



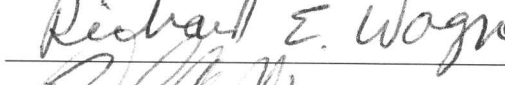




THE CALCULUS OF CONFLICT

by

Adam C. Smith  
A Dissertation  
Submitted to the  
Graduate Faculty  
of  
George Mason University  
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The Requirements for the Degree  
of  
Doctor of Philosophy  
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A dissertation submitted in partial fulfillment of the requirements for the degree of  
Doctor of Philosophy at George Mason University

By

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Master of Arts  
George Mason University, 2008

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Fall 2010  
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## DEDICATION

This is dedicated to my parents whose unbelievable commitment and support could not have been more integral in making this accomplishment a reality. Thank you for all you have done and continue to do in inspiring me to achieve.

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I would first like to thank my committee for agreeing to oversee this research endeavor. In particular, I want to thank Peter Leeson for providing the initial spark that brought my attention to how we conceive of cost in environments dominated by conflict. I also thank Peter Boettke for helping steer the trajectory of the work and providing several crucial insights into the overall argument.

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It is worth mentioning that Bruce is also my grandfather and has been a beacon of guidance to me for as long as I can remember. His illustrious career in economics has provided a benchmark that I will likely never achieve but always endeavor to reach. Indeed, in my case, the hand that led me to economics was quite visible as it surely was his.

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## ABSTRACT

### THE CALCULUS OF CONFLICT

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This dissertation addresses how we conceive of conflict from an opportunity cost perspective. Traditionally, economics posits the opportunity cost of choice as taking place in the context of tradeoffs between certain productive and consumptive uses of a person's resources, with this tradeoff taking place independently of the decisions of others. While this simple depiction of choice is suitable in markets where property rights are well-defined and outside coercion is minimal, it is ill-suited to contexts involving conflict. In conflictual environments, the opportunity cost of choice encompasses not only how the person allocates her resources to promote certain actions, but also how others will react to these actions. Thus, conflict by definition is nested within an interaction with others and therefore must be depicted as such when determining the opportunity cost considerations or calculus of conflict.

The purpose of my first chapter is to explore the opportunity cost of conflict from this choice-theoretic perspective. This approach involves examining choice as it pertains

to the person actually choosing whether to engage in conflict. My analysis is founded on a conception of conflict as being nested within an ongoing interaction with another person (or persons). This serves to expose a difficulty with modeling conflict from a strictly neoclassical perspective. Generally speaking, in the neoclassical style of argumentation, the decision-maker is described as choosing between two or more commodities/services where the relative prices are known. The opportunity cost of either item is the net gain associated with the foregone choice. Since the emphasis is placed upon resource scarcity as manifested through price differentials as the constraint of interest, negative consequences deriving from interaction with other person(s) merely lurk unstated in the background. As a result, the standard neoclassical approach, which has greatly influenced benefit-cost analysis and other decision models, obscures the disincentives these consequences place upon particular individuals considering acts of conflict. The contribution of this paper is to analytically distinguish the costs that pertain to (1) resource allocation and (2) the interaction with other persons. I draw out these costs by using an opportunity cost framework that builds upon the work of such theorists as Armen Alchian, James Buchanan, Jack Hirshleifer, and Murray Rothbard. My framework exposes the effects of these consequences upon behavior, which constitute crucial disincentives to engage in conflict, limiting its incidence even when no external enforcement is present. Furthermore, I present evidence from several contributions in the new comparative political economy literature that serve to expose how cooperation emerges as a result of the negative consequences of conflict with others.

I next more rigorously define my model and test it using a laboratory experiment. I examine each of these constraints upon conflict, those that derive from resource scarcity and those that derive from the consequences of interaction with others. In this expansion upon previous theoretical and experimental efforts, I incorporate more fully both constraints into the participant's opportunity cost of choosing conflict by linking effort levels in the form of amount of arming and the level of destruction of a contestable resource. I employ an experiment to learn how alteration of these constraints changes outcomes in practice. I find that subjects follow the theoretical predictions in that severing the link between effort level and destruction leads to a 32.29% greater incidence of conflict. I also find a counter-intuitive effect produced by increasing the price of arming: an increase in the price of arms results in a 17.08% increase in the incidence of conflict. These results illustrate that the incidence of conflict is affected by both constraints in tandem as greater resource scarcity alone does not necessitate lower levels of conflict. As I demonstrate, how one models the nested interaction in which conflict takes place ultimately determines the opportunity cost of choosing conflict.

Finally, I apply my framework to the changes in our current political landscape motivated by the recent financial crisis. This paper demonstrates that while policymakers ostensibly claim to be shifting market enterprises towards politically salient objectives, what occurs in practice is an interaction across competing networks of political and market enterprises. This embedded web of relationships inevitably influences actual political outcomes in a direction that no one organization can control or predict. One such outcome, the creation of the Troubled Assets Relief Program (TARP), illustrates the

central thesis of my dissertation. While TARP reduced the costs in resources of gaining political advantages such as extensive subsidies and government support, the resulting backlash from this same mechanism caused market enterprises to reduce their involvement with political enterprises to minimum mandated levels. Furthermore, these companies chose to exit TARP oversight as soon as was legally feasible, an outcome which runs counter to a prediction that relies solely on the observation of decreased resource costs. After all, if the costs of rent-seeking decrease, a simpler model would predict greater rent-seeking. Incorporating the interactive costs of conflict reconciles the observed behavior of firms with economic theory.

In summary, by exposing the interactive nature of conflict, this dissertation demonstrates that resource allocation across productive possibilities is only part of the calculus of conflict. Participants engaging in acts of conflict must reckon with the actions of others. The importance of this contribution is that it reveals that a decrease in the cost of resources used in conflict does not necessitate an increase in the incidence of conflict, as a naïve application of standard demand theory would predict. Instead, the more comprehensive opportunity cost framework I employ shows that it is only when we account for both the costs of these resources and the costs due to the interaction itself that we can apply the law of demand. The implication for research in conflict theory is that the objective resource costs of conflict must be analyzed alongside of the interactive costs of conflict when determining actual incidence of conflict. Incorporating these interactive costs yields a far more optimistic outlook of the ability of persons to cooperate, even

under the direst of circumstances, such as takes place in environments characterized by conflict and violence.

## Chapter 1: *Cost, Choice and the Calculus of Conflict*

### 1. Introduction

In the 16<sup>th</sup> century, disputes emerged between neighboring territories along the Scottish-English border. Bandits known as “reivers” participated in cruel acts of plunder, rape, and murder. Such rampant violence threatened to overwhelm any hope of a reasonable quality of life for these border inhabitants. Yet as Leeson (2009) shows, through this adversity—indeed because of it—residents on both sides of the border were able to come together to create a system of addressing grievances called the *Leges Marcharium*, which allowed victims to prosecute bandits through a credible private legal institution. What is telling about this story is that such a creative and largely effective institutional response emerged without any of the usual mechanisms needed to engender cooperation, such as shared norms, promise of exchange opportunities, or a common outside threat. Leeson offers the following explanation: "However, instead of this situation preventing decentralized institutions from emerging to govern them, if anything, it seems that *these bandits' animosity enhanced the importance* of developing a system to oversee intergroup interactions and, thus, both groups' incentive to devise institutions for regulating their predatory inclinations". (p. 499-500 [emphasis mine])

This claim has a considerable counter-intuitive implication for the nature of conflict and its incidence. Simply put, rather than conflict always begetting further

conflict, conflict may in fact result in its own cessation (or at least reduction). The explanation for such a counter-intuitive result is actually quite simple. If we assume that recipients of uncompensated conflict for the most part abhor this type of interaction, then the incidence—actual or potential—of conflict will encourage efforts to move towards cooperation in future interactions. In Leeson’s anarchistic context where the decisions of persons actually engaged in conflict with others were dominant, past encounters with force caused each party to become more aware of the undesirable consequences of conflict. In economic terms, as the opportunity cost of incurring violent outcomes increased, these persons sought new channels of interaction with one another to prevent further violence. The age-old adage of “necessity is the mother of invention” certainly applies.<sup>1</sup>

This inclusion of the consequences of conflict nested within interaction with another person (or persons) captures the person’s choice between conflict and cooperation in a manner often neglected by those writing on conflict from a strict

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<sup>1</sup> It is interesting to note that one of the earliest written uses of this phrase, dating back to Plato’s *Republic* where Socrates and Adeimantus are discussing the origin of the State, was in the context of the development of new ways of interaction:

“A State, I said, arises, as I conceive, out of the needs of mankind; no one is self-sufficing, but all of us have many wants. Can any other origin of a State be imagined?

There can be no other.

Then, as we have many wants, and many persons are needed to supply them, one takes a helper for one purpose and another for another; and when these partners and helpers are gathered together in one habitation the body of inhabitants is termed a State.

True, he said.

And they exchange with one another, and one gives, and another receives under the idea that the exchange will be for their good.

Very true.

Then, I said, let us begin and create in idea a State; and yet the true creator is necessity, who is the mother of our invention.

Of course, he replied.” p. 368

neoclassical economic perspective. While the economic problem fundamentally concerns decision-making within scarce means, this scarcity is most often manifested in the neoclassical tradition as an allocative decision among various goods and uses of one's resources based upon price. This economic logic is transformed into conflictual settings to a rationale that construes conflict as a decision over productive or predatory means of maximizing one's wealth. The decision then boils down to a choice informed solely by the price (in terms of foregone resources) of each respective means, production or predation (see Hirshleifer 1988, 1991, 1995, 2001; Skaperdas 1992; and Garfinkel and Skaperdas 2007 for an excellent survey of this literature).

Yet conflict involves more than a decision over resource allocation. It is a decision that is fundamentally nested within unique interactions with other person(s). It involves the irrevocable choice of altering the way in which one interacts with another party. Unlike exchange, conflict results in negative consequences for one if not both parties in the interaction. Since these consequences will be taken into account by affected parties, the person must decide whether the actions of others in response or in tandem with one's own decision are severe enough to negate any positive benefit that may emerge from the conflictual act. Consequently, as I will argue, the fundamental economic decision is not between production or predation but between cooperation or conflict with others.

In this paper, I examine this calculus of conflict by placing the relevant choice of action in conflict within an interactive context. I utilize anarchy—meaning the assumption that outside enforcement is absent—as my basic environmental assumption.



Anarchy provides a suitable thought experiment to organize the patterns of interaction under conflict, as no pre-existing institutional parameters are assumed in *ex ante*. This allows the theorist to conceive of conflict in its unadulterated form, exposing the basic dilemmas that exacerbate conflictual tendencies, of which societies employ institutions to control.<sup>2</sup> This mode of contextualizing conflict as occurring within some form of anarchic interaction can be traced back first to the classic works of Hume and Smith and later to more contemporary theorists such as Boulding, Buchanan, Greif, and North.

In building a conceptual framework to organize my argument, I first review these previous contributions that offer insight into this means of organizing the economic decision to engage in conflict. I next expand upon the perspective offered by these authors by placing it within an opportunity cost framework, drawing upon the works of Armen Alchian, James Buchanan, Jack Hirshleifer, and Murray Rothbard. I will use this opportunity cost framework to further examine choice from the perspective of the person deciding whether to engage in conflict with another person and in turn show how this interactive perspective alters the predicted incidence of conflict. I then draw upon several papers within the new comparative political economy literature<sup>3</sup> that serve to demonstrate this framework in practice. I conclude by summarizing the contributions of the paper.

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<sup>2</sup> There are several other tangential reasons why anarchy serves as a useful thought experiment. First, anarchy is not only useful for discovering underlying *conflictual* tendencies but as Boettke (2005) argues, anarchism is also important in exposing the underlying *cooperative* tendencies sustained without external enforcement. A large body of literature exhibits these tendencies in anarchic settings, some of which will be reviewed below (for other examples see Benson 1988, Ellickson 1991, Friedman 1979, Milgrom, North, and Weingast 1990, and Peden 1977). Second, as Rajan (2004) maintains, anarchy is a more realistic starting point in describing interaction in the developing world than the typical neoclassic assumption of perfect enforcement.

<sup>3</sup> This literature is surveyed in Boettke et. al. (2005).

## **2. Conflict from a choice-theoretic perspective**

### *2.1 Previous contributions to the economics of conflict*

In any investigation or inquiry, it is important to establish how we conceive of the phenomena in question. This is particularly poignant in understanding how we conceive of conflict from the economic perspective. The earliest contributions to the economic analysis of conflict conceived of conflict from a contractarian perspective. The contractarian tradition, stemming from the work of Hobbes, depicts society as a manifestation of the need to bring order to an otherwise chaotic set of interactions. Thus, the origin of political and legal institutions lies in humankind's desire to quell the rampant violence that would otherwise occur. In one of the earlier contractarian presentations, Hume presents an argument that depicts conflict over property as an inevitable consequence of human self-interest, yet offers the point that it is this same self-interest that wills us to avoid such a dilemma. It is worth quoting at length. He argues:

'Tis certain, that no affection of the human mind has both a sufficient force, and a proper direction to counter-balance the love of gain, and render men fit members of society, by making them abstain from the possessions of others. Benevolence to strangers is too weak for this purpose; and as to the other passions, they rather inflame this avidity, when we observe, that the larger our possessions are, the more ability we have of gratifying all our appetites. There is no passion, therefore, capable of controuling the interested affection, but the very affection itself, by an alteration of its direction. Now this alteration must necessarily take place upon the least reflection; since 'tis evident, that the passion is much better satisfy'd by its restraint, than by its liberty, and that by preserving society, we make much greater advances in the acquiring possessions, than by running into the solitary and forlorn condition, which must follow upon violence and an universal license. Hume (2000, p. 316)

To reiterate, Hume indicates that self-interest should alert the individual upon the least reflection to the gains of restraining her conflictual desires, as violence would be the consequence rather than prosperity. It is this recognition of the consequences of conflict that help to prevent conflict with others from actually emerging. Hume therefore not only conceives of conflict as occurring within an ongoing interaction but posits the solution to violence as also resting within the dynamic of this ongoing interaction.

Hume's friend and colleague, Adam Smith, wrote in his other great book, *The Theory of Moral Sentiments*, how the recognition of these consequences leads to a conscious desire to avoid disapprobation from society as manifested in the judgment of the "impartial spectator." This spectator alerts us to actions considered outside of the norm of acceptable conduct. This in turn weighs against our more selfish inclinations that would draw us into conflict with others. A particularly relevant passage is as follows:

The horrors which are supposed to haunt the bed of the murderer, the ghosts which, superstition imagines, rise from their graves to demand vengeance upon those who brought them to an untimely end, all take their origin from this natural sympathy with the imaginary resentment of the slain. And with regard, at least, to this most dreadful of all crimes, Nature, antecedent to all reflections upon the utility of punishment, has in this manner stamped upon the human heart, in the strongest and most indelible characters, an immediate and instinctive approbation of the sacred and necessary law of retaliation. p. 71

Here Smith is romanticizing how man is provided with a pre-existing instinct to approve of retaliation in the wake of conflict (in this case murder). This instinct not only provides us with an instinct to punish actual incidents of conflict but a means of evaluating our

own selfish inclinations to engage in conflictual acts ourselves. Through appealing to the “impartial spectator” within all of us, we are able to reconcile our actions with the judgments of others. This allows us to recognize those actions that will garner praise and approbation and those that will elicit disapprobation and retaliation. Using this recognition, we can better order our activities so as to minimize the level of conflict with others.

These classic contributions to the economic analysis of conflict couch conflict within a nested interaction between man and man (or man and society), imputing a desire within man to avoid the costliness of conflict, in incurring violence and/or retaliation from others. Boulding (1962) provides a model that has a similar interpretation yet also provides a more quantitative orientation of how conflict manifests itself between two persons. Boulding’s framework helps illustrate how a person anticipates and reacts to conflict from another person. Imagine a simple environment where two persons are engaged in some form of conflict with one another, with no outside enforcer or ally to interfere with their interaction. Boulding (1962) presented the following function for how a person reacts in such an environment.

$$h_1 = H_1 + (r_1 - m_1 h_2)h_2$$

The level of conflict the person is willing to engage in ( $h_1$ ) is determined by her initial level of hostility ( $H_1$ ), her willingness to retaliate ( $r_1$ ), the level of hostility chosen by the other person ( $h_2$ ) and the rate of change of this willingness to retaliate as the other person’s hostility rises ( $m_1$ ). The initial level of hostility ( $H_1$ ) and the level of hostility

chosen by the other person ( $h_2$ ) are both given at the time of decision and therefore beyond the person's control. The other variables,  $r_1$  and  $m_1$ , function as preference parameters to how much conflict the person is willing to engage in. If  $m_1$  is positive, then it means she has diminishing returns to incurring conflict from the other person. This could reflect, for example, an aversion to destruction of her property or a general abhorrence for violence. Consequently, she will reduce her level of hostility in anticipation of expected hostility from the other person ( $h_2$ ). If  $r_1$  is positive, then she derives some sort of benefit to engaging in conflict once the other person's hostility becomes positive. (Boulding, p. 35-36)

Still, Boulding's model shows us how ongoing conflict is costly if it takes place within a nested interaction. Both participants are well aware of how their choice of conflict is an input into the other person's choice of conflict. This recognition informs each person of the dangers of actually engaging in conflict. Consequently, this recognition encourages restraints upon conflict within limits. Buchanan (1974, 1975) echoes this line of reasoning in showing how the restraint of conflict, in anticipation of the "solitary and forlorn condition" which must inevitably follow, not only reduces the incidence of conflict but also encourages cooperative institutional change.<sup>4</sup> Buchanan describes in true contractarian fashion how such institutional change begins:

Note precisely what this agreement embodies. The contract is one of bilateral behavioral exchange. Individual A agrees to give up some share of his own defense-predation effort in exchange for a related behavioral change on the part of individual B. There is no incentive for either person to take this behavioral change unilaterally, and there is nothing in the initial agreement, as such, which

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<sup>4</sup> Buchanan explicitly acknowledges the similarity to Hume's discussion. (see footnote, p. 27)

requires or even induces any acceptance by the other of the legitimacy of either person's command over goods, either in the preagreement or postagreement stage. Mutual acceptance of 'ownership rights' is not a part of this preliminary disarmament agreement. On the other hand, by negotiating such an initial agreement to limit defense and predation, 'law' of a sort has now emerged. The two persons accept limits to their own freedom of action, to their own liberty. The first leap out of the anarchistic jungle has been taken. (p. 77)

Buchanan's narrative is meant only as a thought experiment, not necessarily an actual description of historical institutional change. Yet it provides 1) a useful means of organizing what incentives people face when dealing with conflict and 2) how these incentives in turn encourage the conditions necessary to initiate enduring property rights over contestable resources. Buchanan therefore takes the analysis one step further by positing that this interaction between man and man in a state of conflict not only encourages these persons to lay down their arms but also to invest in enduring institutions that serve to minimize conflict in the long-run.

Two recent contributions expose how these steps towards cooperative institutional change emerge in practice. Bates, Greif and Singh (2002) model how individuals might choose between various institutional mechanisms that reduce conflict. Specifically, their comparison is between decentralized and centralized enforcement mechanisms. They argue that even when enforcement is centralized, "The state holds no monopoly of violence; rather, people retain control over the means of coercion, and it is their threat to revert to violence, should others defect, that supports order along the equilibrium path." (p. 600) Therefore, the danger of violent outcomes in interaction with others still serves as the constraining influence against conflict, even when force has largely coalesced to a central entity. Hence, the Weberian definition of the "state" as a "monopoly in force" is

misleading.<sup>5</sup> A more accurate depiction is that the state has a relatively high concentration in force, but potential violence still resides with the citizenry and is important in sustaining order by constraining excessive predation by the state itself.

It follows then that each of these two enforcement mechanisms—centralized and decentralized—provides a means of securing peace. If enforcement is completely decentralized, though, then raiding by private parties is still feasible. In response to this raiding, people can prevent plunder in two ways. First, people can simply produce less, so that the gains to raiding are low, making the price of peace poverty. Second, people can invest in military capabilities, thus again rendering the gains from raiding low, making the price of prosperity violence. Note, however, that violence in this sense is not necessarily actual violence, but more likely potential violence. The authors do not qualify the term in this way as they see widespread decentralized enforcement as giving way to “constant displays of military ability or skirmishes” (p. 610). Yet as Fearon (1995) explains, any coherent explanation for the existence of conflict must explain why persons are “unable to locate an alternative outcome that both would prefer to a fight.” (p. 380) Thus, it is unclear given Fearon’s challenge why this potential violence would necessarily become actual violence.

Nevertheless, they reason that this outcome will encourage centralized enforcement in the form of the “state.” They argue, “Our model shows that decentralized systems can provide security; but in doing so, they impose a trade-off between order and prosperity. These examples suggest that members of such societies have been aware of

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<sup>5</sup> See Weber’s *The Theory of Social and Economic Organization*, p. 154.

the limitations imposed upon them and sought an alternative set of political institutions.” (p. 611-612) Furthermore, this allows members of these societies to reduce consequences that previously went to private enforcement by ceding control of the means to engage in violence to a superior agent in force. The creation of the “state” is the essential means by which these societies minimize conflict with one another. Thus, the erection of this cooperative institution is motivated primarily by the desire to alter the ongoing interaction with one another. These gains from both increased security and reduced consequences must, of course, be compared to the greater potential for predation by the “state” itself (see my discussion of conflict in the post-anarchic society below).

North, Wallis, and Weingast (2009) also provide a conceptual framework that focuses upon the emergence of the state as a response to violent outcomes in a nested interaction. In their framework, this conflict occurs between a small number of “elites” rather than a large number of people with unspecified (but equal) potential for force. These elites hold a superior advantage in force relative to the majority of the populace within a society and are initially engaged in conflict in a state of anarchy with other elites. Reflecting the economic rationale discussed so far, elites will find it in their interest to mutually disarm, or at least prevent open hostilities, once the benefits of cooperation exceed the gains rendered from conflict. (p. 18-19) According to the authors, the result of this mutual disarmament is the formation of a “Natural State,” an institutional paradigm that describes most political regimes of the last 10,000 years and indeed much of the political regimes we observe today. (p. 13) They use the term “natural state” to identify historical arrangements where “new forms of integrated



political and economic organization develop to limit violence.” (p. 53) Thus, like Bates, Greif, and Singh, their framework revolves around the notion that cooperative institutional change is precipitated by an ongoing conflictual interaction.

