the public good burden to the other. Due to the greater security of coalitions in the bipolar world, bilateral agreements are shown to have stronger effects than those in a multipolar system.

With the fall of the Berlin Wall and the end of the Cold War, the increase in uncertainty regarding alliances and respective hegemons prompted the resurgence of a new regionalism. Looking at ***Figure 2***, it is apparent that a significant increase in RIAs has occurred concomitant to a strengthening of the multilateral trading system. The fall of the Berlin Wall happens to coincide with the strongest multilateral agreements and the creation of a supra-national institution governing dispute settlement in 1995.

4.1 Multilateralism Defined

There are several definitions of multilateralism. Yarbrough and Yarbrough (1992) in their exposition of a "strategic organizational model" applied to trade-policy institutions, propose that at various time periods different trading institutions have dominated world trade. Their essential proposition is that institutional variety in trade liberalization reflects the efficacy of alternate governance structures: unilateral, bilateral, minilateral, and multilateral. They define multilateralism as *the process whereby countries solve problems in an interactive cooperative fashion*.

Yarbrough and Yarbrough model RIA formation as "minilateralism" where due to the lack of a global hegemon, agreements are likely to be limited to smaller groups which then create third party governance structures for dispute settlement. However, multilateralism and minilateralism, as they define them, are not exclusive of each other as claimed. In reality, WTO member countries do participate in bilateral, minilateral, as well as multilateral

agreements. Hence, empirically, the indications are that bilateralism, minilateralism, and multilateralism do coexist.

Winters (1999) proposes a more trade oriented definition. He defines multilateralism as a characteristic of the world economic system and the extent to which:

- Discrimination is absent, and
- A country's trading regime approximates free trade.

This definition is also not immediately satisfactory as it is quite restrictive and does not take into account the necessity for enforcement institutions. Winters' definition presumes some degree of non-protectionist practices on the part of all individual countries.

Mittaine and Pequerel (1999) define multilateralism as a system of trade organization whereby the generalized trade preferences are extended to all partners adhering to GATT/WTO.[13] This implies that they are not extended to those who are ***not*** members, i.e., Saudi Arabia. This definition is also unsatisfactory in that non-members of GATT/WTO are also beneficiaries of generalized trade preferences, particularly that of most favored nation status.

Because trade has been shown by some researchers to be more open with a hegemon than without, the relationship between hegemony and multilateralism cannot be overlooked. For the purposes of this paper, we require a definition of multilateralism which encompasses not only the process of cooperative decision making and the need for a third party enforcement mechanism provided through the global hegemon, but also the liberalization of trade. Therefore, we propose the following:

Definition: *Multilateralism requires the creation of a supra-national governance structure which has the express purpose of influencing the global trading system to lower discrimination and approximate free trade.*

4.2 Regionalism and the Supra-hegemon

The new resurgence of regionalism influences the nature and the evolution of the global economy. Continued evolution will be accomplished through adequate measures to deal with conflicts. The need to reduce uncertainties underscores the importance of regime-building enhancing predictability through rules. Regionalism and multilateralism are inextricably interlinked.

With the end of the Cold War, the hegemon role played by the U.S. declined. The decline in the influence of the hegemon, in time, encourages the growth of multilateralism. This growth reflects the nation's desire for self-protection by purchasing cooperation through regional integration in order to diminish the probability of a "bad" outcome.

The definition of multilateralism proposed in this paper presupposes that the WTO has been able to competently assume its position as a supra-enforcement agent following the decline in the power of the United States as the global hegemon. There seems to be wide agreement among policy analysts that the GATT/WTO rules are complied with by most nations most of the time. Due to its dispute resolution process, the capacity of the WTO to prevent the occurrence of escalating and destabilizing conflicts has, in fact, proven itself to be relatively forceful. Available to all member states since 1995, it differs from the GATT mechanism in two important ways: panels have binding jurisdiction and the members are obliged to submit to dispute resolution. Panels write opinions which may be appealed to the appellate body which acts largely as the judicial organ, thus encouraging the establishment of a common law tradition.

