Economics Bulletin

Volume 32, Issue 1

Peace Dividends in a Trade-theoretic Model of Conflict

Sajal Lahiri
Southern Illinois University Carbondale

Valerica Vlad
Penn State Erie

Abstract

We construct a trade-theoretic model for three open economies two of which are in conflict with each other and the third is the source of foreign investments to the two warring countries. War efforts — which involve the use of soldiers — is determined endogenously. The purpose of war is the capture of land, but the costs are production sacrificed, reduced flow of foreign investments, and general disruptions in the economy. We examine the effect of a bilateral piecemeal reduction in war efforts on the level of foreign investments and on welfare in the three countries. We find positive effects on all fronts.

§ Department of Economics, Southern Illinois University Carbondale, Carbondale, Il. 62901- 4515, U.S.A.; FAX: +1-618-453-2717; E-mail: lahiri@siu.edu ‡ Penn State Erie, The Behrend College, Erie, PA 16563-1400, U.S.A; E-mail:vuv2@psu.edu
Citation: Sajal Lahiri and Valerica Vlad, (2012) "Peace Dividends in a Trade-theoretic Model of Conflict", *Economics Bulletin*, Vol. 32 No. 1 pp. 737-745.
Contact: Sajal Lahiri - lahiri@siu.edu, Valerica Vlad - vuv2@psu.edu.
Submitted: October 25, 2011. **Published:** February 26, 2012.

1 Introduction

International and regional conflicts are more commonplace that one would like.[1] In response, there is now a significant theoretical and empirical literature on the economics of conflict. The theoretical literature follows the seminal work of Hirshleifer (1988) and develops game-theoretic models where two rival groups allocate resources between productive and appropriative activities (see, for example, Brito and Intriligator (1985), Hirshleifer (1995), Grossman and Kim (1996), Skaperdas (1992), Neary (1997), and Skaperdas and Syropoulos (2002)). Recent contributions by Anderton, Anderton, and Carter (1999), Skaperdas and Syropoulos (1996, 2001), Garfinkel, Skaperdas and Syropoulos (2008), and Findlay and Amin (2008) emphasize trade and conflict in two-country frameworks and Becsi and Lahiri (2007) consider a three-country model. Anderson and Marcouiller (2005) examine the consequences of endogenous transaction costs in the form of predation on international trade.

The benefits of war in these classes of models come mainly from a gain of resources, and the costs of warfare is the use of soldiers and consequent foregone production as labor is diverted toward warfare. This cost has been the focus of the recent trade theoretic literature on conflict (Skaperdas and Syropoulos, 2001, Syropolous, 2004, Becsi and Lahiri, 2007).

We build upon this framework by incorporating elements of peace dividends which would arise should the conflict be resolved. Our framework has three countries. Two of the countries are in conflict with each other and the third country is the source of foreign investments to the two warring countries. We also introduce a factor that represents a general level of disruption to economic activities in both warring countries. The war equilibrium is specified as a Nash one where each warring country decides on its war effort taking as given the war effort of the adversary. Therefore, in our framework peace dividends associated with a reduction in war activities have two components: (i) a general reduction in disruption in economic activities increasing welfare directly, and (ii) an increase in the flow of foreign investments. The latter can occur directly because a reduction in war efforts and indirectly via induced reduction in disruptions.

The purpose of the paper is to examine the effect of, starting from the initial war equilibrium, bilateral piecemeal reductions in war efforts on welfare levels in the three countries and on the inflow of foreign investments in the warring nations.

2 The Model

We develop a three-country, many-good, many-factor model with two of the countries — called country a and country b — engaged in a war with each other and a third country — called country c — that does not take part in the war but is the source of foreign investments in the warring countries. All product and factor markets are perfectly competitive. There are many inelastically supplied factors of production; however, three of the factors play important roles in our analysis. For expositional ease, we shall call these factors labor, capital and land although one could interpret them differently. The warring countries use labor to fight the war and land is what they fight for. We define $f(L_s^a, L_s^b)$ as the net gain

[1] According to Gleditsch (2004), there were 199 international wars and 251 civil wars between 1816 and 2002.

of land by country a from war,[2] where L_s^a and L_s^b are respectively the amount of 'soldiers' employed by country a and b.[3] For this net-gain function we make the following assumptions.

