

CONFLICT ECONOMICS IN CHRISTIAN PERSPECTIVE

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Conflict economics has become an established sub-specialty within economics as evidenced by its own group of practitioners, its publication success in leading journals, and its integration into the research efforts of important international economics organizations (e.g., the World Bank). In this article, I survey the historical development and current state of the art of conflict economics. Following the survey I offer a Christian perspective on the field. I maintain that the doctrine of fallen humanity, which has been relegated to the fringe of present-day economic presuppositions, can be seen as operative in the field of conflict economics and productive of scientific economic inquiry.

What is Conflict Economics?

The rise of the Cold War drew a number of economists into research designed to explain various aspects of international conflict, e.g., causes of war, arms races and arms control, alliance formation, defense production and arms trade, and economic impacts of defense spending. This research was called peace economics by some and defense economics by others. Peace economics focuses upon the causes of conflict and ways that it can be managed, reduced, or eliminated. Defense economics embraces the topics and concerns of peace economics, but it also encompasses analytical methods for achieving optimal weapons production and optimal allocations of resources for prosecuting war.

Walter Isard and Kenneth Boulding carried out foundational work in peace economics. Isard played the major role in developing the Peace Science Society in the early 1960s. His publications in the Society's *Papers* along with his 1969

book, *General Theory: Social, Political, Economic, and Regional*, provide some of the earliest foundational theoretical work in peace economics. Boulding played a significant role in launching the *Journal of Conflict Resolution* in 1957 and his 1962 book, *Conflict and Defense*, is a classic in the field. In defense economics, Charles Hitch and Roland McKean's 1960 book, *The Economics of Defense in the Nuclear Age*, pioneered the application of economics to the defense sector. Their work was part of an effort by scholars at the RAND Corporation to find cost-effective means to compete economically, technologically, and militarily with the Soviet Union. Two other seminal contributions in defense economics were Merton Peck and Frederic Scherer's (1962) *The Weapons Acquisition Process* and Scherer's (1964) *The Weapons Acquisition Process: The Economic Incentives*. Both volumes analyzed the non-market character of weapons acquisition and optimal defense contracting. Thomas Schelling pioneered the application of game theory in defense and peace economics with his 1960 classic, *The Strategy of Conflict*. Another seminal contribution to the field was Mancur Olson and Richard Zeckhauser's "An Economic Theory of Alliances," which appeared in the *Review of Economics and Statistics* in 1966.

With the end of the Cold War, defense and peace economics is examining *intranational* conflict, e.g., ethnic, religious and cultural violence, peacekeeping and peace enforcement, regional arms races, and subterranean arms trade. No matter how one groups topics within it, defense and peace economics is generally seen as an extension of economic methods to topics that are not traditionally viewed as economic (Hirshleifer 1985). The agents studied are supranational organizations, nation states, political leaders, managers of defense firms, arms traders, and tacticians of peace and war in regional and local contexts. The consumers, producers, and traders of traditional economic inquiry are generally ignored. This has begun to change, however, and as a result, a new dimension of defense and peace

economics is emerging. This new dimension of the field is called conflict economics (Rider 2000, Anderton 2000a).

Conflict, broadly defined, is the use of resources for creating or defending against appropriation. A broad context of conflict encompasses crime, corruption, litigation, strikes, rent-seeking, redistributive politics, and international and intrastate hostility. Within each of these manifestations of human conflict, economic agents allocate resources toward the defense and coercive appropriation of material goods. Moreover, such resource allocations generally reshape key economic variables such as relative prices, production, trade volume, welfare, and security of property. Conflict economics is the study of resource allocations toward the defense and coercive appropriation of material goods and the reshaping of the economic landscape that results from such allocations.

Theoretical Foundations of Conflict Economics

The Generality of Conflict

Human conflict over material goods is a general phenomenon; it is as old as fallen humanity and permeates just about every aspect of material life. Historical and contemporary examples of resource allocations to defense and appropriation among nations, ethnicities, classes, and polities can be multiplied almost endlessly. Such prominent examples of conflict should not divert the economist's attention from the more mundane manifestations of defense and appropriation in the economy. Even in countries with fairly secure property, businesses and individuals allocate resources to defend their wares from appropriators. At many stores in developed economies, security cameras scan

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the parking lot and store shelves to deter would-be appropriators; this also induces people to shop there because of the higher security. The typical vending machine is a fairly sophisticated piece of defense capital. Much of what economists take to be standard production and trade activities contain a defense apparatus to insure their existence (Bowles and Gintis 1993, Lane 1979). Conflict economics is not just about international or intrastate war over resources; it is about any manifestation of appropriative struggle over material goods and its impact on the economy.