### **3. The opportunity cost of conflict**

This discussion of the interactive nature of conflict illuminates the costliness of conflict that emerges from the actions of others. The costs that derive from this interaction act upon our decision-making calculus by guiding us in our choice to engage in conflict. Still, in order to fully recognize the implications of this line of reasoning, it is important to couch these interactive costs within the broader opportunity cost paradigm, so often employed in economic reasoning. I establish the basic opportunity cost framework by drawing upon the works of Armen Alchian, James Buchanan, and others. I will then integrate several arguments by Jack Hirshleifer and Murray Rothbard that utilize opportunity cost in the context of conflictual interactions. This discussion will help illuminate how we can analytically treat separately the costs of conflict due to resource allocation and those due to the interaction itself. By breaking apart these costs, I show that conflict is indeed more costly than would otherwise be considered from a more naïve application of neoclassical theory. Examples taken from the new comparative economy literature demonstrate this in practice in the section following.

#### *3.1 Cost and choice*

Cost used in the strict economic sense differs from “cost” used in the colloquial sense. “Cost” in the colloquial sense can refer to any expenditure or outlay used up in pursuit of an opportunity (i.e. the movie ticket “costs” \$15), while cost in the economic sense must be tied with a choice among alternatives (i.e., going to the movies cost me a relaxing evening at home). This distinction is subtle but important, as opportunity cost in fact encompasses all relevant “costs” in its organization of decision-making, by incorporating all such “costs” into each of their respective opportunities. These “costs” enter into each opportunity as negative components with the benefit of each opportunity accounting for the positive component. The only true cost the individual faces is the value of the highest foregone opportunity she misses out on through choice. Alchian rather succinctly explains this difference between the colloquial term “costs” and the cost of the strict economic sense.

Failure to appreciate the purpose of the concept of cost can lead to confusing the concept of cost with the undesirable attributes of some event. For example, when one builds a swimming pool, the toil and trouble of digging it and the nuisance of noisy, disobedient neighborhood children and uninvited guests who use it are undesirable attributes of the pool. They are not the costs of creating and having a pool. This distinction between (a) undesirable attributes inherent in some event and (b) the highest-valued forsaken option necessary to realize that event is fundamental, for only the latter is cost as the term is used in economics. Alchian 1977, p. 302

He further clarifies how recognition of these “costs” or undesirable attributes is still important as they determine the net value of each opportunity before the individual.

The definition of cost does not deny that the pain and time and trouble of producing some event are influential in the measure of cost. But it does show that

these aspects enter into costs only by affecting the value of the best forsaken opportunities. *ibid.*, p. 181

This clarification is useful in that it helps us to differentiate between the undesirable attributes inherent in some action and the actual cost of decision-making in the form of lost opportunities. The diagram below illustrates how each of these components is organized into the opportunity cost framework.

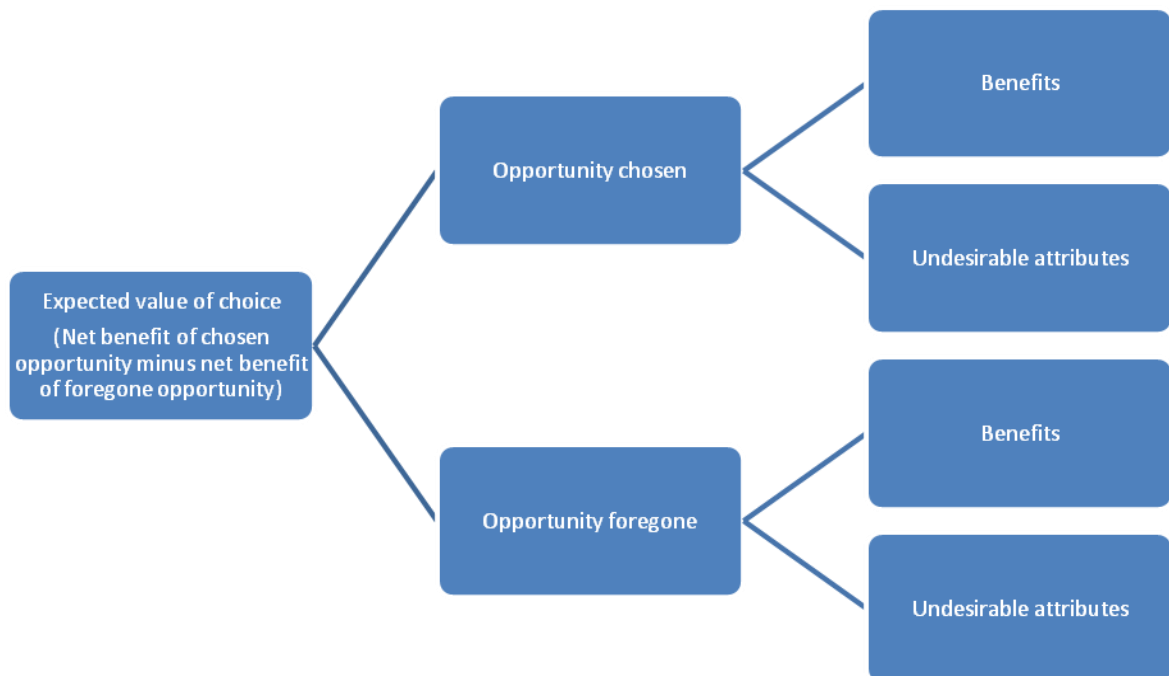


Figure 8: Opportunity cost framework

Each opportunity has a unique set of benefits and undesirable attributes. The expected value of the opportunity chosen is equal to its net benefit minus the net benefit of the opportunity foregone.

### 3.2 *The Calculus of Conflict*

In the traditional economic problem, this choice calculus operates as follows. A person has multiple opportunities in which to employ her resources. Each of these opportunities in turn provides some net benefit to her. To maximize her utility, the person should choose the opportunity of highest net benefit and allocate her resources accordingly. Now consider a more complex environment where conflict is at play. Each opportunity before the person no longer provides a fixed net benefit but instead is a product of the actions of her *and the person she is in conflict with*. After all, if she employs her resources in a manner that the other person considers intolerable, then she may find her resources confiscated or destroyed before they are able to attain any value for her. Therefore, when using opportunity cost in an environment characterized by conflict, we must expand the concept to incorporate such interactive features of choice.

In a highly influential piece, Hirshleifer (1988) extended the basic model of rent-seeking first presented in Tullock (1980) to incorporate interaction under conflict, when no external enforcement is present. This model stands as the foundation to most of the literature surveyed in Garfinkel and Skaperdas (2007) and is worth exploring in detail as a means to help organize how costs affect choice in conflictual interaction with other persons. Hirshleifer uses the following narrative to describe the intuition behind his model.

*An allegory:* On Lake Contention there are two villages. Each village can launch fishing boats or gunboats. The fishing boats catch the fish (production); the

gunboats protect the village's catch and may seize the other village's catch (appropriation). Yet the hostilities between the villages are limited in several ways. First, each side's home base is assumed invulnerable to attack. Second, in any hostile encounter, whichever side is outmatched simply flees and surrenders its catch. (Thus, there is coercive taking but no actual battle.) p. 204

The environment described has no external enforcement. In fact, he assumes that no conflict resolution mechanisms exist, as he is examining conflict under least-resistant conditions to determine the limits of cooperation. Thus, the focus is upon individual decision-making when conflict is allowed to run rampant. Of course, as explained above, specific institutional mechanisms can be introduced at a later stage building upon this anarchic foundation.

Transferring this narrative into game theoretic logic produces the following. Let an individual invest a finite set of resources into two functions: production ( $F_i$ ) and appropriation ( $G_i$ ). The following constraint equation represents this tradeoff:

$$R_i = F_i + G_i$$

If the individual engages in appropriation, then she will pit her appropriation resources ( $G_i$ ) against her intended target's appropriation resources ( $G_j$ ) according to the following contest success function.

$$P_i = \frac{G_i}{G_i + G_j}$$

Once combined, these arguments determine the representative individual's expected value function.

$$E[V_i] = p_i(R - G_{i+j})$$

Finally, the following reaction function specifies the optimal levels of appropriation.

$$G_i^* = \frac{R_i}{2}, E(V) = \frac{R}{2}$$

As the model indicates, the level of appropriation chosen depends solely on the initial resources held.<sup>6</sup>

One important addition to this model was introduced in Hirshleifer (1995), where he incorporated price parameters into the function of production and appropriation. This alters the basic model as follows. The constraint equation becomes:

$$R_i = aF_i + bG_i, a=[0,1], b=[0,1]$$

These *logistic cost coefficients* for production ( $a$ ) and appropriation ( $b$ ) represent the relative price of converting units of  $R_i$  into functioning units of production or appropriation. The reaction function changes to account for this.

$$G_i^* = \frac{R_i}{2b}, E(V) = \frac{R}{2}$$

The level of appropriation chosen now depends on the initial resources held and the price of appropriation resources.

Later expansions of the Hirshleifer model incorporated a destructiveness parameter ( $\varphi$ ).<sup>7</sup> This changes the expected value function to the following.

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<sup>6</sup> I have assumed constant returns to scale of appropriation to simplify the presentation of the model.

$$E[V_i] = p_i \phi (R - G_{i+j}), \phi = [0,1]$$

If conflict should occur, then the resource base (net of appropriation resources used) is reduced according to the destructiveness parameter. Therefore, the consequences of appropriation at least at the social level are both lost resource outlays that could have gone to production and destruction of the contested good. Ostensibly, Hirshleifer incorporates costs due to both resource allocation and interaction into the model.

But what about opportunity cost to the actual person? The reaction equations above are Nash equilibria, which of course means that they do not change should the other player change their own allocation of units between production and appropriation. Given this information, the representative person can predict what the other person's production/appropriation bundle will be and choose her own accordingly. The opportunity cost of her decision will reflect this. I will illustrate this point by first presenting an opportunity cost paradigm using Hirshleifer's arguments as he presents them and then showing what the opportunity cost to the person would look like in comparison.

Hirshleifer argues that the person can choose to allocate her units to production or appropriation. The benefits of appropriation are the increased likelihood of gaining units according to the specified contest success function. The consequences, however, are more units dedicated to appropriation according to a unit price of  $b$ . Furthermore, any

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<sup>7</sup> I use Garfinkel & Skaperdas (2007, Sections 4.1.1 and 4.2.1) as the basis for this expansion of the Hirshleifer model.

units dedicated to appropriation sets off the destruction parameter  $\phi$ . The benefits of production are that fewer units will be removed from the resource base  $R$ . The consequence is that units dedicated to production incur a price of  $a$ . In a social welfare sense, as indicated by the updated opportunity cost diagram below, Hirshleifer has incorporated allocative and interactive costs.

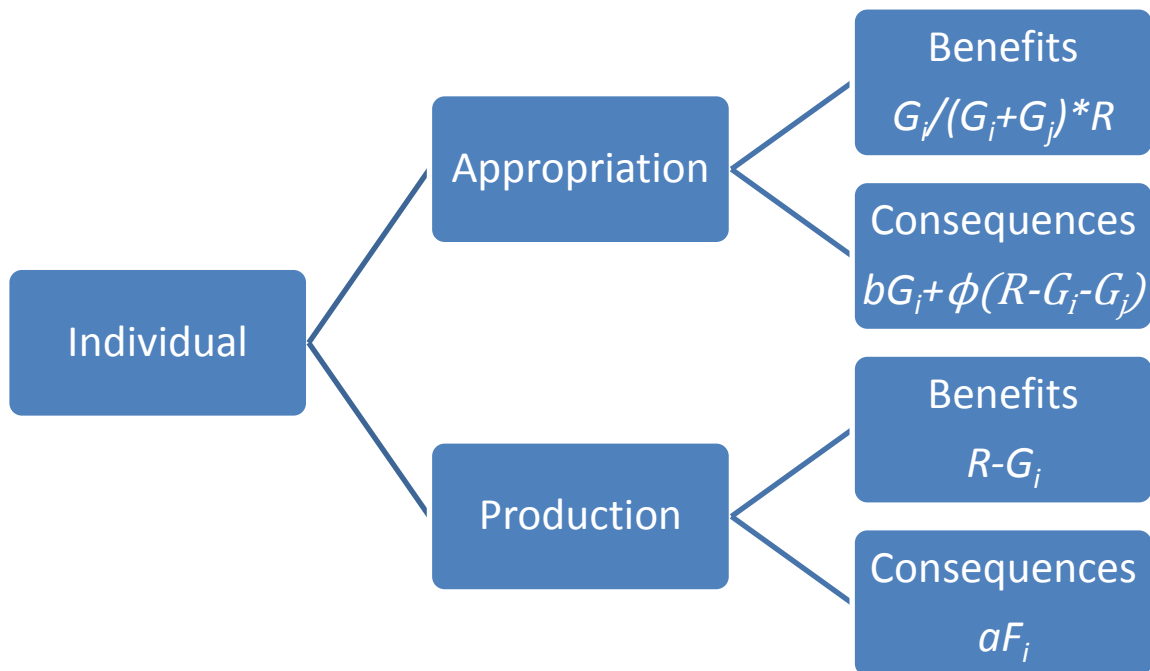


Figure 9: Opportunity cost as presented in Hirshleifer model

Yet this opportunity cost only takes place at the social level, not at the level of the person choosing to engage in conflict. Hirshleifer maintains that opportunity cost operates in the model as the person has to give up units of production when she invests in appropriation. However, this claim that the person faces an opportunity cost burden of investing predation by foregoing gains from production is inconsistent with the game-



theoretic nature of the model. For example, if this representative person were to choose to allocate all of her units into production, she would not reduce her opportunity cost to zero. In fact, she would lose all of her units and suffer the highest possible opportunity cost by neglecting to protect her assets from appropriation.<sup>8</sup> The reason for this outcome is that the other person will invest half of his endowment into appropriation regardless of what the representative person chooses. In the game theoretic model described above, the person is not choosing the function of appropriation or the function of production. She is choosing to allocate scarce resources across the two functions so as to optimize her value. This choice is in turn affected by the decision of the other person. Taking into account Nash strategies, the person can expect to maximize her value with the optimal strategy  $\{E=50, F=50\}$ . Consequently, the determination of opportunity cost as it pertains to the person must take into account the logic of the Nash equilibrium.

Once the Nash equilibrium is taken into account, we realize that the opportunity cost of engaging in conflict is essentially zero, as full cooperation would only lead to zero net gain. To illustrate this claim, I first present the person's choice in the conflict environment with no destruction. The figure below plots the person's expected value for each additional unit of appropriation chosen in light of the fixed choice of appropriation ( $F_j=50$ ) by the other person. My parameters are the following:  $R=200$ ,  $R_{i,j}=100$ ,  $a,b=1$ .

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<sup>8</sup> In a perhaps uncharitable interpretation, Hirshleifer's definition of opportunity cost is susceptible to the fallacy that the marginal revolution addressed, namely a confusion over choice between goods and whole stocks of goods (see Rothbard, p. 22).

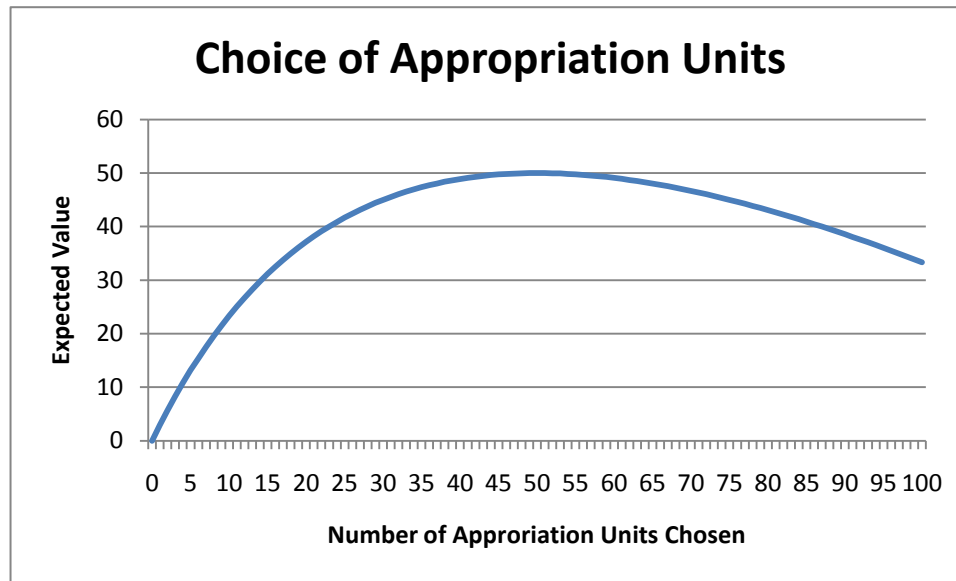


Figure 10: Relationship between appropriation and expected value

As the figure illustrates, the person will use half of her endowment (which is the Nash equilibrium) to purchase appropriation units as any other allocation reduces her expected value. Equivalently, opportunity cost to the person is minimized at an appropriation level of 50.

One could argue that the person still faces an interactive cost due to the possible destruction of the contested resource. Yet the extent of the damage to the resource base wrought by the destruction parameter  $\varphi$  is invariant to the level of appropriation chosen. In other words, regardless of whether the representative person chooses the minimum or maximum level of appropriation, the same amount of destruction occurs. Furthermore, if the Nash equilibrium holds, then it does not even matter if the individual chooses zero as the other person will cause destruction of the resource anyway. I demonstrate this by

incorporating the destruction parameter into the previous example. My parameters are the following:  $R=200$ ,  $R_{i,j}=100$ ,  $a,b=1$ ,  $\varphi=0.5$ .

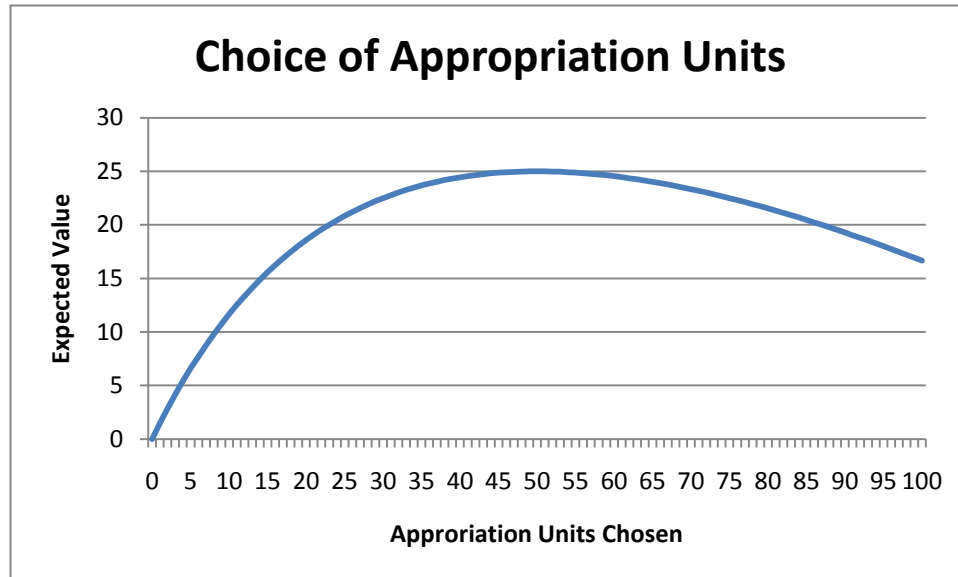


Figure 11: Relationship between appropriation and expected value incorporating destruction parameter

As the figure above demonstrates, the destruction parameter has no effect on choice as the optimal response is still to invest half of her endowment into appropriation (see Garfinkel and Skaperdas 2007, p. 23 for a more thorough quantitative discussion). The only change is in the level of expected value, which has been reduced by half according to a destruction parameter of 0.5. While this result may seem counter-intuitive, the logic is simple. While the individual is averse to destruction of the resource, she is still forced to react to the predicted appropriation level of the other person. Since the Nash equilibrium has not changed, neither will the representative person's optimal choice. In

essence, they are fighting at the same level but over a smaller pie. An exogenous shock that reduced the entire endowment by one-half would have the same effect.

Thus, Hirshleifer fails to incorporate an interactive component to conflict that actually affects choice through costing the person something.<sup>9</sup> This shortcoming of the model can largely be attributed to the neoclassical perspective itself. While Alchian is analyzing cost as it affects choice from the choice-theoretic level, Hirshleifer is analyzing cost as mechanistic decision over resource allocation. This latter perspective lends itself to a more social welfare interpretation of conflict. For example, if we conceive of society as a unitary actor, then resources utilized for conflictual purposes or destroyed in conflict represent costs to society as these resources could have been used for more productive societal pursuits. Yet these costs are divorced from the choices of actual persons affecting these social outcomes. While there is nothing incorrect about this formulation, it does ignore the motivations driving individual components within society to engage in conflict in the first place and therefore limits the explanatory potential for this approach. It is after all only because these consequences affect the calculus of those persons actually engaging in conflict that they have an impact on overall conflict.

This rendering of conflictual interaction stems from a broader trend of neoclassical economics in focusing upon choice as the allocation of resources, given as

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<sup>9</sup> In a comment on Hirshleifer's 1995 paper, Dowd (1997) makes much the same argument when he claims, "The desire to economize on conflict costs provides a driving force for the evolution of a private system of law and order, and this system sustains itself because the parties involved benefit from the reduction in violent conflict..."

objective magnitudes, rather than a subjective choice among uniquely valued opportunities.<sup>10</sup> Further discriminating between these two perspectives on cost will illuminate the comparative advantage of the latter perspective in understanding why an actual person would choose conflict or cooperation and in turn show us how to better incorporate the interactive nature of conflict. Buchanan (1969) provides an insightful analysis of this difference between opportunity cost as given in the neoclassical sense and the opportunity cost faced by an actual decision-maker. When describing the neoclassical definition of cost, he argues:

This is the cost of the familiar textbook diagrams, the objectively identifiable magnitude that is minimized. It is the market value of the alternate product that might be produced by rational reallocation of resource inputs to uses other than that observed. This market value is reflected in the market prices for resource units; hence, cost is measured directly by prospective money consequences.

This “cost” is not, however, an accurate representation of opportunity cost before the actual decision-maker as he goes on to explain.

For whom is this cost relevant? This becomes a critically important question. Cost as just defined is faced in the strict sense only by the automaton, the pure economic man, who inhabits the scientist’s model. It is the behavior-inhibiting element that is plugged into the purely mechanistic market model. The conversion of objective data reflecting prospective money consequences into the subjective evaluations made by real-world decision-makers is of no concern to the predictive theorist. In the strict sense, this theory is not a theory of *choice* at all. Individuals do not choose; they behave predictably in response to objectively measurable changes in their environment.