Assumption 1 *$f(\cdot)$ is homogeneous of degree zero in the two arguments and $f_1 > 0,\ f_2 < 0$.*

The production side of the economies, indexed by $i = a, b, c$, is described by the three revenue functions $\Theta_a(L_s^a + L_s^b)R^a(p, \bar{L}^a - L_s^a, \bar{V}^a + f(L_s^a, L_s^b), \bar{K}^a + F^a)$, $\Theta_b(L_s^a + L_s^b)R^b(p, \bar{L}^b - L_s^b, \bar{V}^b - f(L_s^a, L_s^b), \bar{K}^b + F^b)$ and $R^c(p, \bar{L}^c, \bar{V}^c, \bar{K}^c - F^a - F^b)$ where $\bar{L}^i$, $\bar{K}^i$ and $\bar{V}^i$ are the endowments of labor and land respectively in country i, p is the international price vector of the non-numeraire goods, and F^i is the amount of foreign investment from country c to country i.[4] The functions $\Theta_a(L_s^a + L_s^b)$ and $\Theta_b(L_s^a + L_s^b)$ represent the 'disruptive' effect of a war on the two warring countries. That is, getting involved in a war not only costs the countries resources in the form of soldiers who are no longer productively employed in the private sector, but also reduces overall economic activities for given level of endowments. These functions are assumed to be decreasing functions of the total number of soldiers employed between the two warring countries, i.e., $L_s^a + L_s^b$, which represents the scale of the war in our framework. The absolute values of $\Theta_a' R^a$ and $\Theta_b' R^b$ can be interpreted as the extent of one type 'peace dividends' in the two countries. The other type of peace dividend in our model will appear via changes in the level of foreign investments even when $\Theta_a' = \Theta_b' = 0$.

We assume that the three factors are complements to one other, i.e., $R_{jk}^i \geq 0,\ j \neq k = 2, 3, 4;\ i = a, b, c$. Formally,

Assumption 2 $\quad R_{jk}^i \geq 0,\ j \neq k = 2, 3, 4;\ i = a, b, c.$

The consumption side of the economies is represented by the expenditure functions $E^a(p, u^a)$, $E^b(p, u^b)$ and$E^c(p, u^c)$, where u^i is the utility level of a representative consumer in country i $(i = a, b, c)$.[5]

The income-expenditure balance equations of consumers in the three countries are given by:

$$
\begin{aligned}
E^a(p, u^a) &= \Theta_a(\cdot)R^a\left(p, \bar{L}^a - L_s^a, \bar{V}^a + f\left(L_s^a, L_s^b\right), \bar{K}^a + F^a\right) - F^a\Theta_a(\cdot)R_4^a, &(1)\\
E^b\left(p, u^b\right) &= \Theta_b(\cdot)R^b\left(p, \bar{L}^b - L_s^b, \bar{V}^b - f\left(L_s^a, L_s^b\right), \bar{K}^b + F^b\right) - F^b\Theta_b(\cdot)R_4^b, &(2)\\
E^c(p, u^c) &= R^c\left(p, \bar{L}^c, \bar{V}^c, \bar{K}^c - F^a - F^b\right) + F^a\Theta_a(\cdot)R_4^a + F^b\Theta_b(\cdot)R_4^b. &(3)
\end{aligned}
$$

The left-hand sides in (1)-(2) are expenditures and the right-hand sides are total factor incomes net of repatriated income due to foreign investments. In (3), the right-hand side is total factor income plus repatriated income from outward foreign investments.

[2]This can be viewed as the reduced form of a 'contest' payoff function.