Furthermore, conflict can significantly shape economic activity, *even when no explicit violence occurs*. Schelling

(1966) points out that the lack of explicit force does not mean the absence of force. A threatening gunboat can be effective in forcing an outcome even if no shots are fired. Given that the threatened parties change their behavior, the semblance of peace in the presence of the gunboat is an illusion. Likewise, the potential for violence can significantly influence economic activity, even when we do not observe its explicit outbreak. Since the *potential* for violence in human affairs is pervasive, the reshaping of economic activity via this potential is a general phenomenon.

The Contest Success Function

A major objective of conflict economics is to produce an underlying microtheory that links together the various forms of appropriative struggle in human relations (Hirshleifer 1995a). One of the necessary building blocks of a unifying microtheory of conflict economics is the contest success function (CSF), which specifies how the appropriative efforts of agents lead to an appropriative outcome. To date, two families of CSFs have been developed. In one family, the conflict outcome depends on the *ratio* of fighting efforts, in the other family it depends upon the *difference* of fighting efforts (Hirshleifer 1995a). The ratio form of the contest success function in the two-player case is:

$$p_A = [F_A^m / (F_A^m + ZF_B^m)] \text{ and } p_B = [ZF_B^m / (F_A^m + ZF_B^m)] \quad (1)$$

while the difference form can be written as the logistic functions:

$$p_A = 1/[1 + e^{m(ZF_B - F_A)}] \text{ and } p_B = 1/[1 + e^{m(F_A - ZF_B)}] \quad (2)$$

In equations (1) and (2), F_i ($i=A,B$) represents the fighting effort of player i . Depending on the model, p_i is the proportion of a contested item acquired by player i or the probability of i 's victory in a conflict. The parameter m is a "decisiveness coefficient;" it represents the degree to which greater appropriative effort translates into conflict success. The parameter Z represents the relative technological advantage of F_B over F_A .¹

The contest success functions in (1) and (2) are analogous to production functions. Just as economists delve into the properties and applicability of Cobb-Douglas and CES production functions, so conflict economists consider the properties and applicability of ratio and logistic contest success functions. As Hirshleifer (1995a) points out: "Increasing versus decreasing returns, economies of scale and scope, complementarity of labor and capital are as applicable in the conflict domain as in the productive domain" (p. 176).

Game Theory

Another necessary building block for a unifying microtheory of conflict economics is a systematic treatment of various agent characteristics in the appropriative realm: number of players, modes of strategic interdependence, preferences, perceptions, access to information, and moral sentiments. Game theorists have contributed significantly to this task, while Hirshleifer (1995a) documents many agent characteristics in the context of conflict economics.

Appropriation Possibilities

The technology of conflict embodied in a contest success function and the game theoretic characteristics of economic agents define the appropriation possibilities inherent in an economy. Appropriation possibilities encompass an agent's attack or defense possibilities (or both) over material goods. Conflict economists maintain that, by ignoring appropriation possibilities, mainstream economic inquiry ignores a fundamental dimension of economic behavior. Hence, conflict economists attempt to reformulate theoretical and empirical economics through the "invasion" of appropriation possibilities into mainstream economic inquiry. This is something quite different from the application of economic methodology outside the traditional domain of economics, which has heretofore characterized defense and peace economics.

Contemporary Research in Conflict Economics: Selected Examples

Production/Appropriation Tradeoffs

Appropriation possibilities reshape production possibilities as shown in Figure 1. Assume that player D (a nation, group, or individual) can combine labor and land to

produce food and shelter. In a perfectly secure economy, D's production possibilities are defined by the bold locus in Figure 1. Suppose, however, that D's land holding is subject to seizure by player A according to a contest success function. This assumption casts D as a defender and A as an attacker. Given A's fighting effort, F_A , D can use some of its laborers to produce an optimal defense effort, F_D^* . D's optimal defense effort implies a production possibilities frontier in the insecure world shown by the dashed locus in Figure 1. D's insecure production possibilities over goods are lower than its secure production possibilities because D diverts some of its laborers to defense and A acquires some of D's original land holding in the appropriative struggle. Under the rubric of the technology of conflict and game theory, a systematic theoretical analysis of how appropriation possibilities reshape production possibilities is well underway.² Given the significance of production possibilities in many subfields of economics, theoretical integration of production and appropriation possibilities implies new theoretical and empirical inquiry in these fields.