Here the person faces a given environment and chooses automatically. In a sense, there is no choice as the person is simply reacting to a given set of circumstances with no

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<sup>10</sup> See Buchanan (1964) for an early construal of these two competing methodological perspectives.

ability to interact with the environment itself. In the case of conflict, this translates into an environment where the person cannot affect the decisions of the other person or more importantly change the nature of the interaction itself. Instead, she must manage her resources as a reaction to her given circumstance. This is why choice in the neoclassical sense breaks down to a decision over predation or production (or some combination of the two) with little or no mention of the interactive consequences of these pursuits. The consequences are after all beyond the person's control by definition of the model.

But to "choose," a person must have alternatives to choose from. When there are no viable alternatives to violent conflict, then the person faces no real cost, as Knight explains:

The cost of any alternative (simple or complex) chosen is the alternative that has to be given up; where there is no alternative to a given experience, no choice, there is no economic problem, and cost has no meaning. (Knight, "Notes on Utility and Cost," mimeograph, p. 18—see Buchanan 1969, p. 15)

So if the concept of opportunity cost so often used in neoclassical modeling is not a true depiction of cost, then what is? Buchanan offers his own answer as follows.

Cost is that which the decision-taker sacrifices or gives up when he makes a choice. It consists in his own evaluation of the enjoyment or utility that he anticipates having to forego as a result of selection among alternative courses of action.

As he goes on to argue, cost can only be depicted in a *utility* dimension as opposed to a *commodity* dimension.

What this means for the purposes of this paper is that the person choosing to engage in conflict conceives of choice in a different manner than the theorist attempting to model choice as allocation of scarce resources in a fixed strategy environment. Persons attempting to engage in conflict must reckon with the actions of other persons she is choosing to engage in conflict with. This person choosing to engage in conflict does so at the cost of certain irretrievable alternatives that revolve around these dynamic interactions with other persons. It is often because of this interaction with other persons that conflict does not take place, in contrast to the consequence of losing productive resources.

### *3.3 Resource allocation and interactive consequences*

This analysis of the nature of cost and its rendering by neoclassical economists exposes a lacuna in the conflict literature. Specifically, cost to the person choosing conflict cannot be determined without an organizing framework that recognizes competing opportunities before that person. In the case of conflict analysis, a rendering of the cost concept must account for how one affects and changes the nature of the interaction with another person as this other person's actions will directly determine the net gain of each opportunity chosen. By extending our analysis to not only constraints that derive from resource allocation but constraints that derive from the interaction itself,

we expand our understanding of what conflict actually costs the person choosing to engage in it.

It is therefore useful to differentiate between these two sets of constraints a person faces when choosing to engage in conflict: *resource scarcity* and *interactive consequences*. The cost of foregone resources such as when guns are produced rather than butter derive from resource scarcity. These are the costs that economists typically focus upon when rendering conflict from the neoclassical perspective. Yet as discussed above, a crucial negative component of the decision to engage in conflict are the consequences that inevitably follow, as the other person react to one's decision. Such examples as psychic damage, lost trade opportunities, retaliatory conflict, or less cooperative interaction in the future all stem from the actions of others and are therefore interactive consequences.<sup>11</sup> This additional category of constraint embodies crucial negative components to the choice to engage in conflict that directly affect the opportunity cost calculus in constraining the person from engaging in such conflict. Consequently, much conflict is avoided through recognition of these additional negative consequences that will inevitably follow should the person choose to engage in it.<sup>12</sup> This

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<sup>11</sup> Psychic damage could be considered an internal rather than interactive constraint, as one could argue that it is imposed from within rather than without. Yet as Smith indicates above, "...Nature, antecedent to all reflections upon the utility of punishment, has in this manner stamped upon the human heart, in the strongest and most indelible characters, an immediate and instinctive approbation of the sacred and necessary law of retaliation." (p. 71). I therefore follow Smith in ascribing the psychic damage one imposes on oneself as resulting from social disapprobation and consequently a product of interaction, indirect as it might be.

<sup>12</sup> Buchanan (1975) offers an example of this in the form of a potential "busy-body" deciding whether to reprimand another individual's choice of growing his or her hair long. He writes, "Hence, despite his presumed internal and private preference about long hair, the potential busy-



helps us to understand why people strive to avoid conflictual interaction, even when the resources needed to pursue such actions are less “costly” than the resources used in more cooperative channels.

Rothbard (1962) provides several examples of costs that emerge from the interaction itself and how these costs in turn inform the value of the opportunities before the person. Echoing the Boulding model, Rothbard utilizes a thought experiment in which two unitary actors, “Crusoe” and “Jackson,” engage in some form of conflictual interaction with one another. He provides four consequences of conflict that Crusoe faces and in doing so supplements what can inform  $m_i$  in the Boulding model:

- (1) He [Crusoe] may feel that the use of violence against any other human being is *immoral*, i.e., that refraining from violence against another person is an end in itself, whose rank in his value scale is higher than that of any advantages in the form of capital or consumers’ goods that he might gain from such action.
- (2) He may decide that instituting violent action might well establish an unwelcome precedent, causing the other person to take up arms against him, so that he may end by being the victim instead of the victor. If he begins a type of action where one must gain at the expense of another, then he must face the fact that *he* might turn out to be the loser as a result of the action.
- (3) Even if he feels that his violent action eventually will result in victory over the other, he may conclude that the “costs of the war” would exceed his net gain from the victory. Thus, the disutility of time and labor-energy spent in *fighting the war* (war may be defined as violent action used by two or more opponents), in accumulating *weapons* for the war (capital goods for war uses), etc., might, in prospect, outweigh the spoils of conquest.
- (4) Even if Crusoe feels reasonably certain of victory and believes that the costs of fighting will be far less than the utility of his spoils of victory, this short-run gain may well be outweighed in his decision by long-run losses. Thus, his conquest of

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body might refrain from interfering because of this fear of reciprocal intrusion into his own behavior pattern.” (p. 6) Though this is a relatively innocuous example of conflict, the same logic should hold for more serious conflictual interactions.

Jackson's furs and house may add to his satisfaction for a while after the "period of production" (=preparing for the war + the length of time of the war itself), but, after a time, his house will decay and his furs will become worthless. He may then conclude that, by his murder of Jackson, he has lost permanently many services which Jackson's continued existence might have furnished. This might be companionship or other types of consumers' or capital goods... Crusoe may be detained from using violence by estimating the disutility of the long-run consequences more highly than the utility of the expected short-run gains. On the other hand, his time preference may be so high as to cause his short-run gains to override the long-run losses in his decision. (p. 80-81)

Rothbard thus enumerates four costs of conflict: (1) psychic damage, (2) unwelcome precedents, (3) resource costs, and (4) lost exchange opportunities. While consequence (3) reflects the costs of resource allocation, consequences (1), (2), and (4) all derive from the interactive nature of conflict. Even the first consequence, largely reminiscent of Smith's impartial spectator, only manifests itself due to the presence of another person.

While not exhaustive, these four consequences reinforce Hume's observation that it is our own self-interest that prevents us from engaging in more conflictual opportunities. As people demand new forms of interaction to minimize violent confrontation with one another, enduring institutions are created and conflict is funneled into a more innocuous form. Wagner (1993) describes such a system as "the proper design of a network of governing institutions, such that forces of constitutional dissipation will be blown away by a preponderance of opposing guns." (p. 20) My assertion is that such institutions, or at the very least the attempt to erect such institutions, are more representative of daily human interaction than open conflict. I next provide empirical support for my claim by drawing upon several papers in the new comparative political economy literature.

#### 4. Applications

The framework presented above helps us to understand the underlying calculus for the emergence of cooperation out of conflict. In this section, I apply my framework to several pre-existing case studies, where cooperation occurs despite the seeming insurmountable or hostile circumstances of the surrounding environment. This discussion is helpful in understanding both how conflict motivates cooperative outcomes in practice and how this motivation derives from the interactive nature of conflict.

The first two examples show how the anticipation of costly interaction with others leads to the development of new institutional channels, where conflict is less violent. Leeson and Nowrasteh examine the exploits of privateers in the 18<sup>th</sup>-19<sup>th</sup> century to demonstrate how plunder contracts between privateers and their victims helped prevent undesirable violent outcomes. In one argument worth noting, they claim, “our model illustrates that, *ceteris paribus*, the larger the social cost of inefficient plunder—i.e., plunder that doesn’t economize on the resources used in plunderous production and destroyed in the violent conflict plunder precipitates—the more likely plunder will be efficient. The reason for this is straightforward. Since the social costs of inefficient plunder are also private costs for plunderers and victims, the prospective gains from Coasean plunder bargains increase as plunder’s costliness increases in the absence of such bargains, making it more likely that plunderers and victims will resort to them.” (p. 8-9)

The rationale for this arrangement goes beyond Coasian bargaining considerations, though, as the parties had more at stake than reducing “social costs”. As Leeson and Nowrasteh indicate, these social “costs” were in fact private costs as each party faced undesirable consequences from employing their resources in a way that would sustain ongoing conflict. For the privateers, this ongoing conflict would destroy goods that could otherwise be appropriated, not to mention certain minimal casualties should violent conflict occur. In the case of the victims, these consequences included destruction of their goods and quite possibly death should violent conflict emerge. Thus, the merchant victims, in particular, had a strong incentive to alter the nature of the interaction to avoid this outcome.

This led to the creation of plunder contracts called “ransom bills,” which allowed each side to credibly commit to avoid this undesirable violence as these bills were upheld in court and legally bound these victims to compensate their plunderers. These contracts allowed merchant ships to surrender without resistance and encouraged privateers to minimize the role of violence in coercing their victims. (p. 29) Consequently, while plunder still took place, the loss of resources was reduced considerably. Violence became unnecessary once privateers contracted to reduce their amount of plunder in exchange for their victims’ cooperation in not staging a mutiny once captured. (p. 22-23)

What is fascinating about the creation of these ransom bills is that these parties had no reason to cooperate, except to avoid violent outcomes. Furthermore, this shows that even when one party has an absolute advantage in force (privateers), violent conflict is not inevitable. It still behooves the superior party to engender cooperation, as violence

can only diminish their gains. The creation of contracts that allowed these parties to avoid such outcomes speaks to the large measures people will go to in recognition of the potential for ongoing conflictual interaction with other persons.

Leeson (2007) documents another innovative cooperative mechanism developed in Central Africa circa the mid-1800s in response to ongoing conflict. This territory consisted of a largely lawless domain. Leeson breaks down inhabitants of this territory into two economic groups: producers of raw materials such as ivory, beeswax, and rubber and middlemen who distributed these goods abroad. Because these middlemen maintained an absolute advantage in force, they were able to resort to plunder with little in the way of retaliation. Hence, banditry was a prevalent feature of the landscape. In response to this banditry, producers were forced to develop new ways of interacting with these middlemen to avoid these violent outcomes.

As Leeson describes, “Weaker individuals’ inability to rely on mechanisms described by the folk theorem and to invest in force for defense or aggression does not prevent them from making exchange with bandits self-enforcing in the face of threats of violent theft.” (p. 305) This exchange mechanism came in the form of “credit” arrangements made between producers and middlemen. (p. 311-313) Producers contracted with these middlemen by agreeing to produce raw materials for future exchange, rather than having such inventories on hand. Consequently, because middlemen could only secure these goods through the credit arrangement, plunder was no longer a viable option. The credit arrangement therefore served as a constraint against conflict. Some goods were less pliable for such an arrangement (i.e. slaves) and

continued plunder by less patient middlemen ensued. This led to the development of a second mechanism used to engender cooperative relationships in the form of risk premiums, which were levied on trading middlemen to compensate for those that remained plunderers. (p. 315-318) In summary, Leeson argues “While the potential for violent theft poses a significant threat to the ability of individuals to realize the gains from trade, the benefits of preventing this threat from becoming a reality compel agents to develop informal solutions to the problem of banditry. By altering the cost-benefit structure of trade versus violence, these solutions have in common the fact that they transform stronger agents’ incentive from plunder to peaceful exchange.” (p. 318)

This case study shows that people are capable of implementing innovative arrangements that circumvent conflictual outcomes. These arrangements revolve around the notion that constraints can be placed upon violent behavior in recognition of the gains of ongoing cooperative interaction between parties, which serve to reduce the expected gains under conflict relative to these cooperative alternatives. In contradiction to the Bates, Greif, and Singh model, these producers were able to avoid conflict without resorting to decreased production or private enforcement, but instead by altering the nature of the interaction itself. Again, conflict in an ongoing interaction was the instigator in developing these arrangements, as producers sought to avoid persecution by these middlemen.

This final example demonstrates how removing the component of ongoing interaction removes the incentive to cooperate and engenders conflict instead. Axelrod’s work on tit-for-tat strategies and other self-enforcing cooperative equilibria serves as a

precursor to the emphasis of the new comparative political economy literature upon humankind's innate propensity to cooperative, despite the adverse circumstances of his or her environment. Axelrod (1984, Ch. 4) provides an example of how ongoing interaction between parties can militate against conflict even in the most adverse of circumstances. Axelrod's example illustrates a creative approach to sustaining cooperation through signaling the violent consequences of conflict, as soldiers sought to illustrate the advantages of cooperation across enemy lines under trench warfare in World War I:

The strategies that could sustain mutual cooperation were the ones which were provocable. During the periods of mutual restraint, the enemy soldiers took pains to show each other that they could indeed retaliate if necessary. For example, German snipers showed their prowess to the British by aiming at spots on the walls of cottages and firing until they had cut a hole...Likewise the artillery would often demonstrate with a few accurately aimed shots that they could do more damage if they wished. These demonstrations of retaliatory capabilities helped police the system by showing that restraint was not due to weakness, and that defection would be self-defeating. (p. 79-80)

This example is, of course, originally meant as an illustration of Axelrod's seminal presentation of the "tit-for-tat" strategy. Cooperation is sustainable because of the threat of retaliation. Therefore, by reciprocating the other side's move, cooperation can emerge. But note that the ultimate enforcement of such a cooperative agreement is the nature of the interaction itself. These soldiers were able to constrain violent conflict, only by maintaining an ongoing interaction with their counterparts across the trenches. This constraint would be weakened if the interaction were to cease or become sporadic.

This in fact explains why the "live-and-let-live" system collapsed. Axelrod maintains that central command began ordering controlled raids, as a means to discourage the cooperative system emerging between trench lines. These raids were

controlled by higher authority, not the soldiers themselves. Consequently, the timing and incidence of these raids were unpredictable from the perspective of the side being attacked. While retaliatory raids could conceivably have the same dampening effect on conflict, as the “live-and-let-live” system had, “the magnitude of the retaliatory raid could also be controlled, preventing a dampening of the process. The battalions were forced to mount real attacks on the enemy, the retaliation was undampened, and the process echoed out of control.” (p. 82) In other words, the constraints of conflict were weakened, as command was able to alter the nature of the interaction between the soldiers from one of constantly reinforced reciprocity to sporadic displays of violence. Furthermore, this conflict was divorced from the interaction between any particular opponents, as neither side could punish the particular soldiers responsible in the same way they were able to by shooting at their counterparts across the trenches. Therefore, while the raiders could expect retaliation from their actions, this retaliation could neither be suppressed nor predicted. This in effect permanently distorted the interaction, and, consequently, conflict resumed.<sup>13</sup>

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<sup>13</sup> A similar notion is employed in the recent challenge to Axelrod’s argument, first presented in Skaperdas and Syropoulos (1996), expanded upon in Garfinkel and Skaperdas (2000), and surveyed in Garfinkel and Skaperdas (2007). In this argument, Axelrod’s argument that a longer time horizon for the interaction will increase the chances for cooperation is overturned if one side of the interaction can completely eliminate the other. If this assumption holds, then a longer time horizon will only serve to increase the chances for conflict as termination of one’s opponent would mean that the resource is consumed each period solely by the victor and without the need for constant arming. Note, of course, that this argument rests upon the assumption that one side can be totally eliminated, or in other words, the “interaction” can be dissolved. Such an outcome would only support my own theory that ongoing interaction serves to increase the chances for cooperation and therefore the lack of such interaction encourages the opposite in the form of conflict.



## **5. Conclusion**

In this paper, I have depicted conflict as nested within an ongoing interaction between persons. Following the classical discussion of conflict in Hume and Smith to the more recent contributions by North, Wallis and Weingast, ongoing interaction with other persons discourages those who would otherwise choose to engage in conflict and promotes cooperative institutional change. This depiction of conflict alerts us to an obvious need to understand how exactly costs weigh on the actual person(s) choosing to engage in conflict.

I have organized these costs into two broad categories of constraint, those resulting from resource scarcity and those that emerge from interaction with other persons. People care not only about the resources needed to act but also about the consequences of acting. This latter constraint, which I labeled “interactive consequences,” serves as a powerful influence on persons deciding whether to engage in conflict by imposing a recognition of additional losses that result from the actions of others. This constraining influence encourages persons to seek more cooperative channels of interaction to reduce their own personal losses that would otherwise accumulate under conflict. The case studies presented above by Leeson and Nowrasteh, Leeson, and Axelrod demonstrate this avoidance of conflict through cooperative institutional change in practice.

## **Chapter 2: *An Experimental Examination of the Costs of Conflict***

### **1. The cost of conflict**

In determining the cost of one's actions, including acts of conflict, economists typically employ the concept of opportunity cost. This concept is most often depicted as a choice among competing opportunities in which to utilize an individual's (or a society's) resources. In the case of conflict, this amounts to a decision involving tradeoffs in investing one's resources towards predation or production. In the domain of human action involving conflict, one's actions lead to noticeable and unavoidable reactions from other parties. Conflict may indeed encourage immediate action on the part of other persons within one's environment. The consequences of conflict range from overt reactions such as violence towards one's person to subtle repercussions in the form of guilt and regret. Recognition of this interdependence between costly consequences and conflict means that we must extend our definition of opportunity cost to include not only the resources devoted to the action but the consequences that derive from interaction with others as well.<sup>14</sup>

It is the interactive nature of conflict and its consequences that we hope to explore and better elucidate in the present study. To determine how the interactive component of

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<sup>14</sup> For a further discussion of the opportunity cost concept and its integration into conflict analysis, see Smith (working paper).

conflict affects choice and the potential for cooperation, we utilize a laboratory experiment. For our design, we draw upon the experimental environment presented in McBride and Skaperdas (2009). In their environment, paired subjects engage in a repeated game where the variable of interest is the decision to choose to “cooperate” by automatically splitting a good of fixed value or choose to engage in “conflict” where only one of the two subjects receives the entire good according to a fixed probability distribution. These decisions are motivated by certain payout functions, which in turn are determined by an exogenous continuation probability that decides how many rounds the game will be repeated and concomitantly how valuable the contestable resource becomes.

In their experiment, they show that the decision to attempt to appropriate the good is sensitive to the number of expected rounds that will be played, in that the more rounds subjects can expect to engage in, the more likely they will choose to appropriate. These results run counter to the prevailing theoretical literature that has emerged largely from the seminal presentation in Axelrod (1984) of cooperation as a viable strategy in repeated interactions. Their theoretical reasoning for this discrepancy is that extending the “shadow of the future” to a longer time horizon can have the perverse effect of encouraging greater attempts to appropriate as acquired goods are subject to greater returns when property can be secured from rivals permanently. Parties may also be able to forego future arming costs if they can eliminate potential rivals early on. Both of these benefits increase as the time horizon is extended.

While we agree that the “shadow of the future” can influence behavior in non-optimal ways, we show that their result is not robust to changes in the specification of

how conflict and destruction of the contested good are connected. In their model, the consequences of conflict are relegated to a destructiveness parameter, set at an exogenous level. This parameter determines how much of the contested resource is available once conflict has taken place.<sup>15</sup> This parameter is not affected, however, by the levels of arming chosen by the parties engaging in conflict. Furthermore, these parties could only choose one level of conflict.

Our aim is to extend this feature to allow for a greater range of destructive options, which vary in accordance with the level of fighting chosen by the parties actually engaging in conflict. We show that (1) expanding the choice of arming level to include multiple levels of arming and (2) explicitly linking the level of arming chosen to the amount of destruction of the contested resource generates a more effective opportunity cost of conflict, which partially obviates the effects of the longer time-horizon. In addition, we alter their assumption regarding destruction of the resource in post-conflict interaction. Specifically, we assume that the contested resource is not only partially destroyed in the initial conflict but in subsequent periods as well. In other words, we assume that the consequences of conflict are not just relegated to the initial skirmish but have pronounced effects over a longer time-horizon. We offer a combination of theoretical and empirical evidence towards each of our alterations, which shows that conflict is both inherently interactive and more costly for the participants than the existing literature accounts for.

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<sup>15</sup> In their paper, this was set at 30%, meaning that 70% of the contested resource was available to the victor once conflict had taken place.

We further provide evidence towards our thesis by conducting a laboratory experiment. Our main finding is that including these features reduces the level of conflict relative to a baseline treatment, where the link between arming levels and the destruction parameter is severed. A secondary finding of noteworthy importance is that a decrease (increase) in the price of appropriation actually leads to less (more) conflict. As this outcome demonstrates, the standard demand curve relationship between the marginal value of conflict and its cost must account for not only the conventional costs of conflict that derive from resource scarcity but the costs that stem from the interaction in which this conflict takes place. In our case, when the price of arms increases, the cost of maintaining an armed peace also increases, which encourages greater conflict. This result can only be reconciled, though, when we recognize that conflict is inherently interactive.

## **2. The dual constraints of conflict**

In the economic analysis of conflict, theorists have traditionally derived two constraints facing those who engage in conflict. The first and primary constraint is the allocation of scarce productive resources into appropriative activities. While these resources may generate positive earnings when used for appropriation, the individual loses productive capacity by allocating resources in this manner. Given the propensity of economists to study the allocation of scarce resources, this constraint is the more familiar and intuitive of the two.

The second constraint can be labeled the interactive consequences of engaging in conflict. This entails the expected undesirable outcomes of engaging in conflict with others. This constraint has not been as well-specified as the first, given its expansive and somewhat psychological character. Yet examples that fall within constraint such as resource destruction, incurring social disapprobation, and losing trading partners are all undesirable consequences that clearly affect the incidence of conflict in practice. Furthermore, they are analytically separable from the first constraint as they emerge from the interactive nature of conflict, rather than the more autarkic considerations of resource allocation.