Stephan (2000) examines three cases of dispute resolution where the United States lost. He chooses the cases of environmental safeguards (dolphins and turtles), Kodak's complaint against Japan, and transfer pricing rules to show the significance of the way WTO

organs justified their decisions. The examples chosen by Stephan show that the WTO has sufficient authority, and exercises it, to counter and even influence the actions of the United States. This alone indicates a decline in the hegemonic power of the United States.[14]

4.3 A Change in the Probability of a Trade War

Having shown the existence of multilateralism, let us now turn to examine a nation's propensity to join a RIA following an increase in the probability of a trade war. To do so, we repeat the strategy of introducing an exogenous shift parameter to **α(γ)**. Let **η** be such a shift parameter and **α(γ(η); η)** is now the probability of a trade war. Note that the parameter **η** can also be interpreted as representing the power of the supra-national institution, which is inversely related to the decline of the United States as the global hegemon. From Equation 3**,** we find that $\frac{d\gamma}{d\eta} = \frac{H}{S}$ where H is:

$$\mathrm{H} = -\frac{d\alpha'(\gamma;\eta)}{d\eta}\left[e^{-RT} - e^{-RN}\right] - \frac{d\alpha}{d\eta}c'(\gamma)\left[\left(e^{-RT}\right)(R\mathrm{B}) - \left(e^{-RN}\right)(R\Theta)\right] \qquad (5)$$

and **S < 0** is the second order condition. The first term of **H** is the gain in utility following the purchase of more self-protection in response to the change in the probability parameter, **η**. The second term is the marginal cost incurred by this increase weighted by the marginal utilities of the two states. The sign of the numerator is not immediately determinable, therefore, $\frac{d\gamma}{d\eta}$ is not necessarily positive or negative. This leads to the following proposition:

> **Proposition 2:** There exists a critical switching point beyond which self-protection purchases will cease to increase with a greater threat of trade wars.

Clearly the urgency to join a multilateral trade organization depends on the initial probability of a trade war following a decrease in the presence of a hegemon. If **α(γ(η); η)** is large, there

is every reason for a nation to require protection from multilateral trade organization. In this case, the gain in utility outweighs the marginal cost weighted term and integration would be purchased.

As the degree of participation increases and more protection is purchased, the reduction in α alleviates this urgency. Due to the presence of a wealth effect, the marginal cost weighted term would overwhelm the gain in utility, consequently, the purchase of integration would cease. Thus said, there must exist an α below which an increase in η will decrease the purchase of integration, γ[15].

Owing to the fact that it is difficult to obtain an analytical solution for the switching point, I present a simple simulation to demonstrate that such a switching point indeed exists. ***Figure 3*** plots the relationship between alpha and gamma, and shows that their relationship is non-monotonic. The 'switching point' is reached when γ approximates 4.5 and the gain in utility terms, due to the purchase of more self-protection in response to the change in the probability parameter η, equals the marginal cost weighted by marginal utilities of the two states.[16]

In other words, the switching point occurs when the power of the supra-national organization, the WTO, has attained its maximum institutional strength, i.e., the WTO has attained the ability to enforce its decisions and has developed a respectable history of jurisprudence. Consequently, countries will no longer perceive the need for self-protection purchases against global trading risks. Under the circumstances, **Proposition 2** implies that multilateralism and regionalism are indeed complementary to each other.

5 Conclusion

The post-World War II trading regime has seen a shift from the use of protective policy to the use of other forms of trade restrictions. Although the GATT/WTO has sought to build a stable environment for trade policy subject to simple and predictable rules, governments have chosen to intervene more closely in international markets using non-tariff controls and tariffs tailor-made to the perceived need of protected domestic industries. The Bretton Woods institutions were, in part, developed to facilitate cooperation between the economic powers and to prevent world economic crises from developing anew. However, since the Second World War, a large number of bilateral disputes have surfaced and on a number of occasions, disputes involving the great economic powers have sometimes begun to evolve into intensive trade wars.