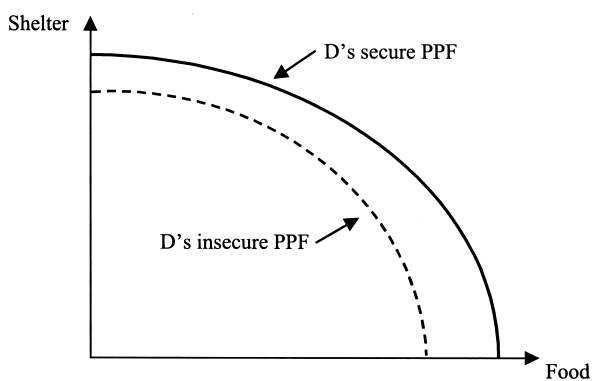
Economic Growth and Development

Consider economic growth and development economics, which both utilize the conceptual scheme of production possibilities. Since appropriation possibilities affect production possibilities, appropriation possibilities will generally affect economic growth and development. Grossman and Kim (1996b) formally integrate appropriation possibilities into the theory of economic growth by modeling accumulations of capital of a predator dynasty and a prey dynasty in a struggle over wealth. They find that the generations of the prey dynasty that choose to deter predation (giving rise to secure property) accumulate capital more slowly than preceding generations that tolerated predation. Hence, contrary to conventional wisdom, greater security of property can be associated with slower capital accumulation.

In relation to the development literature, I integrate appropriation and exchange possibilities in a hawk/dove model (Anderton 2001). One of the unusual results of the model is *nullifying productivity growth*, i.e., under certain conditions, increases in the productivity of each agent in its area of comparative advantage causes aggregate production and per capita welfare to *fall*. In the model, a general increase in the productivity of economic agents tends to increase output and per capita welfare as standard economic theory suggests. In a predator/prey economy, however, a general increase in productivity may benefit predators more than prey, causing the proportion of the population acting in a predatory manner to rise. Since a greater proportion of predators in an economy can dampen output and per capita

Figure 1

Appropriation Possibilities and the Reshaping of the PPF



welfare, the net effect of a general increase in productivity is ambiguous. Under certain conditions (such as an initial preponderance of predators), the increase in output and welfare brought about by a general increase in productivity is swamped by the emergence of a greater proportion of predators in the economy.

Collier (1999) considers the impact of civil war on the growth rate and composition of GDP. The study is significant for development economists because civil war “is both a tragedy and an impediment to development, affecting most of the world’s poorest countries” (Collier and Hoeffler 2000, p. 2). A key feature of Collier’s (1999) theoretical model is the differential adjustment of various factor endowments in the face of civil war. While some factors can adjust quickly to a crisis (e.g., financial capital), others adjust more slowly (e.g., physical and human capital, land). Based upon a sample of all civil wars occurring over the 1960–92 period, Collier finds that civil war has a significant negative impact on GDP per capita. Moreover, the restoration of peace does not necessarily recreate the economic characteristics of the prewar economy. Collier also presents evidence (in the case of Uganda) of the differential effects of civil war on the availability of factors of production and the sectors dependent upon them.

Trade Theory

Since exchange often needs to be defended and trade volume depends upon production possibilities, it necessarily follows that appropriation possibilities reshape exchange. Trade theorists generally assume that exchange will arise whenever it is Pareto superior to autarky. This ignores the requirement that exchange be a Pareto improvement for each economic agent relative to appropriation possibilities. Hence, trade theory asserts the existence of exchange rather than deriving the conditions of its existence. Recent theoretical work in conflict economics is attempting to identify the conditions of production and appropriation possibilities under which exchange will arise rather than (or along side of) redistributive struggle. Such work derives exchange as an equilibrium outcome and shows how the major variables of the production/exchange economy are reshaped by appropriation possibilities.³

Anderson and Marcouiller (2000) consider the impacts on international trade flows and prices of the insecurity of exchange brought about by predation. They maintain that empirical “work which ignores the security of exchange suffers from an important omitted variables bias” (p. 1), and conclude that

Predation by thieves or by corrupt officials generates a price markup equivalent to a hidden tax or tariff These price markups significantly constrain trade . . . (p. 20).

A fundamental idea implied by the Anderson/Marcouiller study is that appropriation possibilities are a significant dimension of economic behavior because they reshape key economic variables—in this case, prices and trade volumes.

Microeconomics

Cassel (1927/28) maintained that

Economic theory is in its essence a theory of price. Its main function is to explain the *whole process* by which prices are fixed at their actual heights (p. 511, my emphasis).

The main function of microeconomics is to explain prices in the economy and, more generally, valuations in all human choices. Appropriation possibilities represent an essential dimension of microeconomics because they are a significant part of the whole process of price determination referred to by Cassel. Just as exchange possibilities reshape autarky prices, so appropriation possibilities reshape prices and other key variables in the production/exchange economy. Hence, conflict economists believe that if production or exchange possibilities were to be excluded from the core of microeconomics, this would be no more heretical than the exclusion of appropriation possibilities. Furthermore, classifying appropriation possibilities as a mere transaction cost, similar to transportation rigidities or the risk of natural disasters, sidesteps its fundamental economic nature. Geographical barriers and natural disasters are not sentient economic decision-makers; they do not purposefully and strategically allocate resources to achieve objectives. Hence, appropriation possibilities are no more a transaction cost inhibiting production and exchange than production possibilities are a transaction cost inhibiting consumption.