[3]The net gain function takes negative values when country b 'wins' the war.

[4]All factors other than land, capital and labor are suppressed in the revenue functions as they do not change in our analysis. As is well known, the partial derivative of a revenue function with respect to a factor endowment gives the price of that factor. The revenue functions are negative semi-definite in the endowments of the factors of production. In particular, they satisfy $R_{jj}^i \leq 0$, for $i = a, b, c$ and $j = 2, 3, 4$. For these and other properties of revenue functions see Dixit and Norman (1980).

[5]The partial derivative of an expenditure function with respect to the utility level is the reciprocal of the marginal utility of income.

Foreign investments are endogenous, and the equilibrium is achieved when the rates of return on capital are the same in the source and the destination countries, i.e.,

$$\Theta_a(\cdot)R_4^a = R_4^c, \quad \Theta_b(\cdot)R_4^b = R_4^c. \tag{4}$$

Having stated the basic model, we now turn to the derivation of the war equilibrium.

2.1 The War equilibrium

Differentiating (1)-(3), we obtain

$$\begin{aligned} E_2^a\, du^a &= [\Theta_a' R^a - \Theta_a R_2^a + \Theta_a R_3^a f_1 - F^a \Theta_a' R_4^a + F^a \Theta_a R_{42}^a - F^a \Theta_a R_{43}^a f_1]\ dL_s^a \\ &\quad + [\Theta_a' R^a + \Theta_a R_3^a f_2 - F^a \Theta_a' R_4^a - F^a \Theta_a R_{43}^a f_2]\ dL_s^b - F^a \Theta_a R_{44}^a dF^a, & (5) \\ E_2^b\, du^b &= \left[\Theta_b' R^b - \Theta_b R_2^b - \Theta_b R_3^b f_2 - F^b \Theta_b' R_4^b + F^b \Theta_b R_{42}^b + F^b \Theta_b R_{43}^b f_2\right]\ dL_s^b \\ &\quad + \left[\Theta_b' R^b - \Theta_b R_3^b f_1 - F^b \Theta_b' R_4^b + F^b \Theta_b R_{43}^b f_1\right]\ dL_s^a - F^a \Theta_b R_{44}^b dF^b, & (6) \\ E_2^c\, du^c &= \left[F^a R_4^a \Theta_a' + F^b R_4^b \Theta_b' - F^a \Theta_a (R_{42}^a - R_{43}^a f_1) - F^b \Theta_b R_{43}^b f_1\right]\ dL_s^a \\ &\quad + \left[F^a R_4^a \Theta_a' + F^b R_4^b \Theta_b' - F^b \Theta_b (R_{42}^b + R_{43}^b f_2) + F^a \Theta_a R_{43}^a f_2\right]\ dL_s^b \\ &\quad + F^a \Theta^a R_{44}^a\ dF^a + F^b \Theta^b R_{44}^b\ dF^b. & (7) \end{aligned}$$

An increase in the inflow of foreign investment reduces the rental rate of capital and thus the level of income repatriated out, and this increases welfare in the two recipient countries and reduces that in the source country (the last terms in (5)-(7)). An increase in the employment of soldiers in a country has a number of conflicting effects on that country. It increases disruption and reduces welfare (first term); it reduces productive activities by reducing the supply of workers and thus reduces welfare (second term); it increases supply of land and this increases welfare (third term); it also affects repatriated income and thus welfare (the last three terms). An increase in the employment of soldiers in a country also has international externalities. It affects the source country via changes in repatriated income. It affects the other warring country by (i) increasing disruption and reducing welfare (first term); (ii) reducing land and thus welfare (second term); and (iii) changing repatriated income by altering the rate of return to capital (the last two terms).

Differentiating the equations in (4), we first of find how the levels of foreign investments F^a and F^b change with changes in the levels of war efforts L_s^a and L_s^b, and these are given the Appendix (see (A.1) and (A.2)). Then substituting (A.1) and (A.2) into (5)-(7), we obtain how changes in the war efforts affect the levels of welfare in all three countries, and these are given the Appendix (see (A.3)-(A.5)).