A paradoxical effect of the Cold War was the emergence, with U.S. support, of a set of international organizations undertaking types of economic coordination to supersede the state-to-state management of issues of international influence.[17] The fall of the Berlin Wall has dramatically changed the global system of alliances and has altered the U.S.'s influence. More significant is the emergence of the WTO which provided trade agreements with the institutional provision of third party enforcement.

The relatively recent shift of study from the defensive approach, associated with insurance, to preventive, associated with self-protection, in the economics literature has not generally addressed issues outside those of the security arena. This paper has used the self-protection framework to analyze and provide a general explanation of regional integration where the incentive for loss prevention takes the form of cooperation. Through the formation of political and economic agreements, the probability of the uncertain outcome is reduced.

Clearly, international regional integration is a complex phenomenon incorporating many different degrees of integration with an equally diverse number of aims and objectives. The problem does not readily lend itself to simplification. This paper proposes a model which uses elements from three literatures - on customs unions, on preventive action, and security issues - to fill a gap in the theory of economic integration. In particular, it has extended the self-protection literature to incorporate cooperative aspects.

In this paper, I have treated countries as utility maximizers faced with two states in the uncertain world: trade war and no trade war. A country chooses some level of integration to which a cost is associated. I find the optimal level of integration and then explore how changes in the underlying cost and probability parameters affect the optimum.

An increase in the institutional cost of self-protection results in a decreasing interest on the part of the country to purchase integration. Both changes in institutional cost and in multilateralism are institutional arrangements which affect the country's desire for integration. In particular, I find that as the power of the bipolar system declines, interest in self-protection increases. This heightened interest is due to the fact that countries are no longer locked securely into the Cold War alliances as the probability of a bad state increases. This paper has shown that it is the resulting uncertainty which encourages the formation of regional integration arrangements.

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Endnotes

1. Source: www.wto.org.

2. See Winters, L.A., 1996. Regionalism versus multilateralism. Policy Research Working Paper 1687. World Bank, International Economics Department, Washington, D.C., for a survey of this debate.

3. Kreinin (1964) and others have argued that one of the incentives for the formation of a RIA is the elimination of risks and uncertainty from foreign transactions leading to expanded trade and investments.

4. In a subsequent analysis, Dionne and Eeckhoudt (1985) examined the effects of risk aversion on self-protection and self-insurance activities. They found that a more risk averse individual is not necessarily inclined to purchase more self-protection.

5. The optimal mix of protection and stockpiling depends on cost parameters while lower risk aversion entails stronger preparation and increased importance for stockpiling.

6. These formations can also be modeled in a bargaining framework. See for example, Reizman, R., 1979. A 3x3 Model of Customs Unions. Journal of International Economics 9:341-354.

7. If APEC is counted as a type of planned regional trading arrangement, then all countries in the WTO now belong to at least one club. Since the 1997 Asian financial crisis, there has been a commencement of FTA negotiations intra-APEC. These negotiations include countries who have hitherto been opposed to such types of agreements, i.e., Japan. In response to the financial crisis, the core ASEAN countries have accelerated regional economic integration and moved the target year forward dropping tariffs beginning in 2002. In addition, the ASEAN FTA has now targeted 2008 as the scheduled date for implementation of the zero tariff trade zone.

8. Domestic political and economic factors were not aligned with the possibility of such an agreement. "Both governments saw a commercial treaty as a way of defusing tensions and improving diplomatic relations." Britain ensured its political relationship with France, benefitted greatly from new lower tariff rates, and diminished the probability of war.

9. China ***not*** being accepted to the WTO. An expected treaty ***not*** being signed e.g. an expected Arab-Israeli peace treaty not being ratified by the Knesset.

10. The utility function may differ between trade war and no trade war. Some goods may simply be more valued in a state of trade war; the state dependence of the utility function allows this concept to be captured.

11. See Appendix for the general case.

12. The second order condition is reported in the Appendix.

13. “Système d’organisation commerciale au sein duquel des préférences généralisées sont étendues à l’ensemble des partinaires adhérent à l’accord général du GATT/OMC,” page 88.