A Christian Perspective on Conflict Economics

Many social scientists today would likely see the linkage of a religious worldview with social scientific inquiry as problematic. As Boulding (1974) warned, “there might well be cases in which devotion to religion actually stood in the way of that objectivity of mind and devotion to truth at all costs which is supposed to be—and sometimes is—the mark of scientific inquiry” (p. 72). Nevertheless, *all* social scientists have a philosophical worldview (i.e., a “religion”) which affects their work, even when they’re not explicit about it.⁴ Boulding (1974) also warns that there “is a quasi religion of ‘scientism’ which by rejecting all . . . spiritual phenomena severely limits the scope of scientific inquiry” (p. 72). The real issue is whether the various worldviews informing the work of social scientists (consciously or unconsciously) are productive or unproductive of social scientific inquiry. In this section I briefly discuss the *homo economicus* assumption and economic causes of conflict from the perspectives of conflict economics and Christian-

ity. The discussion highlights the common ground between these two modes of viewing conflict over material goods and some ways in which a Christian worldview can be productive of the economic study of conflict.⁵

Homo Economicus and the Dark Side of Human Behavior

A caricature of the debate over the nature of “rational economic man” (*homo economicus*) goes something like the following. *Homo economicus* considers only the costs and benefits to him or herself in the pursuit of objectives, i.e., *homo economicus* is selfish. Critics of the *homo economicus* assumption maintain that it is a spectacularly narrow characterization of human motivation given the many acts of goodwill found in human behavior (Sen 1987). Supporters of the assumption respond with one or more of the following: (1) the narrow view of *homo economicus* has been productive in explaining a great deal of human behavior; (2) human motives beyond selfishness (e.g., altruism) can be consistent with a broadened interpretation of *homo economicus*; and (3) a great deal of what is cited as non-selfish behavior is still selfish at its root (as usually explained by sociobiology).

What is striking about much of the critique of *homo economicus* (both Christian and non-Christian) is the scarcity of what Hirshleifer (1994) calls the “dark side” of human behavior. While there is some mention of motivations like revenge and envy in economics (e.g., Frank 1988), most social scientists who are upset with *homo economicus* believe that people are generally better than such a selfish creature. Christians believe that part of the reason for virtuous human behavior is that people are stamped with the “image of God,” which manifests itself in a wide range of cultural contexts (Lewis 1947). But within Christianity there is also the belief that something has gone very wrong with human nature. Humankind has a fallen nature (a dark side)—manifesting itself in various forms of human conflict and enmity toward God—which no amount of human progress is able fundamentally to solve. Real people may be better than the narrow characterization of *homo economicus*, but they are also worse. Hence,

the notion of *homo economicus* is a bit puzzling in what it requires of a human being: he will haggle to death to get a better price, though never think about grabbing what the other person has if given the chance to do so. This is an image of well-defined ruthlessness within a bubble of sainthood. But, real human beings everywhere—from Russia, to Somalia, to Colombia, to inside U.S. prisons as well as board rooms, to name just a few places—are often so ruthless that they burst this bubble (Garfinkel and Skaperdas 2000, p. 5).

Conflict economists are puzzled by the narrow character-

ization of *homo economicus* because the darker side of human behavior is seen as a general phenomenon having vast economic implications. It seems reasonable to believe that many Christian economists would view the darker side of human behavior in a similar way.

Economic Causes of Intra-State Conflict

Among the few economists who have written about conflict, most cite the desire for material gain as a fundamental cause. In some cases, the desire to acquire goods held by another may be driven by a survival constraint (Malthus 1820). It seems that in most cases of conflict over material goods, however, appropriation of goods originally held by another was not necessary for the acquirer’s immediate or inter-temporal survival. The simple economic story for why an appropriator goes after the goods held by another is the expectation of a net gain in material well being.⁶ This is the “greed motive” for conflict. Another motive for conflict is grievance. One group may carry out hostile acts against another group based upon perceptions of past or present injustices. While greed and grievance motives for conflict are distinguished in the conflict economics litera-

Appropriation possibilities represent an essential dimension of microeconomics because they are a significant part of the whole process of price determination.

ture, it is also recognized that they are often intertwined.

Greed is a problem repeatedly addressed in the Bible and in many religions outside of Christianity and Judaism (Lewis 1947). For example, greed (rooted in human nature) is a cause of fighting in James 4:1–2:

What causes wars, and what causes fightings among you? Is it not your passions that are at war in your members? You desire and do not have; so you kill. And you covet and cannot obtain; so you fight and wage war . . .