Before turning to the determination of the war equilibrium, let us explain how war affects the inflow of foreign investments in the two warring countries. We shall explain only (A.1), and the explanation of (A.2) is similar. There are two broad channels via which war affects the inflow of foreign investments. First, it has a disruptive effect on the two countries reducing the rate of return to investment in both countries. The reduction of the rate of return in one country reduces the inflow of foreign investment in that country and increases that in the other warring country. These effects are given by the terms involving Θ_a' and Θ_b' in (A.1). The other channel works via changes in the rates of return to capital because of changes in the levels of endowments (both labor and land) induced by war and because of the complementarity between the factors of production. The second channel operates even when $\Theta'_a = \Theta'_b = 0$, i.e., even in the absence of disruptions.

Having derived the welfare equations for the two warring nations, we are now in a position to describe the war equilibrium. Each country sets the level of the employment of soldiers by maximizing its welfare, taking the level of soldiers in the other country as given, That is, by setting $\partial u^a/\partial L^a_s = \partial u^b/\partial L^b_s = 0$, we get the two war equilibrium conditions as:[6]

$$\begin{aligned} - \quad & \Theta_a R^a_2 + \Theta_a R^a_3 f_1 + R^a \Theta'_a = \rho R^c_{44} F^a \left\{ R^a_4 \Theta_b R^b_{44} \Theta'_a \right. \\ + \quad & \left. \Theta_a R^a_{44} (R^b_4 \Theta'_b - \Theta_b R^b_{43} f_1) - \Theta_a \Theta_b R^b_{44} (R^a_{42} - R^a_{43} f_1) \right\}, \quad (8) \\ - \quad & \Theta_b R^b_2 - \Theta_b R^b_3 f_2 + R^b \Theta'_b = \rho R^c_{44} F^b \left\{ R^a_4 \Theta_b R^b_{44} \Theta'_a \right. \\ - \quad & \left. \Theta_a \Theta_b R^a_{44} (R^b_{42} + R^b_{43} f_2) + \Theta_b R^b_{44} (\Theta_a R^b_{43} f_2 + R^a_4 \Theta'_a) \right\}. \quad (9) \end{aligned}$$

The left-hand sides of (8) and (9) give the sum of the marginal cost of diverting workers from the productive sectors to war (first term), marginal benefit of increased landholding for the marginal soldier (second term), and the marginal cost from disruption in productive activities. The right-hand sides give marginal effects via changes in repatriated profits due to changes in the rate of return to capital. An increase in war effort reduces the rate of return to capital in the waring countries because of the disruptive nature of war and this reduced repatriated income (for given levels of foreign investments). This effect (represented by the terms involving Θ'_a and Θ'_b on the right hand side of (8) and (9)) will tend to increase war efforts. There are other terms on the right hand side of (8) and (9) that affect repatriated income even in the absence of disruption to economic activities.

3 Peace Dividends

Having described the theoretical framework in the previous section, we shall now examine how, starting from the war equilibrium defined above, a bilateral piecemeal reduction in war efforts affects the welfare in the two warring countries and in the source country of foreign investments. We shall also examine how such reductions affect the flow of foreign investments into the warring countries. In doing so we shall identify effects that appear because of a reduction in overall disruptions to economic activities given by the Θ-functions and those that would appear even in the absence of the disruptions.

In our analysis, we shall assume that in the absence of peace dividend — i.e., when $\Theta'_a = \Theta'_b = F^a = F^b = 0$ — it benefits a country to employ an extra soldier, i.e., $(\partial u^i/\partial L^i_s)|_{\Theta'_i = F^i = 0} \geq 0,\ (i = a, b)$. Formally,

Assumption 3 $\quad R^a_2 - R^a_3 f_1 \leq 0$ *and* $R^b_2 + R^b_3 f_2 \leq 0$.