Economists who have explored this constraint largely focus on the first example offered above, resource destruction (though see Skaperdas and Syropoulos 2002 for an insightful study into the cost of interacting with potential trading partners). The theoretical treatment of this type of constraint is typically labeled as the “destructiveness parameter” and was first presented in Grossman and Kim (1995). This parameter symbolizes the amount of the contestable good destroyed in conflict and acts as a discounting coefficient limiting the gains from pursuing conflict.

What is peculiar about this specification of the consequences of conflict, at least as it is commonly employed, is that it is disconnected between the actual level of conflict chosen. In other words, the same portion of the contested resource is destroyed regardless of whether fighting occurs at the minimum or maximum level (or anywhere in between). We believe the rationale for this simplified design feature lies in the first

contributions to this literature. This is evident in one of the original papers in this literature, Hirshleifer (1988), who offers an allegorical depiction of his model of conflict:

*An allegory:* On Lake Contention there are two villages. Each village can launch fishing boats or gunboats. The fishing boats catch the fish (production); the gunboats protect the village's catch and may seize the other village's catch (appropriation). Yet the hostilities between the villages are limited in several ways. First, each side's home base is assumed invulnerable to attack. Second, in any hostile encounter, whichever side is outmatched simply flees and surrenders its catch. (Thus, there is coercive taking but no actual battle.) p. 204

As outlined, the model has no actual battle, only a pre-emptive allocation of resources to elicit greater bargaining strengths. In other words, only the first constraint of resource allocation is present. The dueling parties need not fear consequences from one another. In Hirshleifer (1995), a more elaborate model of anarchy is presented, which predicts that positive levels of conflict will emerge except under very strong assumptions. Yet still no consequence of conflict in the form of destruction is present. Hirshleifer recognizes this difficulty and explicitly states, “Apart from opportunity costs in the form of forgone production, fighting was assumed nondestructive. (This assumption biases our results in the direction of conflict).”

Other theorists took on this burden shortly after Hirshleifer’s seminal paper with Grossman and Kim being the first. Yet as noted above, their destructiveness parameter is set exogenously and is not tied to any other variable within the model. As they indicate in a footnote, “the model does not provide an internal explanation for violence and destruction.” (p. 1279, f8) This destructiveness parameter has become a common feature in the conflict literature (see for example Anderton 2003; Garfkinkel and Skaperdas 2000, 2007). Yet to our knowledge, no effort has been made to further link the decision

to engage in conflict with destruction of the resource. While incorporating a fixed destruction parameter does impose consequences and therefore provides for settlement opportunities, this decision between settlement and conflict is outside of the explanatory power of the models. By modeling destruction so that it is unaffected by the chosen arming levels, participants face a reduced opportunity cost for their actions as the interactive consequences of choosing conflict are essentially binary. Either the contested resource gets destroyed or not. It is no surprise then that these models typically predict conflict is inevitable except under very strong conditions (see for example Hirshleifer 1995 for a delineation of the assumptions needed to ensure a stable cooperative equilibrium under anarchy).

Previous experimental work on conflict has closely followed the literature surveyed above (see Abbink 2010 for a survey of conflict experiments). Durham, Hirshleifer, and Smith (1998) present an experimental test of the theory outlined in Hirshleifer (1991). Following Hirshleifer's model, they do not provide a destruction parameter to encourage cooperation. Instead, the only constraint is allocating an endowed resource among competing opportunities: production and predation. They find that subjects follow the Nash non-cooperative equilibrium quite closely when they match subjects randomly. This result is not robust to fixed matching, however, as subjects begin to cooperate over time when repeatedly paired with the same person. Fixed matching, of course, introduces an interactive constraint to conflict as subjects learn the benefits of signaling cooperation to one another.



The next experiment was performed by Carter and Anderton (2001) and examines the model presented in Grossman and Kim (1996), an extension of the model we surveyed above in Grossman and Kim (1995). Specifically, they focus on the optimal response of an individual to protect her asset from a potential predator when the effectiveness of predation increases. While the technology of conflict could increase for predators, this did not have a negative effect on the value of the resource, as no destructiveness parameter was utilized. They find that Nash non-cooperative outcomes ensue.

Duffy and Kim (2005) analyze an environment where subjects switch between roles as predators or producers. Their emphasis is on the possibilities for long-run “careers” in one role or the other. Furthermore, they examine whether having one subject as “dictator” to determine optimal levels of protection for producers has any effect on outcomes. In neither treatment is the resource subject to destruction, no matter how great the level of predation chosen. They find that the non-cooperative equilibrium holds when no “dictator” is present as producer subjects under-invest in protection causing greater numbers of predatory subjects. This outcome is ameliorated once a dictator imposes the level of protection in their treatment. There they find that a Pareto-superior outcome to the non-dictator treatment as greater investment is made in protection and therefore less subjects become predators.

Lacomba et. al. (2008) provide possibly the closest experiment to examining the interaction between conflict and its dual consequences. In their experiment, subjects play a game derived from the models in Hirshleifer (1988) and Skaperdas (1992). Subjects

engage in production and predation over a contestable resource in a similar vein to Durham, Hirshleifer, and Smith (1998). They introduce an interesting twist, however, as in two of their treatments, the loser of conflict may choose to destroy part (or all) of their appropriated resource before the winner claims it. In one treatment, this decision is made without knowing how much the winner will choose to take. In the other, this information is first communicated to the loser. In all three treatments, the winner of conflict may decide how much to take rather than simply taking everything from the loser.

They find that introducing this endogenous determination of the destruction parameter has a profound effect on behavior, not entirely appreciated in the theoretical literature. In both treatments where losers may destroy part of the winning take, investments in appropriation are lower than their baseline comparison, particularly in the treatment where the loser first learns the amount the winner plans to take. Furthermore, losing subjects are inequality-seeking (see Houser and Xiao 2009), particularly when they learn the take rate chosen by winners first. Winners were in turn cognizant of this preference and generally decided upon a lower take rate when this could affect the decision of the loser to destroy the resource.

Our own experiment is similar to Lacomba et. al., except that we focus on destruction that can occur as a result of the decision to engage in conflict itself rather than post-conflict distributional decisions. While we believe the Lacomba et. al. experiment provides a crucial addition to the conflict literature in the form of emphasizing interactive constraints to conflict, we see our own experiment as emphasizing interactive

consequences as they pertain to the actual conflict itself rather than in the post-conflict stage. Thus, we see our efforts as complementing the insights gained in Lacomba et. al.

As Lacomba et. al. discover, much conflict is avoided precisely because participants must deal with the consequences of often violent interactions with others. As North, Wallis, and Weingast (2009) demonstrate, the avoidance of such costly interactions is the impetus to providing conflict-reducing bargains among powerful rivals and undergirds much of historical institutional development. Indeed, even in environments where lack of institutions would seemingly plunge their inhabitants into conflict, the opposite pattern has emerged as communities demonstrate innovative bottom-up strategies to avoid the costs of conflict.

Leeson (2009) explores one such environment by analyzing the Scottish-English border circa the 16<sup>th</sup> century. At the time, border inhabitants were unable to appeal to any cross-border authority as such jurisdictional enforcement simply did not exist. An aggressive group of individuals called “reivers” plagued many border inhabitants with instances of murder, rape, and pillage. Yet Leeson shows that, far from living in a lawless unprotected territory, these inhabitants were able to erect a system of law to address grievances between border inhabitants.

As Leeson maintains, following the earlier insight from Axelrod (1984), border inhabitants are essentially caught in a Prisoner’s Dilemma matrix, where cooperative institutional mechanisms are needed to spur behavior to peaceful outcomes. Yet because no such authority exists, individual incentives lead to violent outcomes. This only holds, however, if these persons do not sufficiently discount future gains from peaceful

interaction. Following the logic of the Folk Theorem, as individuals anticipate greater gains from long-run repeated interactions, they are encouraged to signal cooperative intentions to move to the cooperative region of interaction.

A private body of law, called the *Leges Marcharum*, accomplished just this by providing a venue to address grievances and militate against backsliding into an equilibrium of continual conflict. What is interesting about Leeson's case study is that the incentive to cooperate across bordering territories did not appear to be motivated by rent-creating exchange opportunities, the primary conceptual device presented in North, Wallis, and Weingast, but instead by the exceedingly high level of violence anticipated in the non-cooperative equilibrium. As Leeson indicates, "instead of this situation preventing decentralized institutions from emerging to govern them, if anything, it seems that these bandits' animosity enhanced the importance of developing a system to oversee intergroup interactions and, thus, both groups' incentive to devise institutions for regulating their predatory inclinations." (p. 500)

Leeson's narrative produces an insight not recognized in the literature discussed so far. It is because the consequences of violent interaction with "reivers" were so pronounced that the border inhabitants erected a set of enduring, cooperative institutions. In other words, it was the link between the level of conflict and its consequence that drove this society to alter its prevailing institutional make-up.

### **3. A model linking arming and violence**

We present the following model as a means to incorporate this greater range of destructive consequences of appropriation in the form of lost surplus of a contestable good  $Y$ .<sup>16</sup> Suppose two parties  $i$  and  $j$  compete over this resource by investing in arms. These parties first decide their relative investment levels of arms, labeled  $a_i$  and  $a_j$ , respectively. Once these levels are known to both parties, then they determine whether to split the contestable good according to their relative arming strengths or engage in potentially destructive conflict.

Should these parties choose to engage in conflict, then the winner of the conflict is chosen according to the following contest success function. We denote  $P_{i,j}$  as the probability that person  $i$  be the victor over person  $j$  in conflict. Similarly, within the contest success function, we define  $a_{i,j}$  as the arming level of person  $i$  with  $a_{j,i}$  as the arming level of person  $j$ . To determine the probability and arming level from person  $j$ 's perspective, we simply switch the order of the subscripts. Thus, our use of the standard contest success function proceeds as follows:

$$P_{i,j} = \frac{a_{i,j}}{a_{i,j} + a_{j,i}}$$

The value of the contestable good, which we denote as  $Y$ , is reduced, however, by the relative levels of appropriation chosen. Specifically, the level of destruction is determined by an exogenous parameter  $\varphi$  multiplied by the sum of arming levels chosen

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<sup>16</sup> We recognize that our model does not incorporate other missing consequences from the analysis of conflict outlined above such as psychological consequences in the form of guilt and regret. Our own efforts here remain an important contribution yet future efforts directed at these fundamental issues are certainly warranted. See Boulding (1962, p. 36) for an early attempt at this.

$(a_i + a_j)$ . While this parameter is still exogenous, its impact upon choice is now affected directly by the relative arming strengths, as defined by the contest success function.

Altogether then, the parties face the following choice. They may both cooperate, in which case both face the following expected value function. We label this function  $EV_{i,j}$ :

$$EV_{i,j} = Y \left( \frac{a_{i,j}}{a_{i,j} + a_{j,i}} \right) - a_{i,j}$$

This value function reflects the surplus of good  $Y$  incurred (discounted by each party's arming strength) along with the sunk cost that must be paid for previous arming expenditures.

Should either party choose to engage in conflict, however, then both parties are subject to the following expected value function. Note that we now introduce our version of the destructiveness parameter, which we label as  $\phi$ :

$$EV_{i,j} = Y [1 - \phi(a_{i,j} + a_{j,i})] \left( \frac{a_{i,j}}{a_{i,j} + a_{j,i}} \right) - a_{i,j}, \quad \phi \in (0, 1), \quad 1 \geq \phi(a_{i,j} + a_{j,i})$$

As outlined above, the individual can expect to acquire the good  $Y$  according to their relative arming strength. The value of the good is reduced, however, by the parameter  $\varphi$  in conjunction with the arming levels chosen by both parties. Finally, both parties must still pay the arming costs regardless of the outcome.

Therefore, for both parties to choose to cooperate, the following inequality must hold:

$$Y \left( \frac{a_{i,j}}{a_{i,j} + a_{j,i}} \right) - a_{i,j} > Y [1 - \phi(a_{i,j} + a_{j,i})] \left( \frac{a_{i,j}}{a_{i,j} + a_{j,i}} \right) - a_{i,j}$$

which reduces to:

$$\phi(a_{i,j} + a_{j,i}) > 0$$

Essentially the costs due to both the destructiveness parameter and level of arming must be zero for armed conflict to be desirable in a one-shot interaction. Even if this strong assumption holds, each party would be indifferent to arming or not so there is essentially no possibility for conflict in this scenario.

Next, we incorporate future periods of interaction based upon decisions made over distribution of the good  $Y$  in period 1. Following McBride and Skaperdas, we assume that parties who win conflicts in period 1 will not be subject to arming costs in subsequent periods. However, we take exception to their assumption that destruction incurred in period 1 somehow does not affect values in subsequent periods. They offer no theoretical or empirical evidence for this assumption and indeed it would be difficult to do so as destructive conflict has obvious effects on productivity and reconstruction in subsequent periods of interaction (see for example Leeson 2007 for an analysis of reconstructive efforts in post-civil war Somalia, an environment largely reminiscent of McBride and Skaperdas' theoretical depiction of post-conflict where one party has completely subsumed the other).

We therefore incorporate the possibility for future periods of activity utilizing the variable  $n$ , which denotes the number of (or equivalent number of anticipated) periods of interaction as follows. If both parties cooperate:

$$EV_{i,j} = n \left[ Y \left( \frac{a_{i,j}}{a_{i,j} + a_{j,i}} \right) - a_{i,j} \right], \quad n \in (1, \infty)$$

Per our assumptions, each individual splits the surplus according to their relative arming strength for all subsequent periods but must maintain their arms levels in order to enforce this agreement. If either party chooses to defect in the first period, then their expected value is as follows:

$$EV_{i,j} = n \left[ Y [1 - \phi(a_{i,j} + a_{j,i})] \left( \frac{a_{i,j}}{a_{i,j} + a_{j,i}} \right) \right] - a_{i,j}, \phi \in (0, 1), n \in (1, \infty), 1$$

$$\geq \phi(a_{i,j} + a_{j,i})$$

Here the value of the good minus what is destroyed is incurred in each period. The winner (and loser) does not need to pay arming costs for future periods of activity, only the first period, as the rival is assumed to be eliminated.

The inequality for cooperation changes to the following:

$$n \left[ Y \left( \frac{a_{i,j}}{a_{i,j} + a_{j,i}} \right) - a_{i,j} \right] > nY \left( \frac{a_{i,j}}{a_{i,j} + a_{j,i}} \right) [1 - \phi(a_{i,j} + a_{j,i})] - a_{i,j}$$

which reduces to:

$$-na_{i,j} > -nY\phi a_{i,j} - a_{i,j}$$

and then to:

$$Y > \frac{(n-1)}{n\phi}$$



Several observations can be made based upon this result. The destruction parameter has an unambiguously positive effect on the likelihood of cooperation. The number of periods ( $n$ ) has a very slight negative effect. Given our additional assumptions, arming levels have no effect on the tradeoff between cooperation and conflict.

Beyond these more fundamental results, another feature emerges once a price scalar is incorporated into the arming function. This can be demonstrated by adding a price variable  $w$  to the value functions, where each party faces the same price. These value functions then change to the following. If both parties cooperate:

$$EV_{i,j} = n \left[ Y \left( \frac{a_{i,j}}{a_{i,j} + a_{j,i}} \right) - wa_{i,j} \right], \quad n \in (1, \infty)$$

If either party chooses conflict, then:

$$\begin{aligned} EV_{i,j} &= n \left[ Y [1 - \phi(a_{i,j} + a_{j,i})] \left( \frac{a_{i,j}}{a_{i,j} + a_{j,i}} \right) \right] - wa_{i,j}, \quad \phi \in (0, 1), n \in (1, \infty), 1 \\ &\geq \phi(a_{i,j} + a_{j,i}) \end{aligned}$$

The inequality for cooperation then changes to:

$$n \left[ Y \left( \frac{a_{i,j}}{a_{i,j} + a_{j,i}} \right) - wa_{i,j} \right] > nY \left( \frac{a_{i,j}}{a_{i,j} + a_{j,i}} \right) [1 - \phi(a_{i,j} + a_{j,i})] - wa_{i,j}$$

which reduces to:

$$-nwa_{i,j} > -nY\phi a_{i,j} - wa_{i,j}$$

and then to:

$$Y > \frac{(n-1)w}{n\phi}$$

This price parameter has the intriguing effect of *positively* affecting the likelihood of conflict.<sup>17</sup> What this means intuitively is that as the price of purchasing arms decreases, parties will find an armed peace to be less costly than if the price of arms was greater. Thus, the somewhat surprising outcome we observe is that less scarcity of arms leads to lower levels of conflict.

#### **4. Experimental Design**

##### *A. Experimental parameters*

We conduct an experimental examination of the costs of conflict using four treatment comparisons. We outline our hypotheses regarding the predicted outcomes across these treatments in the next section. But first we describe our experimental setup and procedures, starting with our primary treatment, which we designate *PRIME*.<sup>18</sup> We start by pairing subjects in a number of matches, each of which consist of a number of rounds. Before each match we provide each subject with an endowment of E\$50 (to compensate for potential negative earnings in the match) and notify them of the price of arming units (E\$10), the assessed fee for each arming unit used in conflict (E\$10 per

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<sup>17</sup> Compare this result to McBride and Skaperdas 2006, where the price of arms has a negative relationship. The difference in our results reflects the greater emphasis on destruction in our framework.

<sup>18</sup> Where possible, we follow the parameters and experimental procedures presented in McBride and Skaperdas, both for purposes of replication and treatment comparison. We also borrow language from instructions presented in Lacombe et. al. See the instructions in the appendix below.

unit), and the continuation probability that determines the number of rounds for the match, which we set at 0.75.<sup>19</sup>

Subjects are randomly paired according to a computer program and this pairing changes every round. In each match, the paired subjects make two decisions. For their first decision, subjects select the number of arming units they wish to carry over into the second decision of the experiment. They may choose anywhere between 0 and 5 arming units. In our primary treatment, each unit chosen will reduce their total earnings for the match by E\$10 for each round it is used in and if used in conflict will reduce the total value of the contestable resource by E\$10 for each round. Before the second stage of the match begins, we notify each subject of his or her paired subject's chosen arming level.

In the second stage of the match, they may either choose "Cooperate" by allocating a contested good according to their relative arming strengths or choose "Conflict" to determine a sole recipient of the good based upon these same relative arming strengths.<sup>20</sup> In each case, relative arming strengths are determined by the following contest success function with the representative individual's arming level designated as  $a_i$  and their paired subject's as  $a_j$ :

$$P_i = \frac{a_i}{a_i + a_j}$$

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<sup>19</sup> We set the continuation probability here as we wish to examine the highest continuation probability and thus lowest level of cooperation presented in McBride and Skaperdas' experiment.

<sup>20</sup> We use less provocative language in our instructions such as "Option A" and "Option B" in place of "Cooperate" and "Conflict." Again, see the instructions below.

If both subjects choose to cooperate, this formula acts as a fixed relative distribution to determine each subject's share of the total good. If conflict is chosen by either subject, however, then this contest success function acts as a probability to determine the winner of conflict. We determine the winner of conflict using computer software programmed to provide outcomes according to the probabilities determined by each pair's relative arming levels. Note that it only takes one of the paired subjects to choose conflict for conflict to occur.

If both subjects choose to cooperate, then each subject is paid the surplus times their relative arming strengths minus their arming expenditures. Their arming expenditures consist of a cost of E\$10 for each round played, as each subject must keep up their arming strength to ensure their proportionate surplus of the good. If one or more subjects choose to engage in conflict, though, then the winner of the conflict receives the full value of the surplus minus the level of destruction—which is determined by the amount of arms used—and their arming expenditures. The loser of the conflict must pay for their arming expenditures from their endowment but only for the first round. Thus, in this case, arming units are only used in the first round to determine the winner of the total surplus. Once this winner is determined, there is no need to keep up one's arming strengths and therefore no cost is levied on either subject for subsequent rounds. However, an assessment fee is deducted from this total surplus that consists of E\$10 for every arming unit used by both subjects in the conflict. This fee is assessed for each round in accordance with our assumption that destruction decreases the value of the good permanently.

We then determine the number of rounds in which this outcome is applicable. The number of subsequent rounds is determined according to the continuation probability of 0.75. Given this probability, a computer program determines the actual number of rounds played. The results of the first round of play determine payouts for all additional rounds. If both subjects choose to cooperate in the first round, then they receive the surplus times their relative arming levels minus their arming expenditures for each period. In other words, their earnings for the first round are simply duplicated for each subsequent round. If conflict ensues in the first round, then the winner receives the full value of the contested good, which we set at E\$100, minus the level of destruction and their arming expenditures. For each additional round, the winner is paid E\$100 minus the level of destruction. The loser simply pays the arming fees for Round 1 and receives no gains for that round or any other.

*B. Treatment comparisons*

We utilize three treatment comparisons to isolate the effects of our variables of interest. These treatments specifically serve to compare the effects of (1) linking arming levels to the level of destruction and (2) altering the price of arming. As the table below demonstrates, these treatments form a box design to allow for maximum comparison within our two variables of interest.

**Table 1: Experiment Box Design**

	<b>Cumulative Destruction</b>	<b>Fixed Destruction</b>
<b>Low Price</b>	<i>PRIME</i>	<i>BASE</i>

**High Price** | *PRIME PRICE* | *BASE PRICE* |

In our first treatment, which we label *BASE*, we follow the conventional use of the destructiveness parameter by no longer tying the level of arming chosen with the degree of destruction of the contested resource. While subjects may still choose between 0 and 5 arming units, the assessed fee of units used in conflict is fixed at E\$10 regardless of the number of units employed. We do retain, however, our assumption that conflict destroys the resource for all rounds, not just the first. Thus, if conflict is chosen in Round 1, then this destruction fee is assessed to all subsequent rounds. This treatment is designed specifically to isolate the effect of tying arming levels to destruction in our primary treatment

In our second and third treatments, which we label *PRIME PRICE* and *BASE PRICE*, respectively, we increase the price of arming units from E\$10 to E\$30, in order to determine the effect of changing the price of arms. The treatment *PRIME PRICE* retains all the experimental features of *PRIME* except that arming units now cost E\$30 for every round they are used. Similarly, *BASE PRICE* retains all the experimental features of *BASE* except that arming units now cost E\$30 for every round in which they are used. One significant feature should be noted, however, with the *PRICE* treatments. In these treatments, it is possible for subjects to incur negative earnings for the match. To ensure that earnings in each match were independent, we implemented a rule for all treatments that informed subjects that any negative earnings would automatically be rounded up to zero. While this was implemented in all treatments, it only affected

outcomes in the two *PRICE* treatments. This does not affect our theoretical predictions as noted below.