While many commentaries maintain that James was addressing fighting and quarreling in the Church, a few cite the passage to discuss a greed motive for intrastate and international conflict. For example, Adam Clarke (British Methodist, 1760–1832) comments on the passage as follows:

the wars and fightings to which St. James alludes [in 1st century Judea] [were] undertook . . . from a principle of covetousness. This was the principle from which predatory wars proceeded, and the principles from which all the wars that have afflicted and desolated the world have proceeded. One nation or king covets another’s territory or property; and, as a conquest is supposed to give right to all the possessions gained by it, they kill, slay, burn, and destroy,

till one is overcome or exhausted, and then the other makes his own terms; or, several neighboring potentates fall upon one that is weak; and, ...partition among themselves the fallen king's territory; just as the Austrians, Prussians, and Russians have done with the kingdom of Poland! . . . Ye are constantly engaged in insurrections and predatory wars . . .⁷

The greed motive for conflict, though cited in Scripture and throughout human history, is not the primary narrative used to describe contemporary intrastate conflict in most academic and media circles today. The conventional wisdom is that historic ethnic, religious, and cultural grievances are reasserting themselves in the post-Cold War era. Many political boundaries and spheres of influence—some drawn by the Cold War superpowers and some inherited from colonial history—are not tenable in the long run given the fault-lines of historic ethnic animosities. The geopolitical matrix of the Cold War, which kept many ethnic animosities in check, has receded. The result has been an unleashing of forces propelling various ethnic and religious groups into conflict over historic grievances. It is not my intention to dispute this reading of contemporary intrastate conflict; there is much to commend in such a view. Nevertheless, the greed motive for conflict does not play a prominent role in such narratives. Whether it should is an empirical question.

Collier and Hoeffler (2000) consider whether most civil wars are primarily caused by intergroup grievances and hatreds or by greed. Since both grievance-motivated and

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greed-motivated groups will embed their behavior in a narrative of grievance, asking groups why they're pursuing conflict will not necessarily uncover the true motivation. Collier and Hoeffler's approach is to infer motivation from patterns of observed behavior.

Collier and Hoeffler consider a number of variables reflecting the economic opportunities to groups in an intrastate conflict. The most prominent economic variable is the extent of a state's primary commodity exports. Primary commodities tend to be "lootable" because they are generic endowments which can be extracted directly by a group (thus they are easy to smuggle), they can survive predatory taxation, and they have long transportation routes (and thus many choke points for seizure). Classic examples of lootable resources are diamonds, precious metals, timber, and narcotics. The authors also consider the capacity of diasporas to fund a group's activities. Among the sources of grievance considered by Collier and Hoeffler are ethnic and religious

diversity, vengeance due to previous conflicts, political exclusion, and asset inequality.

Based upon a data set of 161 countries over the 1960–99 period, Collier and Hoeffler (2000) examine the risk of civil war using logit regressions. The authors find that most of the proxies for grievance are insignificant whereas the greed model performs well. The most important influence on the risk of civil conflict is the extent of a nation's primary commodity exports. Collier and Hoeffler (2000) conclude that

Our results . . . contrast with conventional beliefs about the causes of conflict. A stylized version of these beliefs would be that grievance begets conflict which begets grievance which begets further conflict Our model suggests that what is actually happening is that opportunities for primary commodity predation causes conflict, and that the grievances which this generates induce diasporas to finance further conflict (p. 25).

Although ethnic and religious groupings and intergroup grievances are often cited as major sources of intrastate conflict today, such perspectives receive little empirical support in the work of Collier and his colleagues.⁸ The age-old problem of greed emerges as a fundamental cause of such conflicts.

Economic Inquiry and Christian Worldview

It is the darker side of human behavior and its manifestation in the economic realm that conflict economists bring to the fore. Hence, conflict economics represents a development which Christian economists can view as consistent with their worldview about fallen human nature. While Christians and many conflict economists would disagree over the etiology of the darker side of human behavior, both see it as real and all too common. Moreover, given that the "dark side" significantly affects economic outcomes, the Christian worldview about fallen human nature can be productive of scientific economic inquiry in ways that seem attenuated and delayed under present-day economic pre-suppositions.

Many social scientists today likely view the idea of a God who intervenes in human affairs—including the idea of divine revelation—as mere products of culture and the human mind. Hence, relying on divine revelation about human nature in social scientific inquiry (even implicitly) is considered unscientific; it is considered something on the order of superstition. But Boulding's warning about "scientism" (cited above) is appropriate here. If divine revelation regarding human nature is objectively real, it can be a valid way of knowing which can supplement and advance social scientific inquiry.