[6] We implicitly assume the second-order conditions for the optimization problems and the Nash-stability conditions to be satisfied. However, since we do not undertake any comparative static exercise on the equilibrium values of the soldiers, we do not need those conditions explicitly. We use the war equilibrium conditions to simply the effect of a piecemeal multilateral reduction of the employment of soldiers, starting from the war equilibrium, on welfare and on the inflow of foreign investments.

Substituting (8) and (9) into (A.3)-(A.5) and imposing symmetry between the two warring countries (which implies, *inter alia*, $f_1 = -f_2$), we get

$$E_2\ du = [\Theta R_2 - 2\Theta R_3 f_1]\ dL_s, \quad E_2^c\ du^c = 4\rho\Theta R_{44} R_{44}^c F(2R_4\Theta' - \Theta R_{42}) dL_s, \tag{10}$$

where the absence of superscripts from variables and functions implies that they refer to the identical warring country.

From (10) the following proposition follows.

Proposition 1 *A bilateral reduction in war efforts by two identical warring countries : (i) improves the welfare of both of them under assumptions 1 and 3, and (ii) improves the welfare of the source country of foreign investment under assumptions 1 and 2.*

A reduction in the employment of soldiers in a warring country does not affect the welfare of that country as the initial number of soldiers is set at the optimal level (the Envelope theorem). The warring countries are affected, however, via changes in the level of negative international externalities. Starting from the initial war equilibrium, the level of this negative externalities goes down with reduced employment of soldiers. As for the source country of foreign investments, it benefits because a reduction in the number of soldiers increases the rate of return to capital invested in the destination warring countries via two channels: (i) by increasing the supply of labor to the productive sector and thus raising the rate of return to capital due to the assumption of complementarity between the factors of production (assumption 2), and (ii) by reducing disruption in the warring countries.

Turning to the effect on foreign investments, substituting (8) and (9) into (A.1) and imposing symmetry between the two warring countries, we find

$$dF = -\rho\Theta R_{44} \left[2R_4\Theta' - R_{42}\Theta\right]\ dL_s, \tag{11}$$

whence the following proposition follows.

Proposition 2 *Under assumptions 1 and 2, a bilateral reduction in war efforts by two identical warring countries increases the flow of foreign investments in both countries.*

As mentioned before, a bilateral reduction in war efforts increases the rate of return to capital in the warring countries increasing the inflow of foreign capital in those countries. Thus, a bilateral reduction in war efforts provides peace dividends to the warring countries in two ways: it reduces disruptions in their economic activities and this has a direct positive effect on welfare and also an indirect positive effect on welfare via inducing an increased flow of foreign investments.

We conclude our analysis by noting from (10) and (11) all our qualitative results go through even when $\Theta'_a = \Theta'_b = 0$, that is in the absence of any general disruptive effects of wars. However, the effects on the welfare of source country of foreign investment and on the levels of foreign investments are higher in the presence of the disruptive effects.

4 Conclusion

Conflicts for resources between nations or groups within a national are more widespread than one would like. They are often unproductive causing disruptions in economic activities and discourage foreigners from investing in the warring countries. A full or partial resolution of the conflict brings in peace dividends by reducing the costs associated with wars that were mentioned above. In this paper we develop a trade-theoretic model of three countries. Two of them are engaged in a conflict for land, diverting productive labor away from the private sector into the war as soldiers. The third country is the source country of foreign investments for the two warring countries.

In the above framework, we examine the effects of a bilateral reduction in war efforts, starting from an initial war equilibrium, on the levels of welfare in the three countries and on the levels of foreign investments in the two warring countries. We find that when the two warring countries are symmetric, such reductions in war efforts increase welfare in all three countries. Welfare improvements occur due to reductions in disruptions to economic activities and increase in the levels of foreign investments.