14. A cursory review of the Appellate Body and panel opinions indicates a concerted effort to develop a coherent jurisprudence. By October 2000, the WTO members had initiated 162 distinct matters which resulted in 93 panels formed; of these, 19 are pending, 40 were settled before panel resolution and 34 were withdrawn or settled by other means. As of early 2002, there were a total of 263 disputes resulting in 180 distinct matters. Source is: http://www.wto.org/english/tratop_e/dispu_e/dispu_e.htm

15. McGuire, Pratt, Zeckhauser (1991) found the existence of a critical *switching probability*. They consider the proposition that “the more risk-averse individual pays less to secure a small chance of a good outcome, but pays more to avoid a small chance of a bad outcome” since one can interpret “gambling as increasing small chances of good outcomes and insurance as reducing small changes of bad outcomes.” They come very close to identifying the explicit relationship between the degree of risk aversion and the choice of self-protection. The above is interpretable in the context of the *switching probability* beyond which self-protection would no longer be purchased.

16. In preliminary simulation results, the switching point is when gamma is close to 4.5. This may imply that, if 1 is complete unification, a customs union is the optimal integration level.

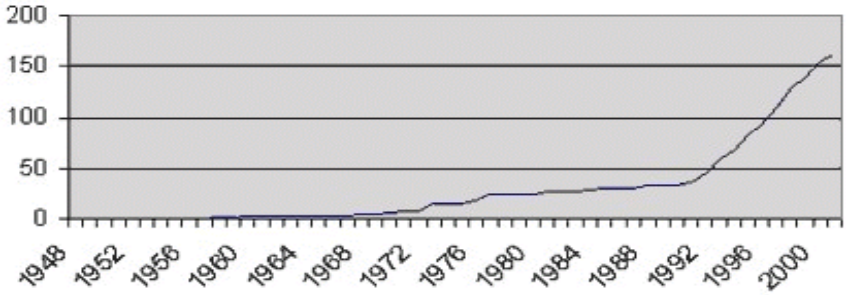
17. See Stephan (2000) for a discussion of regime versus hegemonic stories.

Tables and Figures

Figure 1 : Types of Regional Integration Arrangements

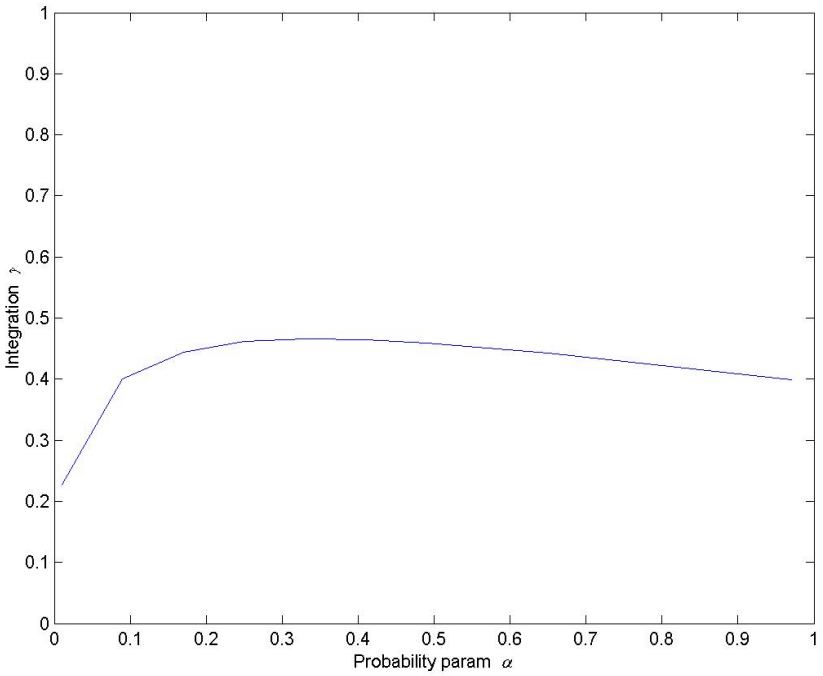
Features: Forms :	Removal of internal quotas and tariffs	Common external tariff	Free mobility of factors of production	Harmonized monetary & fiscal policy	Integration of political & economic policy
Sectoral Cooperation	À				
Preferential or Free Trade Area	–				
Customs Union	–	–			
Common Market	–	–	–		
Economic Union	–	–	–	–	
Supra-national Union	–	–	–	–	–