Many economists seem content with the idea that con-

flict and greed can be productively channeled in the economy under the right institutions. In the meantime, civil unrest and other manifestations of appropriation possibilities (e.g., corruption, fraud, rent-seeking, predation) divert resources and reshape the economic possibilities of billions of people in ways generally neglected in mainstream economics texts. Mainstream economics did not arrive at its profound neglect of appropriation possibilities from any consideration of Judeo-Christian ideas of fallen human nature. A Christian worldview about fallen human nature opens up vistas on the economic world that are ignored or downplayed in mainstream economics texts; this in turn ends up being productive of scientific economic inquiry.

Conclusions

Appropriation possibilities are a significant dimension of economics because resource allocations to appropriation and defense are inherently economic actions (as all material resource allocations are) and they significantly reshape economic variables. It is likely that all of the natural disasters taken together in a given time period cause less wrenching to peoples' lives and economic outcomes than the purposeful and rational workings of appropriation possibilities. Conflict economists recognize the fundamental economic nature of appropriation possibilities and carry out research and teaching in accordance with it. Hence, conflict economics represents an attempt to improve economic inquiry through the integration of appropriation possibilities into the economist's perspective.

From a Christian standpoint, some of the most harmful economic consequences of the Fall are manifested in the appropriative dimension of human behavior. The Biblical commandments against stealing and the many references to appropriation in Scripture point to the age-old nature of material conflict and suggest that it is unlikely to abate any time soon. It should be of no surprise to the Christian economist that there remains today an unfortunate excess supply of behavior for conflict economists to ply their trade.

Endnotes

1 Economists in many contexts have deployed contest success functions. See Loury (1979) and Dasgupta and Stiglitz (1980) on R&D rivalry; Garfinkel (1990) on arms racing; Tullock (1980), Millner and Pratt (1989), and Neary (1997a) on rent-seeking; Nalebuff and Riley (1985) on wars of attrition; Garfinkel and Skaperdas (2000) on ethnic and national conflicts; Grossman (1991), Gershenson and Grossman (2000), Collier (2000), Collier and Hoeffler (2000), and Usher (1989) on civil conflict; Hirshleifer and Osborne (1996) on litigation; Konrad and Skaperdas (1998) on extortion; and Anderton (1999)

on piracy. For general theoretical formulations of the contest success function, see Skaperdas (1992, 1996), Neary (1997b), and Dixit (1987). For a discussion of the applicability of ratio and logistic conflict technologies, see Hirshleifer (1988). For a derivation of general and specific CSFs from easily interpretable axioms, see Skaperdas (1996). Haavelmo (1954: ch. 5) provides, to the best of my knowledge, the first formal statement of a contest success function.

- 2 See, e.g. Bush (1972), Hirshleifer (1988, 1995b), Brito and Intriligator (1985), Usher (1989), Skaperdas (1992), Grossman and Kim (1995, 1996a), Neary (1997b), and Garfinkel and Skaperdas (2000).
- 3 For theoretical work integrating appropriation possibilities and exchange see Rider (1993, 1999, 2000), Skaperdas and Syropoulos (1996, 1998), Anderson and Marcouiller (1998), Anderton et. al. (1999) and Anderton (1999, 2000b).
- 4 I view "philosophical worldview" and "religion" as synonymous in certain respects. A philosophical worldview that rejects any notion of a supreme being can nevertheless be classified as a "religion" according to the fourth definition of religion in *Webster's Dictionary* ("a cause, principle, or system of beliefs held to with ardor or faith.") According to this definition, Carl Sagan's famous statement that the universe is all there was, is, or ever will be is a religious statement.
- 5 Although it is not my concern in this paper, the social scientific study of human conflict also has the potential to make productive contributions to theological inquiry. For example, the apparent chasm between the doctrines "an eye for an eye" and "turn the other cheek" turns out to be relatively small in action/reaction models of conflict. Both speak of a reduction in the degree of reactivity of parties in a conflict system and both tend to reduce the equilibrium level of hostility (i.e., both doctrines are cut from the same mathematical cloth). Moreover, depending on the history and culture of the people within which such doctrines might find a foothold, the adoption of "an eye for eye" for one group might represent a greater moral breakthrough than some other group's adoption of "turn the other cheek."
- 6 This simplistic story may seem rather sterile, i.e., devoid of the moral sentiments that might outweigh narrow cost/benefit analysis. At the same time, we should not underestimate the potential for a large amount of material goods to be redistributed under the simple logic. For example, it is likely that most academics have overstepped copyright laws when copying books, articles, and computer software. Such appropriations can be explained by a simple contest success function where the Z parameter strongly favors the appropriator. Given the large amount of intellectual property readily available to academics today, we may be the greatest Robber

Barons in human history.