### *C. Procedures*

We conducted nine sessions in all using 108 subjects from the at-large student body at George Mason University. Each session had 12 participants who only participated in a single session of this experiment. We seated subjects at a visually isolated computer terminal where they interacted anonymously with other participants. Sessions lasted approximately two hours including 25 minutes of instructions. Subjects received instructions about how to participate in the experiment (see Appendix 2) followed by a quiz of seven questions, used to ensure their understanding of the experimental procedures. Subjects received \$7 for showing up on time in addition to what they earned in the experiment. The average earnings without the show-up payment were \$20.97. We paid out earnings privately at the conclusion of the experiment.

Within each session, subjects participated in eight matches. In each session, we implemented two different treatments with the first treatment occurring in Matches 1 through 4 and the second treatment occurring in Matches 5 through 8. We did not disclose the total number of matches to subjects to mitigate end-game effects of a necessarily finite experiment. Thus, we utilize a within-treatment design where each of these treatments was conducted alongside its most closely related treatment (i.e. *PRIME PRICE* with *PRIME* and *BASE PRICE* with *BASE*). This minimized the number of design changes within each session, which served to reduce the cognitive burden placed

on our subjects. We also randomized the order of these treatments across sessions. The table below summarizes the ordering of treatments conducted for each session.

<b>Table 2: Treatment order by session</b>	
	<i>Treatment 1:Treatment 2</i>
<b>Session 1</b>	<i>Prime:Prime Price</i>
<b>Session 2</b>	<i>Prime:Prime Price</i>
<b>Session 3</b>	<i>Prime:Prime Price</i>
<b>Session 4</b>	<i>Prime Price:Prime</i>
<b>Session 5</b>	<i>Prime Price:Prime</i>
<b>Session 6</b>	<i>Base Price:Base</i>
<b>Session 7</b>	<i>Base Price:Base</i>
<b>Session 8</b>	<i>Base:Base Price</i>
<b>Session 9</b>	<i>Base:Base Price</i>

## 5. Hypotheses

The purpose of this design is to analytically separate and examine the dual costs of conflict explored in our theoretical section. We do this by linking the destruction of conflict with the decisions made by potential aggressors in a way that makes conflict costly as a product of interaction rather than isolation. In addition, by maintaining the previous use of resource costs in the literature we are expanding upon, we provide parameters for both forms of constraint, those that derive from resource scarcity in the form of the price of arming and those that derive from interaction in the form of endogenous destruction of the contestable good. Furthermore, these parameters are analytically distinguishable through treatment comparison, which increases the power of our investigations *ex post*.



In expanding upon the design of McBride and Skaperdas' experiment by both allowing multiple arming levels and then breaking the experiment into two decisions, we have significantly complicated the analysis. Given our parameters, we are still able to deduce the predicted outcomes for both arming levels and the decision to engage in conflict from our theoretical framework.

Starting with treatment *PRIME*, our parameters are as follows:

$$Y = 100, n = 4, w = 10, \alpha = .10$$

Plugging these parameters into the earlier inequality yields the following:

$$100 > \frac{(4 - 1)10}{4(.10)}$$

Therefore, our primary treatment generates a cooperative equilibrium for all arming strategies. The following table shows the predicted outcome for each arming strategy. Each of these outcomes represents the Pareto optimal strategy for each subject (i.e. cooperation or conflict). Recall that it only takes one subject to choose conflict so if only one subject would receive a higher value under conflict, then the predicted outcome is conflictual. We highlight cooperative strategies in green and conflictual outcomes in red.

**Table 3: Expected outcomes in treatment *PRIME***

		<i>Player 2</i>											
		0		1		2		3		4		5	
<i>Player 1</i>	0	200.0	200.0	0.0	360.0	0.0	320.0	0.0	280.0	0.0	240.0	0.0	200.0
	1	360.0	0.0	160.0	160.0	93.3	186.7	60.0	180.0	40.0	160.0	26.7	133.3
	2	320.0	0.0	186.7	93.3	120.0	120.0	80.0	120.0	53.3	106.7	34.3	85.7
	3	280.0	0.0	180.0	60.0	120.0	80.0	80.0	80.0	51.4	68.6	30.0	50.0
	4	240.0	0.0	160.0	40.0	106.7	53.3	68.6	51.4	40.0	40.0	17.8	22.2
	5	200.0	0.0	133.3	26.7	85.7	34.3	50.0	30.0	22.2	17.8	0.0	0.0

From the table, we can determine the Nash equilibrium for the game. In the *PRIME* treatment, this is given in the yellow highlighted cell with arming levels at [2, 2] and is cooperative. Therefore, while it behooves the subject to arm, this does not necessitate conflict actually taking place.

In our *PRIME PRICE* treatment, we increase the price of arms from 10 to 30. These new parameters  $\{Y = 100, n = 4, w = 30, = .10\}$  alter the inequality to the following:

$$100 < \frac{(4 - 1)30}{4(.10)}$$

The equilibrium is therefore conflictual for all arming strategies. The table below shows the equilibria for each arming outcome given these new parameters. Again, the Nash equilibrium is highlighted in yellow.

**Table 4: Expected outcomes in treatment *PRIME PRICE***

		<i>Player 2</i>											
		0	1	2	3	4	5	0	1	2	3	4	5
<i>Player 1</i>	0	200.0	200.0	0.0	330.0	0.0	260.0	0.0	190.0	0.0	120.0	0.0	50.0
	1	330.0	0.0	130.0	130.0	63.3	126.7	30.0	90.0	10.0	40.0	0.0	0.0
	2	260.0	0.0	126.7	63.3	60.0	60.0	20.0	30.0	0.0	0.0	0.0	0.0
	3	190.0	0.0	90.0	30.0	30.0	20.0	0.0	0.0	0.0	0.0	0.0	0.0
	4	120.0	0.0	40.0	10.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	5	50.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

In this treatment, the equilibrium arming level is [1, 1]. So while subjects should demand less arms, they should demand more conflict. This illustrates how increasing the price of

arms does not necessarily decrease the price of conflict, only the price of arms. The reason for this outcome is that the opportunity cost of conflict is actually lower in this treatment relative to *PRIME*. This follows from the fact that subjects must maintain arming levels under cooperation but can disarm after only one round under conflict. Consequently, the opportunity cost of cooperation goes up significantly when the price of holding arms increases. This outcome only seems paradoxical if we ignore the larger opportunity cost of conflict explored above.

Our *BASE* and *BASE PRICE* treatments require a slight alteration of our model to reflect the fact that destruction is no longer tied with arming levels. This does not alter the expected value function under cooperation but does change the function under conflict to the following:

$$EV_{i,j} = n \left[ Y(1 - \phi) \left( \frac{a_{i,j}}{a_{i,j} + a_{j,i}} \right) \right] - wa_{i,j}, \phi \in (0, 1), n \in (1, \infty)$$

The inequality for cooperation thus changes to:

$$Y > \frac{(n - 1)(a_{i,j} + a_{j,i})w}{n\phi}$$

In this treatment, arming levels become important in determining cooperation or conflict, as they are no longer cancelled out by the previous tie to destruction. The treatment *BASE* uses the same parameters as *PRIME*:

$$Y = 100, n = 4, w = 10, \phi = .10$$

However, in this treatment cooperative and conflictual outcomes are possible as arming levels change. The table below summarizes the outcomes given each arming strategy with conflictual and cooperative outcomes highlighted in red and green, respectively.

**Table 5: Expected outcomes in treatment *BASE***

		<i>Player 2</i>											
		0	1	2	3	4	5	0	1	2	3	4	5
<i>Player 1</i>	0	200.0	200.0	0.0	360.0	0.0	340.0	0.0	330.0	0.0	320.0	0.0	310.0
	1	360.0	0.0	170.0	170.0	110.0	220.0	80.0	240.0	62.0	248.0	50.0	250.0
	2	340.0	0.0	220.0	110.0	160.0	160.0	124.0	186.0	100.0	200.0	82.9	207.1
	3	330.0	0.0	240.0	80.0	186.0	124.0	150.0	150.0	124.3	165.7	105.0	175.0
	4	320.0	0.0	248.0	62.0	200.0	100.0	165.7	124.3	140.0	140.0	120.0	150.0
	5	310.0	0.0	250.0	50.0	207.1	82.9	175.0	105.0	150.0	120.0	130.0	130.0

The Nash outcome now involves an arming strategy of [5, 5] and is conflictual. While the opportunity cost of maintaining arming levels is low, the destruction due to conflict is also low. While these features operate in opposite directions, it is clear that the reduction in the opportunity cost of destruction far outweighs the lower price of arms.

Finally, when we increase the price of arms in treatment *BASE PRICE* to 30, the Nash outcome changes to arming levels set at [3, 3]. Again, the price of arming has a negative effect on the level of arming but not its incidence, as in this treatment subjects are likely to engage in conflict across a larger variety of arming possibilities.

**Table 6: Expected outcomes in treatment *BASE PRICE***

		<i>Player 2</i>											
		0	1	2	3	4	5	0	1	2	3	4	5
<i>Player 1</i>	0	200.0	200.0	0.0	330.0	0.0	300.0	0.0	270.0	0.0	240.0	0.0	210.0
	1	330.0	0.0	150.0	150.0	90.0	180.0	60.0	180.0	42.0	168.0	30.0	150.0
	2	300.0	0.0	180.0	90.0	120.0	120.0	84.0	126.0	60.0	120.0	42.9	107.1
	3	270.0	0.0	180.0	60.0	126.0	84.0	90.0	90.0	64.3	85.7	45.0	75.0

4	240.0	0.0	168.0	42.0	120.0	60.0	85.7	64.3	60.0	60.0	40.0	50.0
5	210.0	0.0	150.0	30.0	107.1	42.9	75.0	45.0	50.0	40.0	30.0	30.0

Given these theoretical considerations, we make the following predictions:

- H1: The number of decision outcomes choosing conflict will rank by treatment  $PRIME\ PRICE > BASE\ PRICE > BASE > PRIME$
- H2: The average arming levels chosen in each treatment will rank by treatment  $BASE > BASE\ PRICE > PRIME > PRIME\ PRICE$
- H3: In  $PRIME$  and  $PRIME\ PRICE$ , there will be no correlation between the number of arming units purchased in Stage 1 and the number of cooperative outcomes in Stage 2.
- H4: In  $BASE$  and  $BASE\ PRICE$ , on the other hand, the number of arming units chosen in Stage 1 will be negatively correlated with the number of cooperative outcomes in Stage 2.

## 6. Results

First, we present our basic results in the table below.

<i>Treatment</i>	<i>Number of subjects</i>	<i>Number of times conflict chosen</i>	<i>Average arming level</i>	<i>Number of subjects who chose Conflict only</i>	<i>Number of subjects who chose Conflict at least once</i>
<i>PRIME</i>	60	90 (37.5%)	3.03	7 (11.7%)	41 (68.3%)
<i>BASE</i>	48	139 (72.4%)	3.85	21 (43.7%)	46 (95.8%)
<i>PRIME PRICE</i>	60	132 (55%)	1.99	14 (23.3%)	51 (85%)
<i>BASE PRICE</i>	48	134 (69%)	2.65	15 (31.3%)	47 (97.9%)

As the table indicates, conflict was lowest in treatment  $PRIME$  followed by treatments  $PRIME\ PRICE$ ,  $BASE$ , and  $BASE\ PRICE$ . This mostly follows our predicted pattern with the exception of treatment  $PRIME\ PRICE$ , which had less conflict than  $BASE$  and  $BASE\ PRICE$

*PRICE*. Furthermore, the number of subjects who chose conflict only echoes this ordering closely. It is particularly striking that the number of subjects who exclusively chose conflict nearly quadrupled in percentage terms when the link between destruction and arming level was severed as the comparison between *PRIME* and *BASE* illustrates.

Arming levels were lowest in treatment *PRIME PRICE* followed by treatments *BASE PRICE*, *PRIME* and *BASE*. Again, this mostly follows our theoretical predictions with the exception this time of *BASE PRICE*, which followed more closely its counterpart *PRIME PRICE* than theoretically predicted. We discuss this in greater detail below.

To determine the correlation between arming levels and the option chosen, we performed a Probit regression analysis of our results. The dependent variable in each of these regressions is the average option chosen in each treatment broken down by subject. Within the session, each subject made eight decisions regarding the choice to conflict or cooperate, with four occurring in the two treatments being tested in each session. If the subject chose conflict, this was recorded as a “1” and as a “0” if they chose to cooperate. For each subject, we averaged their four decisions within each treatment to determine the dependent variable. In addition to arming level, we also included in the Probit regression an independent variable to further assess our hypotheses regarding treatment effects on the number of conflict outcomes.

We first group the data by pooling *PRIME* with *PRIME PRICE* and *BASE* and *BASE PRICE* to determine the effect of arming levels given our theoretical predictions. The first Probit regression contains average arming level by subject and a dummy variable for treatment comparison:

<b>Table 8: Results of Probit Test</b>				
<i>Probit 1: Treatments PRIME and PRIME PRICE</i>				
<b>Number of Observations:</b>	120			
<b><u>Variable</u></b>	<b><u>p-value</u></b>	<b><u>Coefficient</u></b>	<b><u>SE</u></b>	<b><u>df/dx</u></b>
<i>Arming Level</i>	0.981	0.003	0.134	0.001
<i>Treatment (Prime Price=1, Prime=0)</i>	0.058	0.563	0.297	0.168

As the Probit regression shows, “Arming Level” had virtually no effect on the option chosen with the two “Prime” treatments, which follows our theoretical prediction. The treatment variable, on the other hand, just fails at the 95% confidence level but still indicates a moderate relationship between treatment and option chosen with treatment *PRIME PRICE* increasing the chances of conflict by over 50%. Furthermore, the marginal effect of treatment *PRIME PRICE* is a nearly 17% increase in the probability of conflict.

Turning to the other two treatments, we assess them in a similar manner with arming level and a dummy variable for treatment as our two independent variables:

<b>Table 9: Results of Probit Test (cont.)</b>				
<i>Probit 2: Treatments BASE and BASE PRICE</i>				
<b>Number of Observations:</b>	96			
<b><u>Variable</u></b>	<b><u>p-value</u></b>	<b><u>Coefficient</u></b>	<b><u>SE</u></b>	<b><u>dF/dx</u></b>
<i>Arming Level</i>	0.056	0.468	0.244	0.017
<i>Treatment (Base Price=1, Base=0)</i>	0.172	0.898	0.658	0.037

As the Probit regression illustrates, “Arming Level” has a moderate effect on option chosen with close to a 50% increase in the probability of choosing conflict for every

additional arming unit purchased. The treatment effect in this Probit regression shows virtually no correlation with option chosen.

Next, we show how conflict evolved over time in each treatment. The figure below breaks down how conflict changes as the rounds progress. The lines represent the average choice of each subject in the sessions that were conducted as labeled (i.e. “Prime:PrimePrice” denotes the average choice in sessions where treatment *PRIME* was played for four rounds and then *PRIME PRICE* was played for four rounds).

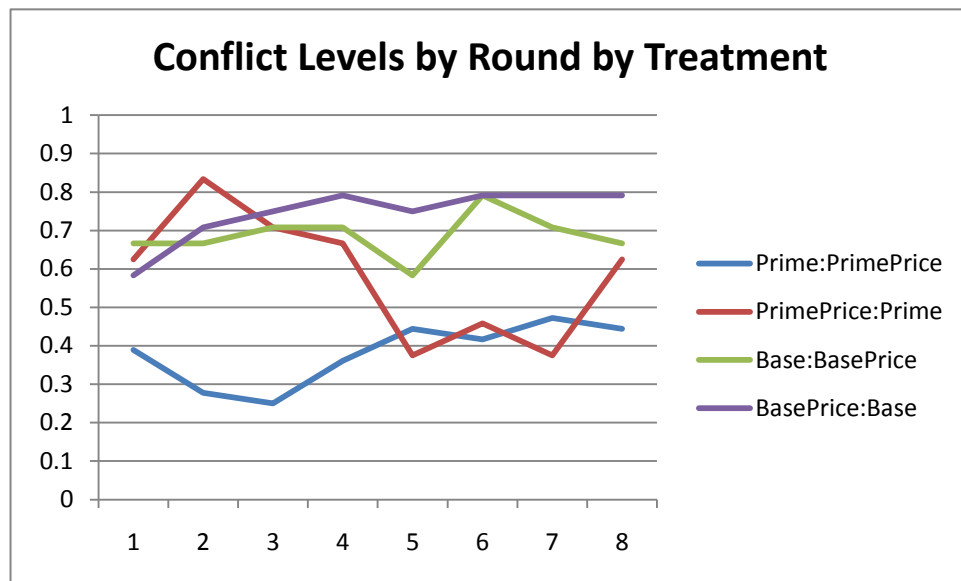


Figure 12: Average level of conflict broken down by session

As the figure shows, conflict was fairly steady when treatments *BASE* and *BASE PRICE* were run. However, when *PRIME* and *PRICE PRICE* were run, conflict moves in the more predicted directions (though do note the interesting uptick on the last round of the PrimePrice:Prime sessions).

Finally, we ran several t-test comparisons to better ascertain which feature of the experiment elicits greater conflict, shifting the price parameter of arms (i.e. resource



scarcity) or removing the link between destruction and arming level (i.e. interactive consequences). We find that a t-test comparison between treatments *PRIME* and *PRIME PRICE* of the choice to engage in conflict or cooperation generates a mean difference of 17.08%. The comparison between *PRIME* and *BASE*, on the other hand, shows a mean difference of 32.29%. While both parameters are important in their effects on conflict, reducing the opportunity cost of interactive consequences holds greater weight, at least in the confines of our experimental environment.

## **7. Conclusion**

These results confirm much of our theoretical predictions but also reveal new insights into the relationship between resource scarcity, interactive concerns, and conflict. In the treatment of least conflict, subjects both faced a lower cost of maintaining their arming levels and faced greater levels of resource destruction, particularly as joint arming levels rose. This shows that subjects are wary of engaging in conflict when such conflict can render the contestable good diminished in value. Furthermore, when the price of arming increased, subjects responded by increasing their levels of conflict. This runs counter to a more naïve interpretation of demand theory but is reconciled quite easily when we recognize that the demand for conflict responds to both resource scarcity and the costs of interaction itself. We find that both of these constraints are important when determining the likely incidence of conflict.

The implication of our analysis for future study is that economists must broaden their use of the opportunity cost concept to incorporate interactive features of conflict

alongside the more familiar one of resource allocation. Otherwise, we stand the chance of rendering our analysis irreconcilable with the incidence of conflict as it plays out in practice.<sup>21</sup>

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<sup>21</sup> The intriguing evolution of the recent Troubled Assets Relief Program provides an example of this. While the TARP program provided participants with unprecedented gains in subsidized capital, the negative consequences of entanglement with an overzealous administration proved too much for these companies. A rush to exit this Faustian bargain was the result. See Smith, Wagner, and Yandle (forthcoming) for a larger write-up of this event.

### **Chapter 3: *An Application of the Costs of Conflict to the TARP and NRA***

#### **1. Introduction**

The recent disturbances within financial markets, along with the accompanying recession, have caused reverberations within academic circles as well as throughout the economies of the world. Within academic circles, a clear polarity has appeared concerning the locus of blame. On one side of that polarity stand claims that the crisis is an instance of market failure, which demonstrates the need for stronger regulatory control over markets, as illustrated by Cohan (2009), Posner (2009), and Shiller (2008). On the other side stand claims that the crisis is a manifestation of excessive regulation, the remedy for which is less regulation, as illustrated by Sowell (2009), Taylor (2009), White (2008), and Woods (2009).

We do not seek here to adjudicate these contending claims, at least not in any direct fashion, because our object of analytical interest is the theory of political economy and not macro-level instability *per se*.<sup>22</sup> Our concern here is with the conceptual treatment of systems of political economy, using some macro-level material associated

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<sup>22</sup> We would demur, however, from the numerous remarks that have claimed that the recent events have shown the inadequacy of all macro-level theories. They have shown the inadequacy of theories of the income-expenditure variety where present actions produce current results. But Austrian-style theories, where credit expansion today can cause a boom tomorrow while also causing a bust the day after tomorrow have been generally on the mark. While much work remains to be done in developing this line of explanation, as Wagner (1999) explores, it does explain how credit expansion can produce a sequence of boom-and-bust.

with economic disturbance to provide substantive content. “Political economy” is a compound term formed from the elements polity and economy, each of which in turn can be conceptualized as pure forms. The question at hand is how to combine those pure forms to arrive at political economy. The common way is to do so through sequential addition, as conveyed crisply in Persson and Tabellini (2000) and Besley (2006). Within this framework, market equilibrium is established theoretically prior to and independently of political action, with subsequent political intervention establishing an alternative equilibrium. This sequential and separable framework is, of course, used to divergent effect: where some claim that political intervention promotes Pareto efficiency or something close to it, others claim that it generates significant losses associated with rent seeking (Tullock 1967) and rent extraction (McChesney 1997).

The separated framework leads naturally to efforts to locate the source of disturbance as originating in either polity or economy. For instance, Congleton (2009) attributes the recent disturbance largely to market processes; alternatively, Rowley and Smith (2009) conclude that causation resides with political action. In contrast, our framework of entangled and simultaneous political economy, as sketched in Wagner (2006, 2007), highlights a third possible option: the recent disturbance is a *systemic feature* of a constitutional system of entangled political economy.<sup>23</sup> We start by setting forth our framework of entangled political economy and compare it with separated political economy. After doing this we examine two historical episodes to illustrate the

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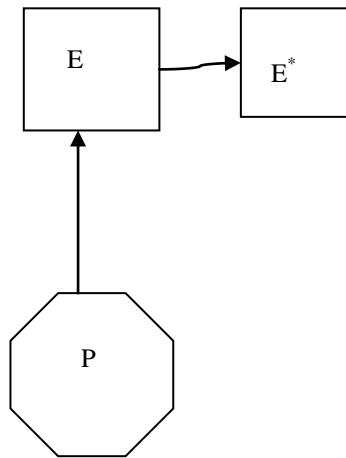
<sup>23</sup> In this vein, we would note that Oliver Kessler (2009) likewise advances a systemic line of explanation, though from an analytic orientation grounded in economic sociology.

explanatory ability of the entangled framework. The first of those episodes is the recent development of the Troubled Assets Relief Program (TARP); the second is the National Recovery Administration (NRA) of the New Deal.