Figure 2 : The Number of RTAs notified to WTO each year 1948-1999



Source: World Trade Organization, 2002

Figure 3: The Probability of a Trade War and RIA Formation



Note: γ calculated for α=(0,1) and assumed to be a quadratic function. R=1, c=1, p_w=0.5, p_D=1, θ=1/4, β=1/3, $\bar{x}$ =3. Details available from the author.

Appendix

1 A General Function

γ is the level of formal trade integration (0,1], i.e., the level of self-protection chosen by the home country. **α(γ)** = [0,1] is the probability of a trade war where **αN(γ)** < 0 and **αO(γ)** > 0. ***c(γ)*** is the cost associated with integrating and **cN(γ)** > 0 and **cO(γ)** > 0. $\mathbf{x}_D$ is the domestically produced good and is the numeraire. $\mathbf{y_m}$ is the imported good and is traded at the world price, $\mathbf{p_w}$. During wartime, $\mathbf{y_D}$, no longer able to be imported, must be domestically produced, and is purchased at the domestically determined price $\mathbf{p_D}$.

Expected utility is:

$$E(\cdot) = \alpha(\gamma)U_T(x_T, y_D) + (1-\alpha(\gamma))U_N(x_N, y_M) \qquad (1.1)$$

In this case, not only does the utility function depend on the state of the world, but so does the constraint. $\bar{x}$ is the country's endowment. The consumer purchases integration for **c(γ)** in the following manner:

$$\begin{aligned} &\textit{In State of Trade War}: && p_T x_T + p_D y_D = \bar{x} - c(\gamma) \\ &\textit{In State of No Trade War}: && p_N x_N + p_W y_M = \bar{x} - c(\gamma) \end{aligned}$$

The problem facing the consumer is to choose the vector of commodities, ***X*** = (**x,y**), and **γ** such that the expected utility is maximized subject to the appropriate constraint. It is intuitively appealing to view this problem in two stages: First, to maximize ***X*** conditional upon **α**, given some **γ**; Second, to choose **γ** using the information derived from the first stage.

Let **x** be the numeraire, then constraint in the state of trade war becomes:

$$\bar{x} - c(\gamma) = 1 \cdot x_T + p_D y_D$$

Solving the conventional consumer choice problem with **x** as the numeraire good, the constraint in the state of no trade war becomes:

$$\bar{x} - c(\gamma) = 1 \cdot x_N + p_w y_m$$

Assuming that the second order conditions of the above utility functions are satisfied (shown below), it is possible to solve these first order conditions for a set of functions of the form:

$$x^0 = x_{\alpha=0} = F((1, p^*_{Dy}), \bar{x} - c(\gamma))$$

and

$$x^1 = x_{\alpha=1} = G((1, p^*_w), \bar{x} - c(\gamma))$$

In the second stage, the problem is to choose the optimal level of integration, **γ*,** in order to maximize expected utility. By substitution into the utility functions of the expected utility problem, we yield the following in indirect utility terms:

$$E(\circ) = \alpha(\gamma)U_T[F((1, p_D^*), \bar{x} - c(\gamma))] + (1 - \alpha(\gamma))U_N[G((1, p_w^*), \bar{x} - c(\gamma))]$$

Note that the levels of ***x*** and ***y*** are optimized under constraints for each state separately. Therefore the level of ***x*** consumed in a state of trade war does not equal the level of ***x*** consumed in a state of no trade war.