- 7 Clarke's commentary can be found at www.godrules.net/index.html.
- 8 A note of caution is appropriate. Many of the empirical studies on the causes of intrastate conflict (including Collier's work) have relatively low R-squares. Hence, future research may uncover a more significant role for grievance than has emerged to date. Collier's work is part of a significant effort by the World Bank to understand the economics of civil war, crime, and violence (see www.worldbank.org/research/conflict/).

References

- Anderson, James E. and Douglas Marcouiller.** 1998. "Trade and Security, I: Anarchy." Mimeo. Revision of National Bureau of Economic Research Working Paper No. 6223.
- _____. 2000. "Insecurity and the Pattern of Trade: An Empirical Investigation." Mimeo. Revision of National Bureau of Economic Research Working Paper No. 7000.
- Anderton, Charles H.** 1999. "Appropriation Possibilities in a Simple Exchange Economy." *Economics Letters*. 63, pp. 77–83.
- _____. 2000a. "Exchange of Goods or Exchange of Blows? New Directions in Conflict and Exchange." *Defence and Peace Economics*. 11, pp. 55–71.
- _____. 2000b. "An Insecure Economy Under Ratio and Logistic Conflict Technologies." *Journal of Conflict Resolution*. 44, pp. 823–838.
- _____. 2001. "Conflict and Trade in a Predator/Prey Economy." *Review of Development Economics*, forthcoming.
- Anderton, Charles H., Roxane A. Anderton, and John R. Carter.** 1999. "Economic Activity in the Shadow of Conflict." *Economic Inquiry*. 37, pp. 166–179.
- Boulding, Kenneth E.** 1962. *Conflict and Defense*. New York: Harper & Row.
- _____. 1974. "Religion and the Social Sciences" in Larry D. Singell, ed., *Kenneth E. Boulding: Collected Papers*, Vol. 4. Denver: University Press of Colorado.
- Bowles, Samuel and Herbert Gintis.** 1993. "The Revenge of Homo Economicus: Contested Exchange and the Revival of Political Economy." *The Journal of Economic Perspectives*. 7, pp. 83–102.
- Brito, Dagobert L. and Michael D. Intriligator.** 1985. "Conflict, War and Redistribution." *American Political Science Review*. 79, pp. 943–957.
- Bush, Winston C.** 1972. "Individual Welfare in Anarchy" in Gordon Tullock, ed., *Explorations in the Theory of Anarchy*. Blacksburg, VA: Center for Study of Public Choice.
- Cassel, Gustav.** 1927/28. "The Rate of Interest, the Bank Rate, and the Stabilization of Prices." *Quarterly Journal of Economics*. 42, pp. 511–529.
- Collier, Paul.** 1999. "On the Economic Consequences of Civil War." *Oxford Economic Papers*. 51, pp. 168–183.
- _____. 2000. "Rebellion as a Quasi-Criminal Activity." *Journal of Conflict Resolution*. 44, pp. 839–853.
- Collier, Paul and Anke Hoeffler.** 2000. "Greed and Grievance in Civil War." Mimeo. Washington, DC: The World Bank.
- Dasgupta, Partha and Joseph Stiglitz.** 1980. "Uncertainty, Industrial Structure, and the Speed of R&D." *Bell Journal of Economics*. 11, pp. 1–28.
- Dixit, Avinash.** 1987. "Strategic Behavior in Contests." *American Economic Review*. 77, pp. 891–898.
- Frank, Robert.** 1988. *Passions Within Reasons: The Strategic Role of the Emotions*. New York: W.W. Norton & Company.
- Garfinkel, Michelle R.** 1990. "Arming as a Strategic Investment in a Cooperative Equilibrium." *American Economic Review*. 80, pp. 50–68.
- Garfinkel, Michelle R. and Stergios Skaperdas.** 2000. "Contract or War? On the Consequences of a Broader View of Self-interest in Economics." *The American Economist*. 44, pp. 5–16.
- Gershenson, Dmitriy and Herschel I. Grossman.** 2000. "Civil Conflict: Ended or Never Ending?" *Journal of Conflict Resolution*. 44, pp. 808–822.
- Grossman, Herschel I.** 1991. "A General Equilibrium Model of Insurrections." *American Economic Review*. 81, pp. 912–921.
- Grossman, Herschel I. and Minseong Kim.** 1995. "Swords or Plowshares? A Theory of the Security of Claims to Property." *Journal of Political Economy*. 103, pp. 1275–1288.
- _____. 1996a. "Predation and Production." In Garfinkel, Michelle R. and Stergios Skaperdas, eds., *Political Economy of Conflict and Appropriation*. New York: Cambridge University Press.
- _____. 1996b. "Predation and Accumulation." *Journal of Economic Growth*. 1, pp. 333–350.
- Haavelmo, T.** 1954. *Contributions to Economic Analysis: A Study in the Theory of Economic Evolution*. Amsterdam: North-Holland.
- Hirshleifer, Jack.** 1985. "The Expanding Domain of Economics." *American Economic Review*. 75, pp. 53–68.
- _____. 1988. "The Analytics of Continuing Conflict." *Synthese*. 76, pp. 201–33.
- _____. 1994. "The Dark Side of the Force." *Economic*