Appendix

$$\begin{aligned} dF^a &= \rho\left[R^c_{44}R^b_4\Theta'_b - R^c_{44}\Theta_b R^b_{43}f_1 - (\Theta_b R^b_{44} + R^c_{44})(R^a_4\Theta'_a - \Theta^a R^a_{42} + \Theta^a R^a_{43}f_1)\right] dL^a_s \\ +\ & \rho\left[R^c_{44}(R^b_4\Theta'_b - \Theta_b R^b_{42} - \Theta_b R^b_{43}f_2) - (\Theta_b R^b_{44} + R^c_{44})(R^a_4\Theta'_a + \Theta_a R^a_{43}f_2)\right] dL^b_s, \qquad \text{(A.1)} \\ dF^b &= \rho\left[R^c_{44}(R^a_4\Theta'_a - \Theta_a R^a_{42} - \Theta_a R^a_{43}f_1) - (\Theta_a R^a_{44} + R^c_{44})(R^b_4\Theta'_b - \Theta_b R^b_{43}f_1)\right] dL^a_s \\ +\ & \rho\left[R^c_{44}R^a_4\Theta'_a + R^c_{44}\Theta_a R^a_{43}f_2 - (\Theta_a R^a_{44} + R^c_{44})(R^b_4\Theta'_b - \Theta^b R^b_{42} - \Theta^b R^b_{43}f_2)\right] dL^b_s, \qquad \text{(A.2)} \end{aligned}$$

where $\rho = 1/\left(\Theta_a\Theta_b R^a_{44}R^b_{44} + \Theta_b R^c_{44}R^b_{44} + \Theta_a R^a_{44}R^c_{44}\right) > 0$.

$$\begin{aligned} E^a_2\, du^a &= \left[-\Theta_a R^a_2 + \Theta_a R^a_3 f_1 + R^a\Theta'_a - \rho R^c_{44}F^a\left\{R^a_4\Theta_b R^b_{44}\Theta'_a - \Theta_a\Theta_b R^b_{44}(R^a_{42} - R^a_{43}f_1)\right.\right. \\ &- \left.\left.\Theta_a\Theta_b R^a_{44}R^b_{43}f_1 + R^b_4\Theta_a R^a_{44}\Theta'_b\right\}\right] dL^a_s + \left[R^a\Theta'_a + \Theta_a R^a_3 f_2 - \rho R^c_{44}F^a\left\{R^a_4\Theta_b R^b_{44}\Theta'_a\right.\right. \\ &+ \left.\left.R^b_4\Theta_a R^a_{44}\Theta'_b + \Theta_a\Theta_b R^b_{44}R^a_{43}f_2 - \Theta_a\Theta_b R^a_{44}(R^b_{42} + R^b_{43}f_2)\right\}\right] dL^b_s, \qquad \text{(A.3)} \\ E^b_2\, du^b &= \left[-\Theta_b R^b_2 - \Theta_b R^b_3 f_2 + R^b\Theta'_b - \rho R^c_{44}F^b\left\{R^a_4\Theta_b R^b_{44}\Theta'_a - \Theta_a\Theta_b R^a_{44}(R^b_{42} + R^b_{43}f_2)\right.\right. \\ &+ \left.\left.\Theta_a\Theta_b R^b_{44}R^b_{43}f_2 + R^a_4\Theta_b R^b_{44}\Theta'_a\right\}\right] dL^b_s + \left[R^b\Theta'_b - \Theta_b R^b_3 f_1 - \rho R^c_{44}F^b\left\{R^b_4\Theta_a R^a_{44}\Theta'_b\right.\right. \\ &+ \left.\left.R^a_4\Theta_b R^b_{44}\Theta'_a - \Theta_a\Theta_b R^a_{44}R^b_{43}f_1 - \Theta_a\Theta_b R^b_{44}(R^a_{42} - R^a_{43}f_1)\right\}\right] dL^a_s, \qquad \text{(A.4)} \\ \frac{E^c_2}{\rho R^c_{44}(F^a + F^b)}\cdot du^c &= \left[\Theta^b R^b_{44}(R^a_4\Theta'_a + \Theta_a R^a_{43}f_1) + \Theta^a R^a_{44}(R^b_4\Theta'_b - \Theta_b R^b_{43}f_1)\right. \\ &\left.-\Theta_a\Theta_b R^b_{44}R^a_{42}\right] dL^a_s + \left[\Theta^b R^b_{44}(R^a_4\Theta'_a + \Theta_a R^a_{43}f_2) + \Theta^a R^a_{44}(R^b_4\Theta'_b - \Theta_b R^b_{43}f_2)\right. \qquad \text{(A.5)} \\ &\left.-\Theta_a\Theta_b R^a_{44}R^b_{42}\right] dL^b_s. \end{aligned}$$