## **2. Two conceptualizations of political economy**

Any analytical framework unavoidably highlights some phenomena while ignoring other phenomena. Within the framework of separated political economy, the final societal equilibrium is generated by sequential addition over two distinct institutional frameworks: a market framework governed by private property and freedom of contract and a constitutional framework that governs political transactions. Actions taken in the political arena thus modify the equilibrium established within the market arena. A further significant feature of this framework is that polity and economy are each conceptualized as single, point-mass entities that act upon one another.

Figure 6 illustrates this analytical framework.



**Figure 13: Separated political economy**

The polity is denoted by the octagon, the economy by the square. As shown there, the polity acts as a single massed entity on the economy which responds as a single massed entity by shifting from  $E$  to  $E^*$  due to political action on the economy, much as one billiard ball would act upon another. Separated political economy theorizes by a process of layered addition. The theory proceeds smoothly and sequentially, with economic entities acting first and political entities second. The outcome of this model of political economy corresponds to what we observe after the second move.

The alternative framework of entangled political economy differs in several significant respects from that of separated political economy. For one thing, polity and economy are not conceptualized through reduction to point-mass status. There is, after all, nothing about billiard balls that would allow entanglement. For entanglement to be

possible, the entities must be conceptualized as networks of relationships where individual nodes craft particular connections with other nodes, and with those connections running through both are arenas of action. Furthermore, market and political actions are undertaken simultaneously, and within an institutional framework that is open to all actors in both arenas. Polity and economy are both arenas of activity that contain numerous interacting enterprises that are connected in network fashion whose systemic properties depend on the structure of the network.

Figure 7 illustrates in simplified fashion a framework of entangled political economy.

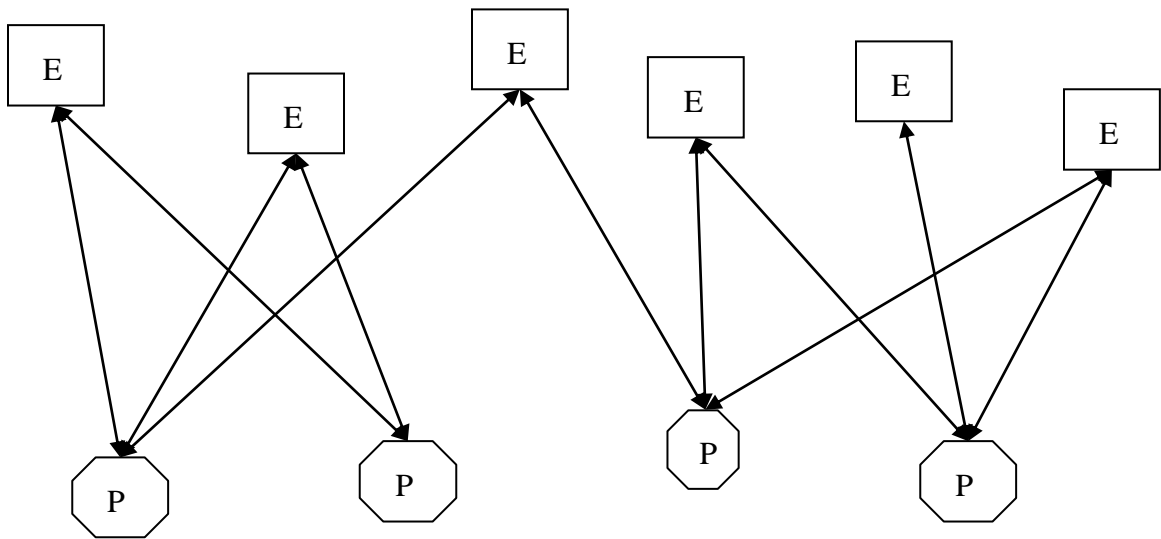


Figure 14: Entangled political economy

The figure is simplified because the individual entities in the economy are portrayed as stand-alone entities and not as existing within a network, so as to reduce the clutter of connections among economic entities that would otherwise appear. The main feature of interest in Figure 7 is that neither polity nor market is reducible to point-mass status. Individual political enterprises differ in the economic entities on which they act, and with different locations of political action generating different economic consequences due to different patterns of network connection among economic entities (which have been suppressed in Figure 7).

While competition among and across commercial and political entities is a key characteristic of the entangled political economy, specialized and divided knowledge is a central feature of this process (Hayek 1945). Smith and Yandle (2009) explain how this divided knowledge generates global patterns that never were the direct object of any participant's choice, but rather were emergent properties of systemic interaction. As agreements are reached, statutes modified, and regulations written, a package of outcomes emerges that no one has chosen, not even senior members of the legislative and executive branches of government. Each participant pursues opportunities for gain within a networked system of complex interaction where the overall outcome is not a product of intentional choice.

This formulation of entangled political economy is not new, though the reductionist-driven imperative of tractable modeling has relegated it to the background of theoretical inquiry. For instance, Jonathan Hughes (1977) presents a wide-ranging



account of entangled political economy going back to colonial times in America, where polity and economy evolved simultaneously through entangled interaction (Yandle, 1984). On a conceptual level, Jane Jacobs (1992) describes societal processes that evolve through interaction between institutional carriers of two distinct moralities, which she describes as the commercial and the guardian moral syndromes. A central feature of her analysis is the treatment of some of the debilitating qualities of certain patterns of entanglement, which she describes as “monstrous moral hybrids,” and which to some extent is reflected in Jonah Goldberg’s (2008) treatment of *Liberal Fascism* and also in Bruce Yandle’s (1983) treatment of Baptists and bootleggers. Indeed, entanglement-driven regulation that delivers special benefits for one part or sector of the political economy while imposing costs on another is recognized as far back as Magna Charta (Yandle 1984) and as recently as the 2010 debate over cap-and-trade carbon emission regulation (Yandle, 2010b). In those two cases and with entanglement generally, political connections and social structure, long developed between interest groups and political power brokers, become energized and highly visible when some political or economic shock sets the stage for action. At other times, lobbyists and politicians, whose political survival depends on serving and balancing the demands of multiple competing interests, happily maintain the connecting networks.

Our analytical framework has both similarities to and differences with Sanford Ikeda’s (1997) and Steve Littlechild’s (1997) treatments of the dynamics of interventionism. The similarities reside in a common concern with the systemic properties of interaction between economic and political entities, and with entanglement

in both cases being a continuing process. The differences reside in our use of a network-based formulation in contrast to the field-based formulation of Ikeda and Littlechild. As Jason Potts (2000) explains, network-based formulations are more suitable for exploring patterns of continual evolution where the emphasis is placed on particular patterns of entanglement and not on the general presence of entanglement. Thus our formulation extends the earlier formulations by supplying some gain-seeking logic by which particular patterns of entanglement are generated.

With regard to institutional arrangements, Elinor Ostrom (1986) reminds us that it is not sufficient to describe the political process as exogenous if we hope to understand outcomes as they emerge in naturally occurring environments. It is necessary to go further by undertaking an examination of the actual organization of decision-making in particular institutional contexts, because different particular contexts can yield different patterns of outcome, as Ostrom (2005) explains. Only in this way will we be able to understand why certain outcomes emerge rather than others. Ostrom's theme informs our own effort to work with a theory of entangled political economy because we think that this institutional framework more accurately reflects the institutional framework from which the present situation has emerged.

### **3. Entangled political economy and the triadic architecture of exchange**

Within the pure theory of a market economy, a transaction entails a dyadic relationship between buyer and seller, and with the terms of trade reflecting agreement between them. Those transactions can be aggregated and then reasonably reduced to a

representative transaction without losing economically significant information. A credit transaction within the pure theory of a market economy would involve a relationship between borrower and lender and no one else. In choosing among borrowers, lenders would base decisions on their appraisal of the anticipated commercial value of proposed transactions, as this value is governed within the framework of private property and freedom of contract. A borrower whose offer is rejected by a lender can try other lenders, but transactions between borrowers and lenders are dyadic relationships in any case.

Political action can be introduced into such transactions in two distinct ways, as Walter Eucken (1952) explains in his distinction between political actions that are market-conformable and those that are not. While it may be doubtful that market conformability is a dichotomous state as against denoting some continuum, the distinction between conformable and non-conformable actions still has traction in distinguishing separated from entangled political economy.<sup>24</sup> Should political actions conform to the operating features of the market economy, the outcome could be described as an instance of separated political economy. Political action would affect all credit transactions in non-discriminatory fashion, in which case it would still be reasonable to reduce the aggregate of credit transactions to a representative transaction. Figure 1 denotes a situation where political actions are market conformable in that they act upon the market as an entity and are neutral toward the pattern of activities within the market.

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<sup>24</sup> In similar fashion, neutral taxation surely depicts a continuum and not a dichotomy. The alleged neutrality of a head tax assumes wrongly that heads can be counted accurately independently of the size of the tax. A head tax may be comparatively neutral among contemporary tax instruments, but the enumerated size of a population would surely vary inversely with the size of the tax.

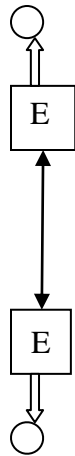
Within a framework of separated political economy, political action tweaks market outcomes without modifying the modus operandi of the market process. Market transactions would retain their dyadic quality, with a polity entity offering bounties to market-based entities but without getting involved in the operation of those entities.

In contrast, political actions that are non-conformable with market processes generate an entangled political economy, one illustration of which is presented in Figure 7. Within this alternative framework, transactions are triadic as political entities participate in market transactions. It is no longer reasonable to reduce some market aggregate to a representative transaction because the behavior of that aggregate will vary with the particular network structure from which the aggregate emerges; such networks are scale-free, so there is no scale by which an aggregate can be reduced to a representative transaction (Barabási 2002). Transactions occur between particular entities within the market and the polity and not between market and polity as point-mass entities. The triadic quality of transactions, moreover, shifts the character of commercial calculation. In dyadic exchanges between market entities, both parties share a common focal point due to their residual claimant positions. This focal point, for instance, explains why the preponderance of commercial disputes is settled without trial. With the triadic transactions of entangled political economy, the salience of the common focal point weakens due to the absence of residual claimancy within political entities.

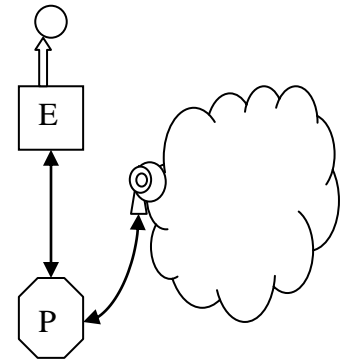
With dyadic transactions, a lender calculates by ordering borrowers in terms of potential profitability when that profitability depends only on the forecasted repayment activity of the borrower. With triadic transactions, this simple calculus gives way to a

more complex calculus that is not readily reducible to a scalar magnitude, due to the absence of residual claimancy. Transactions cannot be ordered by their reduction to scalar magnitudes because they retain vector qualities. For instance, transactions might be subject to side constraints that reflect perceived regulatory preferences regarding the distribution of loans by age, race, gender, or location, to select four categories commonly in play. Regulatory monitoring, however, is never subject to open calculation but rather invariably involves significant measures of arbitrariness that impedes economic calculation as compared with dyadic exchange.

Profit takes a different form when pursued by political entities than when pursued by market entities. There is, however, no unique form that pursuit takes, which injects further complication into economic calculation. Figure 8 illustrates this point.



Panel A: Market exchange with separated political economy



Panel B: Exchange within entangled political economy

Figure 15: Forms of exchange relationships within political economy

Political entities are organized within a framework of inalienable ownership, in contrast to market entities. Hence, profit cannot be appropriated directly through political entities. Yet profit is always present because it merely signifies mutual gains for the parties to a transaction. Hence, a nonprofit status does not eliminate the search for profit but only changes the paths taken by that search. Panel A illustrates an exchange between two market entities denoted by the squares, and with each party expecting to profit from the trade as denoted by the arrows running to the small circles outside the squares. Panel B illustrates a similar exchange when one party is a political entity. While both sides expect to profit, political profit cannot be appropriated directly, and yet the anticipation

of profit will be there or else the enterprise would not have been sponsored. The small triangle located between and to the right of the political and market entities indicates that profit is channeled in some indirect fashion, as illustrated by the cloud into which that profit flows. The image of the cloud is meant to cover the variety of particular ways that such profit might be appropriated: it could be appropriated through higher prices paid to particular input suppliers; it could also be appropriated by offering lower prices to favored buyers. Regardless of the form of appropriation, entangled political economy will feature the appropriation of profits through triadic exchange relationships.

Entangled political economy theorizes in terms of universal profit-seeking pursued simultaneously in both arenas. While political entities cannot appropriate profit directly from their activities, successful political action will nonetheless create profits to be appropriated, for profit is just another word for gain. What we have is universal competition as a feature of universal scarcity, only with the enterprises that engage in competitive activity doing so under different institutional rules of property rights, creating settings of cooperation-cum-conflict that we denote as entangled political economy.

With respect to Panel B of Figure 8, some political entities may be characterized as Big Players (Koppl and Yeager 1996; Koppl 2002). We should note that a Big Player is not distinguished by size but by a mode of operation that differs from that of ordinary market participants. The presence or absence of residual claimancy is one such distinguishing difference. Transactions between people who are working with their own capital may play out differently than transactions where one participant is working with

inalienable capital. Commercial firms have strong incentive to settle disputes because they are working with alienable capital. If one party to a dispute is a political entity, say an Attorney General, the dispute may play out differently. For one thing, the Attorney General cannot claim any residual for settling the dispute. Even more, continuation of the dispute might generate valued publicity for an attempt at higher office. In any case, the Attorney General would generally not operate according to the same language of economic calculation as ordinary market participants.

Credit markets provide particularly good material for the operation of entangled political economy in light of the presence of Big Players. A credit transaction is a form of rental contract where a lender hands over temporary possession of an asset to a borrower. Rental contracts create opportunities for asset conversion that are not present with sales contracts, and so different institutional arrangements have grown up around rental contracts. The conversion of dyadic transactions into triadic transactions through the entrance of Big Players would seem to provide particularly fruitful analytical opportunities, which could not be so readily addressed within a framework of separated political economy. Most of those opportunities relate to changes inside orthodox aggregates rather than to aggregates themselves, with resulting changes in aggregates reflecting systemic properties of an entangled political economy, as we shall now explore in some detail for two specific cases.

#### **4. Current episode: The TARP as illuminated by entangled political economy**



We draw upon two episodes of crisis to better illuminate the relevance of our theory of entangled political economy. Though we maintain that entanglement is a relevant organizing framework during all periods of politico-economic activity, we argue that moments of crisis are particularly useful in demonstrating this relevance because crisis accelerates interaction between the two orders as demand for political responses increases in the wake of undesirable macro-outcomes (see Higgs 1987). Consequently, new relationships are formed across nodes as traditional boundaries are less respected. Finally, this entanglement occurs with greater transparency both because of the previous two arguments and because participants in the entanglement process are more likely to favor expediency over palatability.

To demonstrate how entanglement theory illuminates actions taken in a highly energized political economy, we must 1) explain how an entangled field for action is first formed by key political economy players, 2) identify the energized linkages that brighten during stressful times to deliver specialized benefits to emerging Big Players and related economic agents in the political economy, and then 3) show how an entanglement contagion develops that embraces other firms and industries in an inspired regulatory process. Along the way, we must describe the “gears in the transmission” that make the transfer mechanism work for key players. Our entanglement story offers a superior explanation to events relative to other theories of regulation such as public interest, capture, or special interest theory.<sup>25</sup>

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<sup>25</sup> A summary and discussion of various regulation theories is found in Morriss, Yandle, and Dorchak (2009: 1-15).

In applying our theory, we first draw on the events that led to the creation of the Troubled Assets Relief Program (TARP). We must call attention to the 2007-2008 international financial collapse and world recession that preceded TARP. What followed in the United States was the most serious economic recession since World War II. We note that the credit collapse was associated with an unusual 2001-2005 expansion of credit for adjustable rate mortgage lending to less qualified borrowers and to investors (Taylor 2009: 1-10). As described by Yandle (2010a) and others, the credit collapse has no single cause that might be attributed to one overriding component or agent of the political economy but is rather the result of interacting necessary (but not sufficient) conditions instigated by rent-seeking interest groups that together had formed a economically vulnerable political/social structure which ultimately collapsed. Included in the structure were long-established linkages that delivered benefits from an entangled set of political agents, central bankers and regulatory agencies to mortgage bankers and lenders, credit rating agencies, accounting rule makers, insurance companies, and international broker/dealers. This was at a time when interest rates were low and the U.S. government was dedicated to expanding home ownership among lower income citizens (Sowell 2009: 30-50; Wallin 2008; Yandle 2010a). Enlarged use of the securitization and sale of mortgage-related debt instruments by major Wall Street bankers further accommodated the expanded lending. Mortgage-backed bonds found their way into the portfolios of financial and other institutions worldwide. The subsequent financial collapse became known as the sub-prime crisis, referring to a category of mortgages held as assets by major financial institutions. The magnitude and scope of ownership of these

assets was so large and their value so questionable that banks, financial institutions and even governments worldwide found themselves teetering at the margin of bankruptcy. It was in the throes of this crisis that the connecting political economy linkages became highly energized and U.S. government officials supported a series of unprecedented actions. We draw on three episodes in the evolution of the TARP demonstrating the consequences of these newly energized entanglement network of relationships that connected political and market enterprises.

#### *4.1: Key events in the crisis and the thickening of entanglement*

Our first episode covers the emergence of the TARP in response to the financial crisis. We note that at the time when TARP emerged, the linkages between politicians, central banker, regulators, private bankers and insurance companies were well established and functioning. Robert Higgs (1987) explains how the arrival of a crisis provides opportunities for profit the exploitation of which thickens and energizes the extent of entanglement. The resulting stronger linkages and thickened entanglement are pertinacious and consequently remain in place after the crisis has passed (see Tullock 1975).

As described by the conventional wisdom of monetary economics, the traditional means of combating recessionary pressures and liquidity constraints is through the Federal Reserve. The Fed is endowed with a variety of tools to deal with perceived crises in the economy. Monetary policy actions taken by the Fed operate primarily through managing the money supply and influencing the federal funds rate, which is the interest

rate charged in markets for overnight interbank borrowing. These powers granted to the Federal Deposit Insurance Corporation (FDIC) with regard to insolvent financial institutions theoretically enable bank regulators to stabilize the economy very much along the lines of a separated perspective.

During the initial stages of the reaction to the credit crisis, these organizations largely followed previously established guidelines for dealing with trouble in financial markets. For example, the federal funds rate set by the Federal Reserve averaged 1.81% in September 2008. This rate had fallen to 0.15% as of September 2009. The Federal Reserve took these measures apparently in hope of expanding the credit market in light of the collapse of two government sponsored mortgage lenders, Freddie Mac and Fannie Mae, which molded the vast majority of the market for home loans made in the United States. Additionally, the FDIC later increased its deposit coverage insurance from \$100,000 to \$250,000 (see below).<sup>26</sup>

The reduction of the federal funds rate and primary credit responses by the FDIC to assist troubled financial institutions are traditional responses in times of crisis. The TARP, on the other hand, initially was justified as being critically necessary to remove bad debt from the banking system and “restart” the mortgage market. TARP would augment the use of the Federal Reserve’s traditional tools in reducing the credit market crisis.

Working together in a rare burst of cooperation, U.S. Secretary of Treasury Henry Paulson and Federal Reserve Board Chairman Ben Bernanke searched the limits of their

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<sup>26</sup> <http://www.fdic.gov/news/news/press/2008/pr08093.html>

statutory powers and beyond for ways to inject credit directly into the balance sheets of the teetering banking community. There were a number of mechanisms considered, including providing cash by taking an equity ownership in the failing firms. However, a plan replaced this option that went directly to the problem, the deeply depressed mortgage-backed securities held by banks. Using the TARP, the Treasury would purchase these so-called toxic assets, hold them, and later sell them off, it was hoped, at a higher price than paid for them. In effect, the Fed was to become a hedge fund manager. But, of course, taking the action required congressional approval. The direct interaction of the Treasury, the Federal Reserve Board and Congress that followed ended at least temporarily but perhaps permanently the much-celebrated independent position held by the U.S. central bank since the end of World War II.

In remarks before Congress, Secretary of the Treasury Henry Paulson claimed:

We have proposed a program to remove troubled assets from the system. This troubled asset relief program has to be properly designed for immediate implementation and be sufficiently large to have maximum impact and restore market confidence. It must also protect the taxpayer to the maximum extent possible, and include provisions that ensure transparency and oversight while also ensuring the program can be implemented quickly and run effectively...

...Over these past days, it has become clear that there is bipartisan consensus for an urgent legislative solution. We need to build upon this spirit to enact this bill quickly and cleanly, and avoid slowing it down with other provisions that are unrelated or don't have broad support. This troubled asset purchase program on its own is the single most effective thing we can do to help homeowners, the American people and stimulate our economy.<sup>27</sup>

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<sup>27</sup> <http://www.treas.gov/press/releases/hp1153.htm>

This initiative was first met with skepticism; on its first run through Congress, the statute failed to pass. A second attempt, however, which included certain unrelated provisions that may be thought of as side-payments, was successful and signed into law on October 3, 2008 as *The Emergency Economic Stabilization Act of 2008*. The Act was summarized as an effort “to provide authority for the Federal Government to purchase and insure certain types of troubled assets for the purposes of providing stability to and preventing disruption in the economy and financial system...”<sup>28</sup> In effect, the Act gave Mr. Paulson an open hunting license to do almost anything to soften the crisis, and without required accountability to Congress or transparency of action so that taxpayers would be able to know who was being favored and who was not.

TARP represented a shift in the underlying constitutional order of how political enterprises relate to market enterprises with respect to financial intermediation, property rights, and the ability of boards of directors and corporate officers to manage their enterprises. This new enterprise was not grounded in the same bedrock as the political enterprises it replaced. The defining of new entanglement territory was soon evident as the means to induce financial stability began to change rapidly in terms of the rhetoric and actions of the key political actors involved in its administration.