- Inquiry*. 32, pp. 1–10.
- _____. 1995a. “Theorizing About Conflict” in Keith Hartley and Todd Sandler, eds., *Handbook of Defense Economics*. Amsterdam: Elsevier.
- _____. 1995b. “Anarchy and its Breakdown.” *Journal of Political Economy*. 103, pp. 26–52.
- Hirshleifer, Jack and Evan Osborne.** 1996. “The Legal Battle.” Department of Economics Working Paper. University of California at Los Angeles.
- Hitch, Charles J. and Roland N. McKean.** 1960. *The Economics of Defense in the Nuclear Age*. Cambridge: Harvard University Press.
- Isard, Walter.** 1969. *General Theory: Social, Political, Economic, and Regional With Particular Reference to Decision-Making Analysis*. Cambridge, MA: The MIT Press.
- Konrad, Kai A. and Stergios Skaperdas.** 1998. “Extortion.” *Economica*. 65, pp. 461–477.
- Lane, Frederic C.** 1979. *Profits from Power: Readings in Protection Rent and Violence-Controlling Enterprises*. Albany, NY: State University of New York Press.
- Lewis, C. S.** 1947. *The Abolition of Man*. New York: Macmillan Publishing Company.
- Loury, Glenn.** 1979. “Market Structure and Innovation.” *Quarterly Journal of Economics*. 93, pp. 395–410.
- Malthus, Thomas R.** 1820. *Principles of Political Economy*. London: John Murray.
- Millner, Edward L. and Michael D. Pratt.** 1989. “An Experimental Investigation of Efficient Rent-Seeking.” *Public Choice*. 62, pp. 139–151.
- Nalebuff, Barry and John Riley.** 1985. “Asymmetric Equilibria in the War of Attrition.” *Journal of Theoretical Biology*. 113, pp. 517–527.
- Neary, Hugh M.** 1997a. “A Comparison of Rent-Seeking Models and Economic Models of Conflict.” *Public Choice*. 93, pp. 373–388.
- _____. 1997b. “Equilibrium Structure in an Economic Model of Conflict.” *Economic Inquiry*. 35, pp. 480–494.
- Olson, Mancur, Jr. and Richard Zeckhauser.** 1966. “An Economic Theory of Alliances.” *Review of Economics and Statistics*. 48, pp. 25–48.
- Peck, Merton and Frederic Scherer.** 1962. *The Weapons Acquisition Process*. Boston: Harvard University Press.
- Rider, Robert.** 1993. “War, Pillage, and Markets.” *Public Choice*. 75, pp. 149–56.
- _____. 1999. “Conflict, the Sire of Exchange.” *Journal of Economic Behavior and Organization*. 40, pp. 217–232.
- _____. 2000. “Plunder or Trade?” Mimeo.
- Schelling, Thomas C.** 1960. *The Strategy of Conflict*. Cambridge, MA: Harvard University Press.
- _____. 1966. *Arms and Influence*. New Haven: Yale University Press.
- Scherer, Frederic.** 1964. *The Weapons Acquisition Process: The Economic Incentives*. Boston: Harvard University Press.
- Sen, Amartya.** 1987. *On Ethics and Economics*. New York: Basil Blackwell.
- Skaperdas, Stergios.** 1992. “Cooperation, Conflict, and Power in the Absence of Property Rights.” *American Economic Review*. 82, pp. 720–739.
- _____. 1996. “Contest Success Functions.” *Economic Theory*. 7, pp. 283–290.
- _____. 1998. “Insecure Property and the Stability of Exchange.” Mimeo.
- Skaperdas, Stergios and Constantinos Syropoulos.** 1996. “Competitive Trade with Conflict” in Garfinkel, Michelle R. and Stergios Skaperdas, eds., *Political Economy of Conflict and Appropriation*. New York: Cambridge University Press.
- Tullock, Gordon.** 1980. “Efficient Rent Seeking” in Buchanan, James, Robert Tollison, and Gordon Tullock, eds., *Toward a Theory of the Rent-Seeking Society*. College Station, TX: Texas A&M University Press.
- Usher, Dan.** 1989. “The Dynastic Cycle and the Stationary State.” *American Economic Review*. 79, pp. 1031–1044. ■