References

[1] Anderson, J. E. and D. Marcouiller (2005) "Anarchy and Autarky: Endogenous Predation as a Barrier to Trade," *International Economic Review* **46**, 189-213.

[2] Anderton, C. H., Roxane A. Anderton and J. R. Carter (1999) "Economic Activity in the Shadow of Conflict," *Economic Inquiry* **37**, 166-79.

[3] Becsi, Z. and S. Lahiri (2007) "Bilateral War in a Multilateral World: Carrots and Sticks for Conflict Resolution", *Canadian Journal of Economics* **40**, 1168-1187.

[4] Brito, D. L. and M. D. Intriligator (1985) "Conflict, War, and Redistribution," *American Political Science Review* **79**, 943-957.

[5] Dixit, Avinash K. and Victor Norman (1980) *Theory of International Trade*, Cambridge University Press: Cambridge, U.K.

[6] Findlay, R. and M. Amin (2008) "National Security and International Trade: a Simple General Equilibrium Model," in *Frontiers of Economics and Globalization*, vol 4, by S. Marjit and E. Yu, Eds., Emerald Group Publishing Ltd: London, 13-24.

[7] Garfinkel, M. R., S. Skaperdas, and C. Syropoulos (2008) "Globalization and Domestic Conflict,"*Journal of International Economics* **76**, 296-308,

[8] Gleditsch, K. (2004) "A Revised List of Wars Between and Within Independent States, 1816–2002," *International Interactions* **30**, 231-262.

[9] Grossman, H. I. and M. Kim (1996) "Swords or Plowshares? A Theory of the Security of Claims to Property," *Journal of Political Economy* **103**, 1275-1288.

[10] Hirshleifer, J. (1988) "The Analytics of Continuing Conflict," *Synthese* **76**, 201-233.

[11] Hirshleifer, J. (1995) "Anarchy and its Breakdown," *Journal of Political Economy* **103**, 26-52.

[12] Neary, H. M. (1997) "A Comparison of Rent-Seeking Models and Economic Models of Conflict," *Public Choice* **93**, 373-388.

[13] Skaperdas, S. (1992) "Cooperation, Conflict, and Power in the Absence of Property Rights," *American Economic Review* **82**, 720-739.

[14] Skaperdas, S. and C. Syropoulos (1996) "Competitive Trade with Conflict," in *The Political Economy of Conflict and Appropriation* by M. R. Garfinkel and S. Skaperdas, Eds., Cambridge University Press: Cambridge, U.K., 73-96.

[15] Skaperdas, S. and C. Syropoulos (2001) "Guns Butter, and Openness: On the Relationship Between Security and Trade," *American Economic Review, Papers and Proceedings* **91**, 353-357.

[16] Skaperdas, S. and C. Syropoulos (2002) "Insecure Property and the Efficiency of Exchange," *Economic Journal* **112**, 133-46.

[17] Syropoulos, C. (2004), "Trade Openness and International Conflict," presented at the conference 'New Dimensions in International Trade: Outsourcing, Merger, Technology Transfer, and Culture,' held at Kobe University, Japan during December 11-12, 2004.