The ostensible purpose of the TARP, and the purpose in place when Congress approved the initiative, was to buy up so-called “toxic assets,” those assets held by banks that were considered worthless due to their basis in the failing mortgage derivatives

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<sup>28</sup> [http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=110\\_cong\\_public\\_laws&docid=f:publ343.110.pdf](http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=110_cong_public_laws&docid=f:publ343.110.pdf)

market. Yet as Congleton (2009) points out, this *de jure* purpose soon became inconsistent with the *de facto* actions taken by the Treasury Department. Instead of immediately purchasing toxic assets (i.e., mortgage-backed securities) as approved by Congress, the TARP's first action was to distribute \$250 billion in subsidies to nine large banks and financial institutions by purchasing preferred stock and warrants.<sup>29</sup> The nine-bank "rescue," which was reluctantly embraced by some, unneeded by others, but unavoidably accepted by all formed a family of Big Players who would be armed to operate with relaxed bankruptcy constraints. Congressional review of the newly invented activity became the subject of yet another hearing where Congress called on Secretary Paulson to explain what was taking place. Without apologies, Mr. Paulson indicated that he was doing all in his power to avoid a world collapse of financial institutions, and that if necessary he might change his mind again. It is critical to our theory that congressional leadership accepted rather quietly Mr. Paulson's declaration of unlimited power to conduct the nation's business. Our entanglement theory predicts energizing and expanding the arteries that support the flow of politically produced transfers to economic agents already connected to the political engine.

#### 4.2: *The gears in the TARP transmission*

It is now necessary for us to analyze this shift in more detail. What were the gears in the TARP transmission? How did Mr. Paulson and other key government players

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<sup>29</sup> The represented banks were Bank of America Corp., Citigroup Inc., Goldman Sachs Group Inc., JPMorgan Chase & Co., Merrill Lynch & Co., Bank of New York Mellon Corp., State Street Corp., Morgan Stanley, and Wells Fargo & Co.

fertilize the field for entanglement growth? Recently released government documents show that Secretary of Treasury Paulson had a closed meeting with CEOs from the nine initial recipients of TARP monies, most of which were financially strong and needed no government assistance.<sup>30</sup> In this meeting, Paulson all but ensured compliance with his plan of purchasing preferred stock by telling them that non-compliance “would leave you vulnerable and exposed” and further threatening regulation.<sup>31</sup>

The Treasury soon extended this change in the allocation of the TARP funds beyond these initial nine firms. The Treasury described this new allocation method as follows:

Under the program, Treasury will purchase up to \$250 billion of senior preferred shares on standardized terms as described in the program's term sheet. The program will be available to qualifying U.S. controlled banks, savings associations, and certain bank and savings and loan holding companies engaged only in financial activities that elect to participate before 5:00 pm (EDT) on November 14, 2008. Treasury will determine eligibility and allocations for interested parties after consultation with the appropriate federal banking agency...

...Companies participating in the program must adopt the Treasury Department's standards for executive compensation and corporate governance, for the period during which Treasury holds equity issued under this program. These standards

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<sup>30</sup> The only rational explanation that we can offer for the strong-arming of sound financial institutions assumes that Secretary of Treasury Paulson and his advisors did not want to identify explicitly the weakest large bank in the financial system. Bank runs were already occurring. A bank panic could have been fomented when the invitation list became public.

<sup>31</sup> This comes from documents that reveal a list of talking points at the Oct. 13<sup>th</sup> meeting. The points of relevance are:

- We don't believe it is tenable to opt out because doing so would leave you vulnerable and exposed.
- If a capital infusion is not appealing, you should be aware that your regulator will require it in any circumstance.



generally apply to the chief executive officer, chief financial officer, plus the next three most highly compensated executive officers.<sup>32</sup>

#### 4.3: *How TARP expands entanglement beyond banking*

Our second episode concerns the shifting of the reported objectives of the TARP to incorporate other industries, especially the automobile industry. Here we describe how commercial organizations long accustomed to operating in a highly charged political economy adapted to the new political landscape by altering the nature of their transactions, appealing to newly endowed authorities using other politically expedient devices, or both. We trace the shift in the objectives of the TARP to accommodate these various industries starting with its purchase of additional senior stocks in American Insurance Group (AIG). AIG technically was the world's largest insurance company, had invested heavily in mortgage-backed securities and was also the leading writer of insurance, termed "credit default swaps," which protected sub-prime mortgage investors from default losses. AIG was technically bankrupt because of the operating losses related to the combination of investments and contracts.

With financial linkages that reached across the entire financial community, the government viewed AIG as too big to fail. This made AIG a Big Player, which is to say a firm without a bankruptcy constraint. As a result, the federal government had already become increasingly entangled with AIG, even before the establishment of the TARP.

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<sup>32</sup> <http://www.ustreas.gov/press/releases/hp1207.htm>. In addition to this noted activity, the Federal Reserve Board dramatically expanded the direct purchase of debt instruments including commercial paper from the commercial banking system. As a result, the Fed's balance sheet has shown unprecedented growth, raising serious concerns as to how the Fed will ultimately "unwind" its some \$1 trillion in newly acquired paper (Hamilton 2009: 67-84).

The Federal Reserve Bank of New York authorized a two-year loan of up to \$85 billion for AIG to draw upon following the collapse of Lehman Brothers and the dramatic fall in the value of AIG shares on September 16, 2008.<sup>33</sup> They extended an additional loan of \$37.5 billion on October 8.<sup>34</sup> On November 10, the Treasury Department assumed some of the financial burden by issuing a \$40 billion subsidy to purchase senior preferred stock. This allowed the Federal Reserve Bank of New York to reduce its previous allocation of \$85 billion to \$60 billion.

Given AIG's status as an insurance company rather than strictly a financial institution, it would seem that the TARP monies would not be applicable. However, in its press release the Treasury Department argued that it was necessary "to restructure federal assistance to the systemically important company." This shift of intended recipients of TARP monies from "qualifying U.S. controlled banks, savings associations, and certain bank and savings and loan holding companies engaged only in financial activities" to those deemed systemically important to the economy opened the door for Treasury to define the remaining distribution of TARP monies in any way that might satisfy crisis control logic.

In exchange for this subsidy, the Treasury stipulated the following:

Under the agreement, AIG must comply with the executive compensation and corporate governance requirements of Section 111 of the Emergency Economic Stabilization Act. AIG must comply with the most stringent limitations on executive compensation for its top five senior executive officers as required under the Emergency Economic Stabilization Act. Treasury is also requiring golden parachute limitations and a freeze on the size of the annual bonus pool for the top

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<sup>33</sup> <http://www.federalreserve.gov/newsevents/press/other/20080916a.htm>

<sup>34</sup> <http://www.federalreserve.gov/newsevents/press/other/20081008a.htm>

70 company executives. Additionally, AIG must continue to maintain and enforce newly adopted restrictions put in place by the new management on corporate expenses and lobbying as well as corporate governance requirements, including formation of a risk management committee under the board of directors.<sup>35</sup>

This new oversight of executive compensation practices was a characteristic of entanglement brought about by this allocation of TARP money.

Following this new disbursement practice, three of the largest national insurance companies, which were unaccustomed to federal regulation, took steps to qualify themselves as proper recipients of TARP money. These firms, Lincoln National, Hartford Financial Services Group, and Genworth Financial, each acquired federally regulated financial institutions to qualify for TARP. While Genworth was unable to secure TARP funding, on May 14, 2009, Lincoln Insurance Company and The Hartford both announced preliminary approval for the disbursement of TARP funds.<sup>36</sup> These are just a few among many other companies such as CIT Group, Inc., GMAC, and IB Finance Holding Company, LLC that repositioned themselves in their various market characterizations to take advantage of the new political landscape. In most cases, there was a linkage to financial markets and investment in sub-prime mortgages, no matter how indirect. In some cases, though, the crisis to be met had more to do with countering rising unemployment and regional decline than sub-prime debt.

Perhaps the most apparent example of this came with the appeal of General Motors, Chrysler, and Ford to Congress for TARP funding. In testimony before Congress, the CEOs of these firms argued that a combination of a weak economy,

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<sup>35</sup> <http://www.ustreas.gov/press/releases/hp1261.htm>

<sup>36</sup> <http://www.bloomberg.com/apps/news?pid=20601208&sid=atbD0r7Nr70>

constrained credit institutions, and legacy costs associated with the provision of health care and retirement benefits to United Auto Worker union members was driving their companies into possible insolvency. GM and Chrysler asked for \$25 billion in TARP money.<sup>37</sup> Ford Motor Company was not in such difficult straits; the company asked for a line of credit, not a direct injection of TARP money. Congress rebuffed this initial request, though, apparently failing to see how \$25 billion alone would save the automotive industry.

On December 19, 2008, President George W. Bush, through an executive order, broadened the domain of TARP monies to include essentially any program deemed necessary to avert the financial crisis. The Bush Administration utilized this stunning shift in the direction of the TARP to distribute funds to the ailing automotive industry by offering \$9.4 billion to General Motors and \$4 billion to Chrysler. These disbursements came amidst continued warning from both General Motors and Chrysler that all but declared pending bankruptcy and bought time for the two companies to operate until the new Obama Administration was in office. The Treasury offered even less in the way of justification for this new disbursement practice in the following press statement:

Treasury will make these loans using authority provided for the Troubled Asset Relief Program. While the purpose of this program and the enabling legislation is to stabilize our financial sector, the authority allows us to take this action. Absent Congressional action, no other authorities existed to stave off a disorderly bankruptcy of one or more auto companies.<sup>38</sup>

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<sup>37</sup> [http://www.nytimes.com/2008/11/19/business/19auto.html?\\_r=2&em](http://www.nytimes.com/2008/11/19/business/19auto.html?_r=2&em)

<sup>38</sup> <http://www.treas.gov/press/releases/hp1332.htm>

As the GM and Chrysler restructuring drew to an end, Senator Mike Johanns (R., Neb), without realizing it, described the key difference between an entangled crisis-driven process and the separated political process that would have taken place normally on the political commons: “I never would have believed as a candidate for the U.S. Senate that the U.S. government could buy GM without a hearing, with no vote, yes or no. There are billions and billions of dollars at stake here” (Mitchell 2009). Put differently, there was ignorance, rational or otherwise, regarding the total impact of the TARP-aided auto deal, but those with the most at stake were obviously well informed.

#### *4.4: Making the transition from crisis to leviathan*

The third period of our study describes how entanglement has spread into other features of the regulatory landscape. In particular, we point to such features as the oversight of executive compensation by a White House “Special Master for Compensation,” a new and significant entanglement that has little to do with the original crisis (Solomon 2009a). Going beyond the TARP fund recipients, Treasury Secretary Timothy Geithner pushed for legislative authority to regulate executive pay for all financial institutions (Solomon 2009b). The emerging rules will move this feature of entangled regulation to a more stable position on the political commons. The growing regulation of financial institutions makes that sector look more like public utilities than market-driven corporations subject to some regulatory constraints.

As executive pay and other constraints began to emerge, early recipients of TARP money, wary of continual government oversight, wished to pay back monies borrowed

from the TARP fund to cut ties with federal overseers.<sup>39</sup> According to the American Recovery and Reinvestment Act of 2009, which stipulates the procedure for repayment of TARP monies:

Subject to consultation with the appropriate Federal banking agency (as that term is defined in section 3 of the Federal Deposit Insurance Act), if any, the Secretary shall permit a TARP recipient to repay any assistance previously provided under the TARP to such financial institution, without regard to whether the financial institution has replaced such funds from any other source or to any waiting period, and when such assistance is repaid, the Secretary shall liquidate warrants associated with such assistance at the current market price. (Division B, Title VII, Sec. 7001, SEC 111(g))

This provision indicates that the repayment of borrowed funds is not subject to scrutiny by the Treasury itself. What is *de facto*, however, is not *de jure*.

This became apparent as frustrated executives found a recalcitrant lender waiting. James Dimon, CEO of JP Morgan Chase, claimed on April 17, 2009 in regard to repayment of borrowed TARP funds, “We could pay it back tomorrow. We have the money.”<sup>40</sup> Likewise Goldman Sachs Group Inc. has stated that its “duty” is to repay funds borrowed from the TARP.<sup>41</sup>

Yet the Treasury department did not allow immediate payment. Part of the reason here harkens back to the earlier controversy caused by AIG when it announced \$165 million in bonuses to top executives. This caused a “populist outrage” and spurred political representatives to take action against AIG. On March 19, 2009, the House passed a bill specifically tailored to the AIG incident, which levied a 90% tax on all

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<sup>39</sup> See Smith (working paper) for an in-depth analysis of this withdrawal from TARP.

<sup>40</sup> <http://online.wsj.com/article/SB123986615199224399.html>

<sup>41</sup> <http://online.wsj.com/article/BT-CO-20090414-708619.html>

bonuses received by employees making over \$250,000 annually and currently employed by companies receiving TARP monies.<sup>42</sup> The Senate version reduced this tax to 70%.

With the memory of the outrage against AIG fresh on the minds of lawmakers, the Treasury Department appointed an overseer to determine optimal compensation packages for seven of the largest firms receiving TARP funds.<sup>43</sup> While Treasury has confined this overseer's area of responsibility thus far to these seven firms, the creation of the office alone points to the desire for increased political responsibility within previously market-only domains.

On September 24, 2009, approximately one year after the initiation of the TARP, Neil Barofsky, Special Inspector General for the TARP, testified before Congress regarding the progress of the initiative. As of September 11, 2009, the Treasury has allowed 41 banks to repay borrowed TARP funds. These firms were required to pass several "stress tests" to qualify for repayment including raising a substantial amount of private equity. Some of the firms are still negotiating the reacquisition of warrants extended to the Treasury. As of June 30, 2009, 649 U.S. banks had received \$218 billion in TARP money and \$70 billion has been repaid. Those still in the fold far exceed the number the Treasury has allowed to exit.<sup>44</sup>

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<sup>42</sup> [http://www.nytimes.com/2009/03/20/business/20bailout.html?pagewanted=1&\\_r=1&hp](http://www.nytimes.com/2009/03/20/business/20bailout.html?pagewanted=1&_r=1&hp)

<sup>43</sup> <http://www.nytimes.com/2009/06/11/business/11pay.html?hp>. These firms are American International Group, Citigroup, Bank of America, General Motors, GMAC, Chrysler, and Chrysler Financial.

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[http://sigtarp.gov/reports/testimony/2009/Testimony\\_Before\\_the\\_Senate\\_Banking\\_Committee\\_on\\_Banking\\_Housing\\_and\\_Urban\\_Affairs\\_%209\\_24\\_09\\_Final.pdf](http://sigtarp.gov/reports/testimony/2009/Testimony_Before_the_Senate_Banking_Committee_on_Banking_Housing_and_Urban_Affairs_%209_24_09_Final.pdf)

Our discussion of TARP illustrates how existing linkages between public and private economic agents become energized, enlarged, and expanded when the economy is hit by a severe economic shock. Because it is not episodic but rather about process, entanglement theory better explains the tightened linkages between government and long-connected economic agents relative to competing theories of regulation. Our theory also accounts for new players in an expanded network of transfer and control. To demonstrate that our theory applies beyond the most recent crisis, we now illustrate how entanglement can be applied to a historic example of energized government entanglement into the economy: the New Deal's National Recovery Administration.

#### **5. Historical episode: The NRA as illuminated by entangled political economy**

Our historical episode of entanglement occurred during the Great Depression. We draw parallels in entanglement between these separate episodes to demonstrate how unoriginal the TARP really is. Indeed our analysis calls into question the various normative policy suggestions typically offered in times of crisis, which invariably advocate yet more entanglement. Once again, we must 1) explain how an entangled field for action is first formed by key political economy players, 2) identify the energized linkages that brighten during stressful times to deliver specialized benefits to emerging Big Players and related economic agents in the political economy, and then 3) show how an entanglement contagion develops that embraces other firms and industries in an inspired regulatory process. We must also brush against the “gears in the transmission” that make the transfer mechanism work for key players.



The National Industrial Recovery Act (NIRA), signed into law by President Franklin Delano Roosevelt on June 16, 1933, the last of the first 100 days, provides a prime example of entanglement. Of even greater interest to our story, the Supreme Court nullification of the NIRA just two years later on May 25, 1935 in *Schechter Poultry v. United States* (295 U.S. 495 (1935)), set in motion legislative action that replaced each critical part of the then defunct NIRA. Legislation passed in a matter of months included the Wagner Act, which replaced the NIRA's labor provisions, and the Robinson-Patman Act, which, as an anti-price cutting law, replaced the price codes. This legislative step illustrates the ever thickening entanglement among commercial and political enterprises.

The Great Depression was the crisis trigger. An international financial market meltdown followed by Federal Reserve and protectionist action yielded a deep economic collapse (Temin 1976). Out of the ashes came the New Deal and the 1933 legislation marathon that yielded the NIRA. There are obvious parallels between the TARP story and this one, with the National Industrial Recovery Act corresponding to the Emergency Economic Stabilization Act and the National Recovery Administration (see below) corresponding to the TARP itself. In both cases, a severe credit market shock, hurry-up legislation, and special deal making in the executive branch pushed the political economy into thickening entanglement. In this case, as with TARP, major industries, firms, and their agents had earlier formed close regulatory relationships with government. As documented by Higgs (1987), entanglement did not start with the New Deal, but rather with controls that emerged in World War I.

In placing his signature on the NIRA, President Roosevelt said (Deering, Homan, Lorwin, and Lyon 1934: 1):

History probably will record the National Industrial Recovery Act as the most important and far-reaching legislation ever enacted by the American Congress. It represents a supreme effort to stabilize for all time the many factors which make for the prosperity and the preservation of American standards. Its goal is the assurance of a reasonable profit to industry and living wages for labor, with the elimination of the piratical methods and practices which have not only harassed honest business but also contributed to the ills of labor.

The NIRA signing, moreover, was just one in a series of statutes signed in a matter of hours. These included the Glass-Steagall Act, which established new constraints on banking and initiated the FDIC, and legislation that reorganized the U.S. railroads (Alter 2006: 304-305). Mr. Roosevelt reserved his most expansive comments for the NIRA statute, which he signed last in the series.

Described by Powell (2003: 113) as “FDR’s biggest bet, his best hope, the flagship of the New Deal,” the act gave President Roosevelt almost unlimited power to intervene and manage the U.S. economy. With the signing of the NIRA, the president set in force activities that would eliminate child labor, set minimum wages for every U.S. industry, establish the maximum number of hours in the work week, require recognition of organized labor in the work place, and establish a gigantic bureaucracy for managing the federal cartel that was formed. In terms of our theory, President Roosevelt and his operatives were “grazing” on a policy commons with most of the constitutional barbed wire cut and stored away, at least temporarily. The time was ripe to energize existing

arteries that connected government and commercial agents and to enlarge the network by several orders of magnitude.

Just as now, there was a growing animus against capitalism and capitalists, especially those with high earnings and newly accumulated wealth. The NIRA drew on the model of fascism in Benito Mussolini's Italy, which was popular at the time, and the idea that the corporate state could best manage a depression economy. Many leaders then believed that a new age of collective action and national planning had arrived, that free market capitalism was a dead letter.<sup>45</sup>

In a hearing on the act, Senator Robert F. Wagner, a leading proponent, emphasized that the time for planning and rationalization had arrived. He said

Competition is not abolished; it is only made rational. In this bill we say that business may not compete by reducing wages below the American standard of living, by sweating labor, or by resorting to unfair practices. Competition is limited to legitimate and honorable bids in the market and real gains in technical efficiency (Dearing, Homan, Lorwin and Lyon 1934: 11).

The NIRA's preamble addressed the serious emergency faced by the nation, and in a first component empowered the president to develop industrial codes, industrial and labor coordination, gave the president power to regulate all prices and wages and addressed specifically the power of the president to regulate oil prices and pipeline operations (Dearing, Homan, Lorwin, and Lyon 1934: 116-124).

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<sup>45</sup> Higgs (1987: 177) provides comments from the U.S. Chamber of Commerce and from Senator James F. Byrnes on the end of individualism. Byrnes said that businessmen were "clamoring for legislation providing government controls."

*5.1: The gears in the NRA transmission*

To provide gears in the transmission that would thicken and expand entanglement, the act established a massive bureaucracy charged with the responsibility of cartelizing every major sector and component of the U.S. economy, with each sector organized under a trade association, and with each industry association having a pricing code approved by FDR. A National Recovery Administration (NRA), established by the act and led by Hugh F. Johnson, a retired Army general with considerable experience, having been a part of the World War I bureaucracy. He was dedicated to the task, charged with managing and enforcing the emerging codes. By its very nature, the NRA would write and supervise hundreds of codes for as many industry sectors (Taylor 2007). Each sector and each firm in the sector would be highly informed about the fine print that governed their relevant sector. But it would be an impossible task for the leadership of any sector, firm or industry to keep up with the details of all other sectors. Consistent with the unavoidable division of knowledge, even those closely connected to NRA rules were largely ignorant outside their domains of particular expertise.

Full of enthusiasm for the task that lay before him, General Johnson used all the creativity he could muster to rally support for the Blue Eagle, the ubiquitous symbol he adopted for the NRA. He allowed businesses that toed the NRA line to fly the Blue Eagle flag and affix the Eagle imprimatur to their packages and include in their advertisements, and urged consumers to boycott non-Eagle producers (Higgs 1987: 179).

Once the NRA bureaucracy was up and running, there were 54 state and regional offices with 1,400 employees nationwide (Taylor 2002: 2). Approximately 700 industrial

codes were put in place and these dealt with more than 150 trade practices, such as advertising, packaging, and product standardization. Along with codes came more than 11,000 administrative orders that affected some 2.3 million employers (Powell 2003: 121). In June 1935, the National Industrial Conference Board, the predecessor to today's Conference Board, reported that the NRA's two-year operating cost had totaled \$93.8 million, which is equivalent to \$1.4 billion in 2009 dollars or approximately \$700 million per year (Cost of NRA rule put at \$93,884,595 1935). To give some perspective to the magnitude of the operation, consider this: the 2010 budget for the U.S. Securities and Exchange Commission is \$1.02 billion (U.S. Securities and Exchange Commission Budget in Brief 2009) and the U.S. Federal Trade Commission's 2009 budget is \$243 million (U.S. Federal Trade Commission, 2009, Congressional Budget Justification 2009). Entanglement was being taken to the limit, or so it seemed.

As might be expected, leaders of many major American corporations along with the U.S. Chamber of Commerce strongly supported the NRA. Indeed, when signed into law, the president of the U.S. Chamber referred to the act as the "Magna Charta of industry and labor" (Powell 2003: 114).<sup>46</sup> Major players wanted to be regulated. Another major component of the act focused on labor and labor relations. The NRA effectively required industry to bargain collectively with organized labor and established a government mechanism for settling labor disputes. The NRA codes set minimum

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<sup>46</sup> The codes and trade association coordination components of the act, known as the Swope Plan, had been promoted for several years by Gerard Swope, president of General Electric (Powell 2003: 113). Herbert Hoover had rejected the Swope Plan in 1931, calling it and its supporters "sheer fascism."

prices, minimum wages and maximum hours allowed in a workweek, based on a misguided theory that higher prices would translate into larger revenues for firms so that workers' take-home pay would increase.