$$\underset{\gamma}{Max}\, E(\cdot) = \underset{\gamma}{Max}\left\{\alpha(\gamma)U_T[F((1, p_D^*), \bar{x} - c(\gamma))] + (1 - \alpha(\gamma))U_N[G((1, p_w^*), \bar{x} - c(\gamma))]\right\} \qquad (1.2)$$

where $\mathbf{p_D}$*and $\mathbf{p_w}$* are the equilibrium prices for those quantities of **x** and **y** in trade war and no trade war, respectively, and **F** and **G** are as described above. Solving the above maximization problem with respect to **γ**, gives the following first order condition.

$$\alpha'(\gamma)\left[U_T - U_N\right] = \left[\alpha(\gamma)U_T'F' + (1 - \alpha(\gamma))U_N'G'\right] \cdot c'(\gamma) \qquad (1.3)$$

The first order condition yields an optimal **γ***. The left hand side of Equation (1.3) is the marginal benefit of the activity **γ**, measured in the utility of the two states. The right hand side is the marginal cost weighted by the expected marginal utility of the two states.

1.2 Second Order Condition

Differentiating (1.3) with respect to **γ** yields the following expression.
Solving for the second order conditions with respect to γ, we get the following:

$$\begin{aligned} S = {} & \alpha''(\gamma) \cdot [U_T - U_N] - \{\alpha(\gamma)[U_N'F_2' +] + (1 - \alpha(\gamma))[U_N'G_2']\} \cdot c'(\gamma) \\ & - 2\alpha'(\gamma) \cdot [U_T'F_2' - U_N'G_2'] \cdot c'(\gamma) \\ & + \{\alpha(\gamma)[U_T''(F_2')^2 + U_N'F_2''] + (1 - \alpha(\gamma))[U_N''(G_2')^2 + U_N'G_2'']\} \cdot (c'(\gamma))^2 \end{aligned}$$

where F_2 and G_2 indicate that the derivative is taken with respect to the second term. Examining the first line of the second order condition, we see similarities with the first order condition. The first order condition at an interior optimum implies,

$$\frac{\alpha'(\gamma)[U_T - U_N]}{c'(\gamma)} = \alpha(\gamma)[U_T'F'_2] + (1 - \alpha(\gamma))[U_N'G_2']$$

Hence, the second order condition can be written as,

$$S = [\alpha''(\gamma) - \alpha'(\gamma)\frac{c''(\gamma)}{c'(\gamma)}]\cdot[U_T - U_N] \qquad (1.3a)$$

$$-2\alpha'(\gamma)\cdot[U_T'F_2' - U_N'G_2']\cdot c'(\gamma) \qquad (1.3b)$$

$$+\{\alpha(\gamma)[U_T''(F_2')^2 + U_T'F_2''] + (1-\alpha(\gamma))[U_N''(G_2')^2 + U_N'G_2'']\}\cdot(c'(\gamma))^2 \qquad (1.3c)$$

The first term (1.3a) is positive. αℕ(γ) dominates αO(γ) as the rate of change in the probability of a trade war "slows" as γ approaches 0. In addition, the following relationships hold.

$$U_N > U_T > 0$$
$$U_T' > U_N' > 0$$
$$F_2' > G_2' > 0$$

The last term (1.3c) is negative. The middle term (1.3b) is also negative and is subtracted. In order to satisfy the second order condition, it can be shown that |1.3b+1.3c|>|1.3a| is satisfied.

2 A Specific Function

$$\underset{x,y}{Max}\, E(\cdot) = \underset{x,y}{Max}\left\{\alpha(\gamma)\left[-e^{-R(x^{\beta}y_D^{1-\beta})}\right] + (1-\alpha(\gamma))\left[-e^{-R(x^{\theta}y_M^{1-\theta}}\right]\right\}$$

subject to (1)

$$x_T + p_D y_D = \bar{x} - c(\gamma) \qquad \textit{in the state of trade war}$$

$$x_N + p_w y_M = \bar{x} - c(\gamma) \qquad \textit{in the state of no trade war}$$

We repeat the maximization steps and obtain the equilibrium values for $\mathbf{x_T}^*$ and $\mathbf{y^*_D}$ in a state of war, $\mathbf{x_N}^*$ and $\mathbf{y^*_M}$ in a state of no war.

In a state of trade war:

$$x_T^* = (\bar{x} - c(\gamma))\beta \quad \textit{and} \quad y_D^* = (\bar{x} - c(\gamma))\left(\frac{1-\beta}{p_D}\right)$$

In a state of no trade war:

$$x_N^* = (\bar{x} - c(\gamma))\theta \quad \textit{and} \quad y_M^* = (\bar{x} - c(\gamma))\left(\frac{1-\theta}{p_w}\right)$$

Substituting this into the original expected utility equation,

$$E(\cdot) = \alpha(\gamma)\left[-e^{-R\left[((\bar{x}-c(\gamma))\beta)^{\beta}\left(\frac{(\bar{x}-c(\gamma))1-\beta)}{p_D}\right)^{1-\beta}\right]}\right] + (1-\alpha(\gamma))\left[-e^{-R\left[((\bar{x}-c(\gamma))\theta)^{\theta}\left(\frac{(\bar{x}-c(\gamma))(1-\theta)}{p_w}\right)^{1-\theta}\right]}\right]$$

and after some cancellation, we arrive at the following:

$$E(\cdot)=\alpha(\gamma)\left[-e^{-R\left[(\bar{x}-c(\gamma))(\beta)^{\beta}\left(\frac{(1-\beta)}{p_D}\right)^{1-\beta}\right]}\right]+(1-\alpha(\gamma))\left[-e^{-R\left[(\bar{x}-c(\gamma))(\theta)^{\theta}\left(\frac{(1-\theta)}{p_w}\right)^{1-\theta}\right]}\right] \tag{2}$$

Using the following substitutions:

$$T=(\bar{x}-c(\gamma))\mathrm{B} \qquad \textit{and} \qquad \mathrm{B}=(\beta)^{\beta}\left(\frac{(1-\beta)}{p_D}\right)^{1-\beta}$$

$$N=(\bar{x}-c(\gamma))\Theta \qquad \Theta=(\theta)^{\theta}\left(\frac{(1-\theta)}{p_w}\right)^{1-\theta}$$

the first order condition is:

$$\alpha'(\gamma)\left[e^{-RT}-e^{-RN}\right]=c'(\gamma)\left\{\alpha(\gamma)\left(-e^{-RT}\right)(R\mathrm{B})+(1-\alpha(\gamma))\left(-e^{-RN}\right)(R\Theta)\right\} \tag{3}$$

The value of γ which satisfies the first order condition is γ^*. As before, the expected utility gain from a decrease in the probability of a trade war is equal to the expected marginal utility weighted by the expected cost of cooperation.

Solving this equation for the value of the cost which coincides with the optimal γ^*, we arrive at the following expression for the cost of integrating.

$$c'(\gamma^*)=\frac{\alpha'(\gamma^*)\left[e^{-RT}-e^{-RN}\right]}{\left[\alpha(\gamma^*)\left(-e^{-RT}\right)(R\mathrm{B})+(1-\alpha(\gamma^*))\left(-e^{-RN}\right)(R\Theta)\right]} \tag{3a}$$

Next, we verify the second order condition.

$$\begin{aligned}S=&\left(\alpha''(\gamma)+\alpha'(\gamma)\frac{c''(\gamma)}{c'(\gamma)}\right)\left[\left(-e^{-RT}\right)-\left(-e^{-RN}\right)\right]\\&-2\alpha'(\gamma)c'(\gamma)\left(\left(-e^{-RT}\right)(R\mathrm{B})-\left(-e^{-RN}\right)(R\Theta)\right)\\&+\left(c'(\gamma)\right)^2\left[\alpha(\gamma)\left(-e^{-RT}(R\mathrm{B})^2\right)+(1-\alpha(\gamma))\left(-e^{-RN}(R\Theta)^2\right)\right]\end{aligned} \tag{3b}$$

Examining the second order condition, it can be shown that the first term is positive. The second term is positive but subtracted and the third term is negative. These are as in the general case. In order to satisfy the second order condition, the second plus third terms must be constrained to be greater, in magnitude, than the first term.

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