That some industries were anxious to organize under the Blue Eagle cartel is revealed from the fact that the U.S. cotton textile industry had its NRA code written and approved by the president on July 9, 1933, less than one month after President Roosevelt signed the authorizing legislation (Dearing, Homan, Lorwin and Lyon 1934: 141). The textile code illustrates the entangled fine-tuning accomplished within the context of the NRA, which also identifies one of the more interesting gears in the NRA transmission. Among other things, the textile code established minimum wages for just that industry with a small differential for northern and southern mills, \$13 for a 40 hour week in the North; \$12 in the South (Powell 2003: 121-122). The wages set were significantly higher than those prevailing at the time. Cotton textile manufacturing was rapidly moving south, and organized textile workers in the North used the Blue Eagle opportunity to raise wages and close the wage gap. New England textile mill operators dominated the textile trade association. The first industry entangled with the Blue Eagle was the textile industry.

### *5.2: Difficulties in building and keeping the cartel*

Just as with Treasury attempts to herd major U.S. banks into a TARP cartel, not every firm and industry was cooperative with the Blue Eagle. Henry Ford refused to sign the auto code drafted by General Motors and Chrysler. Powell (2003: 125-127) tells

about Ford's opposition and how, because of this, the NRA threatened him with losing a bid to supply trucks to the government, just as Secretary Paulson threatened TARP-reluctant bankers with new regulatory initiatives. Ford was the low bidder and, ironically, paid the highest wages in the industry. While Ford won that bid, shortly thereafter President Roosevelt issued an executive order that denied government business to any firm that did not fly the Blue Eagle. Mr. Ford's sales increased that year without government orders.

Mr. Ford was not the only one to express opposition to the Graphic Arts Code. As the NRA expanded its reach with codes and other rules, a growing number of 'misfits' began to emerge. Put another way, the cartel was costly to maintain. For example, in July 1934, in a first united protest against the NRA, a group of Bronx printers turned in their Blue Eagles in protest against the Graphic Arts Code that included them (70 Bronx printers return Blue Eagle 1934). The printers had petitioned relief from code-set wages. A representative for the group indicated that the Blue Eagle wages were about double those that prevailed before the code was adopted. Expressing support for the NRA concept and not wanting to appear radical, the statement went on:

It is unfair to expect medium or small-sized shops to pay the same scale of wages as the large plants when general conditions such as the amount and type of business and volume of production is taken into consideration. This schedule will place an unfair hardship on most of us and force many of us to go out of business (70 Bronx printers return Blue Eagle 1934).

Quite possibly, the larger firms in the industry knew exactly what they were doing when they contracted for a code that raised competitors' costs.

There were also occasions where special deals made by the NRA to some firms in an industry, but not to all, led to policy reversals (Cotton pay rise exemptions are granted; NRA aids 145 concerns, ten associations 1934). The growing power of the NRA to deal with specific firms as well as entire industries led the agency to use withdrawal of the Blue Eagle, a requirement for doing business with the government, as the ultimate punishment for failure to abide by the codes. The sanction reached even to the level of the producers of dolls' clothes (NRA may restore a Blue Eagle here 1934). Eventually, while addressing such things as the prices of cigarettes, the NRA turned attention to Hollywood and began an investigation of movie stars' salaries (Movie salaries listed 1934), perhaps the counterpart to today's political concern with executive pay. The effort to maintain the Blue Eagle cartels became more troublesome as some firms tested the legality of the NIRA's antitrust exemption as well as its other powers. As might be expected, the agency opened a litigation department to handle the growing number of lawsuits. In November 1934, after having been in business just seven months, the litigation unit reported that 663 cases had been docketed and that the unit had prevailed in all but 10 of 129 court actions (NRA is winning 90% of its court tests 1934).

With a genius for recognizing opposition and neutralizing it, President Roosevelt named famous courtroom lawyer Clarence Darrow as head of a committee to review the NRA's operation. What may not have been expected was Darrow's fiery assessment that accused FDR of having attempted to monopolize markets and General Johnson of having made deals to alter codes after FDR had signed a "final" order (Johnson accused by



Darrow board of altering code 1934). Custom-tailored entanglement was creating problems.

5.3: *The end of the Blue Eagle: from crisis to leviathan*

Amity Shlaes (2007) provides an interesting and colorful account of how Schechter Brothers Poultry Company, a Brooklyn-based chicken seller, became the plaintiff that ultimately brought down the NIRA and all its trappings. As she might have put it, the Schechter Chicken killed the Blue Eagle. A favorable Supreme Court decision came in a circuitous fashion. The Schechter firm was charged with violating the “Code of Fair Competition for the Live Poultry Industry in and around the Metropolitan Area in and about the City of New York,” an NRA code title that illustrates the specificity of the rules.<sup>47</sup> The firm was charged and convicted in the New York Federal Court (NRA is winning 90% of its court tests 1934). The brothers appealed the case to the U.S. Supreme Court, which ruled unanimously in their favor by declaring that the NIRA unconstitutionally delegated powers to appointed officials to develop laws and regulations that carried criminal sanctions. The Court also ruled that interference in business transactions that did not involve interstate commerce represented an unlawful expansion of powers for the U.S. government.

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<sup>47</sup> To further illustrate the regulatory detail, under the rule in question “(1) It was required that an employee of the seller reach into a crate of chickens and grab out the birds one by one as they came to hand; (2) it was required that the buyer accept the chicken thus pulled forth” (End of NRA 1935: B1). This was the so-called “straight killing” rule, which prohibited selecting individual chickens from a crate. On June 20, 1934, a Schechter employee allowed a customer to pick and chose several chickens from a crate, rejecting some perfectly healthy chickens in the process. It was outright chicken discrimination, illegal under the code.

The ruling was devastating to the FDR effort and to those industries that enjoyed NRA shelters from free market competition. If the NIRA was unconstitutional, other major statutes inevitably would follow. President Roosevelt responded by charging that the decision took the country back to 1789, in effect saying that the federal government was powerless to cope with the problems that came with the country's economic growth and development (End of NRA 1935). In terms of our model, the Court action brought to an end the chaotic activity on the commons. Without missing a beat, though, Congress and President Roosevelt moved quickly to replace key gears in the NIRA transmission with newly enacted statutes.

The Schechter decision was rendered on May 27, 1935. On July 5, 1935, President Roosevelt signed the National Labor Relations Act that effectively embodied the labor section of the NIRA. On June 5, 1935, lawmakers passed the Robinson-Patman Act, a statute that outlawed price-cutting. They passed the Connolly Hot Oil Act earlier, on February 22, 1935. That piece of temporary legislation was then extended to replace the NIRA's petroleum regulations. When considered in their entirety, the new legislation provided uniform wage and hour regulations, guaranteed the right of labor to organize with union representation of its choosing, eliminated child labor, cartelized oil production, and prohibited price-cutting. In terms of social structure, the NIRA had established trade associations as a prevalent American institution for lobbying and favor-seeking, and the NRA experience made Washington, D.C. the center of the nation's political economy. Thus, the links between political and commercial agents were

strengthened; enlarged entanglement became a permanent feature of the modern U.S. economy.

## **6. Some concluding remarks**

As our narrative illustrates, the entanglement of political and commercial enterprises typically thickens and expands in times of crisis, and with new degrees of entanglement becoming new norms going forward. What we witness in instances of crisis is the variable turbulence that is an operating characteristic of a system of entangled political economy. This perspective is hidden from the framework of separated political economy because that framework offers no theoretical space for emergent action within the aggregates we denote as polity and economy to transform a system of political economy. Entrepreneurs are always looking for profit opportunities; however, periods of crisis perhaps provide particular opportunities for seeking profits that generate systemic changes of an emergent nature that have enduring consequences, whether for good or bad.

For example, in times of stability, the Treasury likely would have used its resources as approved by a majority of the legislature in the fashion stipulated by the initial measure or would face the consequence of having these discretionary powers removed. Instead, the crisis enabled Secretary Paulson to maneuver far beyond his original mandate. Under the lens of entanglement, this dramatic shift in the direction of the TARP is understandable at least in form. Secretary Paulson's enhanced maneuverability demonstrates a certain understandable preference from the political side

of the exchange. If he had pursued the plan proposed to Congress, he would have implemented a reverse auction, which presumably would have resulted in so-called toxic assets going off the balance sheets of investment banks and on to the balance sheet of the Federal Reserve Board or the U.S. Treasury. Instead, by buying shares of certain financial institutions directly, the Treasury as a political enterprise became further entangled in the affairs of market enterprises by becoming essentially a *shareholder* rather than a *bondholder*. With ownership rights, Treasury as agent for taxpayers and Congress could extend its control by making demands on how TARP-controlled firms would set loan policies and compensate executives. Furthermore, this enabled further discretion over repayment practices.

We make similar observations regarding President Roosevelt and the NRA. Realizing that he was skating on thin constitutional ice, President Roosevelt moved ahead anyway with one of, if not the most, significant restructurings of the U.S. economy to occur before or since. The Great Depression was the galvanizing event, but not the origin of expanded government and commercial entanglement. At the same time, President Roosevelt and his political operatives were prepared for the day when the Court ruled his juggernaut unconstitutional. In a matter of months, key features of the NRA were embodied in congressional action. Key arteries that connect government with major sectors and industries were made a permanent part of the landscape.

This analysis is not meant to suggest that entanglement is initiated only by political entrepreneurs. Market actors are in many cases just as eager to increase their interactions with political enterprises. Such activity falls under the label of “rent-

seeking” and is an unalterable feature of the political marketplace. This observation calls into question at least one element of the argument that crises are purely a result of unrestrained political intervention. It must be recognized that political action can just as easily be initiated from market enterprises as their political counterparts.

Entanglement there surely always will be, much as Hughes (1977) recognized. To some extent, however, the degree and the structure of entanglement can be subject to influence. If we start from an observation of such heart-wrenching financial problems as people losing their homes, it is natural to expect some collective version of the Samaritan’s Dilemma (Buchanan 1975) to come into play. That dilemma can also operate for private persons, of course, and, indeed, this was Buchanan’s original point. But it also intensifies in collective contexts, as Wagner (1989) explained in his extension of Buchanan’s original insight, because individual responsibility weakens in collective settings, much as Caplan (2007) elaborates. Constitutional limits on the size of government or on the allowable range of its activities might mitigate some of the disruptive features of entanglement. We do not think that such entanglement can be eliminated, though, for we see such entanglement rather as an inescapable element of the human condition.

## **Appendix: *Experiment Instructions***

### **Instructions (*PRIME*)**

You are about to participate in an experiment. Please turn off pagers and cellular phones now. It is important that you not talk or in any way try to communicate with other participants during the session. I will read these instructions to you aloud so that everyone can follow along. In addition, you will take a short quiz after these instructions are read to ensure that you understand the rules and procedures for the experiment. What you earn in the experiment depends partly on your decisions, partly on the decisions of others, and partly on chance. You will be paid for your participation in cash privately at the end of the session. If you have a question at any point, please raise your hand and it will be answered privately.

#### **General Instructions**

Once the experiment begins, you will participate in a certain number of matches. Each match in turn consists of a certain number of rounds. After the last match, you will be paid the total amount you have accumulated during the course of the matches in addition to the show-up fee. During the session, you will earn E\$'s. At the end of the experiment, you will receive \$1 for every 50 E\$'s you earn during the course of the experiment.

At the beginning of each match, a computer program will randomly pair you with another person. For convenience, we will call the person you are paired with 'Other'. At the beginning of each match, both you and Other will each receive 50 E\$'s as an endowment. You and Other must then determine how to allocate an additional amount of E\$'s between the two of you. This additional amount of E\$'s consists of 100 E\$'s for each round played within the match. The outcome for each round (and thus the match as a whole) depends solely on your decisions in the first round.

Thus, the total amount of E\$'s depends on the number of rounds within the match, which itself is determined by a continuation probability. The continuation probability is the probability that the match continues to round 2, the probability that round 3 is reached given you are in round 2, and so on. The more rounds, the larger the total amount of E\$'s.

We will use only one continuation probability: 0.75. This probability means that there will be a 75% chance of another round occurring after Round 1. If Round 2 is reached, then there will be a 75% chance of another round occurring after Round 2. If Round 3 is reached, then there will be a 75% chance of another round occurring after Round 3. And

so on. A computer program that uses this continuation probability will determine the total number of rounds for each match. You will be told the actual number of rounds played at the end of each match.

### **How Decisions are Made**

In the first round of each match, you and Other will each make two decisions.

#### *Decision 1:*

In the first decision, you along with Other will determine privately how many tokens you wish to purchase to be used in the second decision. I will explain in a moment how exactly these tokens are used in the second decision. You may choose to purchase anywhere between 0 and 5 tokens (in whole numbers). Each token purchased will reduce your earnings by 10 E\$ for each round it is used in. This will again be further explained momentarily.

Once you and Other have purchased your respective tokens, then the experimenter will notify each of you how many tokens the other person purchased. In other words, you will be told how many tokens Other purchased, and she or he will in turn be told how many tokens you have purchased.

#### *Decision 2:*

After being told how many tokens each of you has purchased, you and Other will each make your second decision. This second decision is used to determine how to allocate the entire sum of E\$'s. You may choose either **Option A** or **Option B**. If both you *and* Other choose **Option A**, then the sum of E\$'s will be divided between you and Other. If either you *or* Other chooses **Option B**, then the sum will go to only one of you.

### **How Earnings are Determined**

#### *Option A:*

If both you and Other choose Option A, then the entire sum of E\$'s will be distributed according to you and Other's investment in tokens. Specifically, this will be distributed according to the following formula:

$$\text{Your share of sum of E\$'s} = \frac{\text{Your tokens}}{\text{Your tokens} + \text{Other's tokens}}$$

In other words, the entire sum of E\$'s will be distributed according to your share of the total tokens purchased by you and Other. For example, if you purchase 3 tokens and Other purchases 2, then under Option A you will receive 60% of the total E\$'s. In the event that you and Other both decide to purchase zero tokens, your and Other's respective shares would each be one-half of the sum of E\$'s since you would have an equal amount of tokens.

Thus, if both you and Other choose Option A in Round 1, then you will earn E\$'s for the round according to the following formula:

$$\text{Your Earnings for Round 1} = \frac{\text{Your tokens}}{\text{Your tokens} + \text{Other's tokens}} \times 100 \text{ E\$'s} - (\text{number of tokens you purchased} \times 10 \text{ E\$'s})$$

Other's earnings are determined in a similar fashion.

$$\text{Other's Earnings for Round 1} = \frac{\text{Other's tokens}}{\text{Your tokens} + \text{Other's tokens}} \times 100 \text{ E\$'s} - (\text{number of tokens Other purchased} \times 10 \text{ E\$'s})$$

Under Option A you will use your tokens in each round played and therefore must pay a purchase price for the use of these tokens in each round. Also under Option A, the outcome for each round will be exactly the same as the outcome for Round 1. In other words, to determine your earnings for the match, simply multiply your earnings in Round 1 times the total number of rounds.

#### *Option B:*

If either you *or* Other chooses Option B, then the entire sum of E\$'s will be distributed according to the following probability:

$$\text{Probability of receiving all E\$'s} = \frac{\text{Your tokens}}{\text{Your tokens} + \text{Other's tokens}}$$

So though Option B uses the same formula  $\frac{\text{Your tokens}}{\text{Your tokens} + \text{Other's tokens}}$ , it is now a probability to determine who will receive *all* of the E\$'s rather than a fraction representing one's *share* of the E\$'s. The person who receives the entire sum of E\$'s will be determined by a computer program that uses the above probability.

To illustrate this option using the same example as above, if you purchase 3 tokens and Other purchases 2, then under Option B you will have a 60% chance of receiving all E\$'s for the match. In the event that you both choose to purchase zero tokens, your and Other's respective probabilities would each be 50% since you would have an equal amount of tokens.



If you receive the E\$'s in Round 1, then your earnings for Round 1 will be determined by the following formula:

$$\text{Your Earnings for Round 1} = 100 \text{ E\$'s} - (\text{number of tokens you purchased} \times 10 \text{ E\$'s}) - (\text{number of total tokens purchased by you and Other} \times 10 \text{ E\$'s})$$

Your earnings for each additional round will be determined as follows:

$$\text{Your Earnings for each additional round} = 100 \text{ E\$'s} - (\text{number of total tokens purchased by you and Other} \times 10 \text{ E\$'s})$$

In the case that you receive the E\$'s in Round 1, Other will have to pay out of his or her endowment the number of tokens she or he purchased times 10 E\$'s for Round 1 only. Other will not receive any earnings for any subsequent round.

If Other receives the E\$'s in Round 1, then the opposite occurs with Other's earnings determined by the following formula for the first round:

$$\text{Other's Earnings for Round 1} = 100 \text{ E\$'s} - (\text{number of tokens Other purchased} \times 10 \text{ E\$'s}) - (\text{number of total tokens purchased by you and Other} \times 10 \text{ E\$'s})$$

And as follows for each additional round:

$$\text{Other's Earnings for additional rounds} = 100 \text{ E\$'s} - (\text{number of total tokens purchased by you and Other} \times 10 \text{ E\$'s})$$

In the case that Other receives the E\$'s in Round 1, you will have to pay out of your endowment the number of tokens you purchased times 10 E\$'s for Round 1 only. You will not receive any earnings for any additional round.

Thus under Option B, tokens are only used in Round 1 so the purchase price must be paid by you and Other in Round 1 only. However, under Option B, an additional amount equal to the total number of tokens purchased by both you and Other in Round 1 times 10 E\$'s is removed from the 100 E\$'s in *each* round including Round 1.

Finally, the results of each match will be given to you by the experimenter after the match ends. We will notify you of your total earnings for the match and the total number of rounds that were played in the match. In the event that your earnings are negative for the match, we will automatically round your earnings up to \$0. Your earnings in each match will in no way affect your earnings in any other match.

You will keep these instructions throughout the session as a reminder of how E\$'s are allocated.

Any questions?

I will now pass out a short quiz to ensure that you understand these instructions. After a few minutes, I will come by and give you an answer sheet that contains answers with explanations for each question. Please verify your answers privately. After you have verified your answers, the experiment will begin.

### **Additional Instructions**

We are now going to alter the way earnings are determined so please pay close attention. Starting this match, any tokens purchased will now cost 30 E\$'s. This changes the way earnings are determined as follows. Note that these changes are also highlighted for your convenience.

#### **How Earnings are Determined**

*Option A:*

If both you and Other choose Option A in Round 1, then you will earn E\$'s for the round according to the following formula:

$$\text{Your Earnings for Round 1} = \frac{\text{Your tokens}}{\text{Your tokens} + \text{Other's tokens}} \times 100 \text{ E\$'s} - (\text{number of tokens you purchased} \times 30 \text{ E\$'s})$$

Other's earnings are determined in a similar fashion.

$$\text{Other's Earnings for Round 1} = \frac{\text{Other's tokens}}{\text{Your tokens} + \text{Other's tokens}} \times 100 \text{ E\$'s} - (\text{number of tokens Other purchased} \times 30 \text{ E\$'s})$$

*Option B:*

If you receive the E\$'s in Round 1, then your earnings for Round 1 will be determined by the following formula:

$$\text{Your Earnings for Round 1} = 100 \text{ E\$'s} - (\text{number of tokens you purchased} \times 30 \text{ E\$'s}) - (\text{number of total tokens purchased by you and Other} \times 10 \text{ E\$'s})$$

Your earnings for each additional round will be determined as follows:

Your Earnings for each additional round =  $100 \text{ E\$'s} - (\text{number of total tokens purchased by you and Other} \times 10 \text{ E\$'s})$

In the case that you receive the E\$'s in Round 1, Other will have to pay out of his or her endowment the number of tokens she or he purchased times 30 E\$'s for Round 1 only. Other will not receive any earnings for any subsequent round.

If Other receives the E\$'s in Round 1, then the opposite occurs with Other's earnings determined by the following formula for the first round:

Other's Earnings for Round 1 =  $100 \text{ E\$'s} - (\text{number of tokens Other purchased} \times 30 \text{ E\$'s}) - (\text{number of total tokens purchased by you and Other} \times 10 \text{ E\$'s})$

And as follows for each additional round:

Other's Earnings for additional rounds =  $100 \text{ E\$'s} - (\text{number of total tokens purchased by you and Other} \times 10 \text{ E\$'s})$

In the case that Other receives the E\$'s in Round 1, you will have to pay out of your endowment the number of tokens you purchased times 30 E\$'s for Round 1 only. You will not receive any earnings for any additional round.

All other features of the experiment such as your endowment and the number of tokens available for you to purchase are the same. Any questions?

## **Instructions (*BASE*)**

You are about to participate in an experiment. Please turn off pagers and cellular phones now. It is important that you not talk or in any way try to communicate with other participants during the session. I will read these instructions to you aloud so that everyone can follow along. In addition, you will take a short quiz after these instructions are read to ensure that you understand the rules and procedures for the experiment. What you earn in the experiment depends partly on your decisions, partly on the decisions of others, and partly on chance. You will be paid for your participation in cash, privately at the end of the session. If you have a question at any point, please raise your hand and it will be answered privately.

### **General Instructions**

Once the experiment begins, you will participate in a certain number of matches. Each match in turn consists of a certain number of rounds. After the last match, you will be paid the total amount you have accumulated during the course of the matches in addition to the show-up fee. During the session, you will earn E\$'s. At the end of the experiment, you will receive \$1 for every 50 E\$'s you earn during the course of the experiment.

At the beginning of each match, a computer program will randomly pair you with another person. For convenience, we will call the person you are paired with 'Other'. At the beginning of each match, both you and Other will each receive 50 E\$'s as an endowment. You and Other must then determine how to allocate an additional amount of E\$'s between the two of you. This additional amount of E\$'s consists of 100 E\$'s for each round played within the match. The outcome for each round (and thus the match as a whole) depends solely on your decisions in the first round.

Thus, the total amount of E\$'s depends on the number of rounds within the match, which itself is determined by a continuation probability. The continuation probability is the probability that the match continues to round 2, the probability that round 3 is reached given you are in round 2, and so on. The more rounds, the larger the total amount of E\$'s.

We will use only one continuation probability: 0.75. This probability means that there will be a 75% chance of another round occurring after Round 1. If Round 2 is reached, then there will be a 75% chance of another round occurring after Round 2. If Round 3 is reached, then there will be a 75% chance of another round occurring after Round 3. And so on. A computer program that uses this continuation probability will determine the total number of rounds for each match. You will be told the actual number of rounds played at the end of each match.

## How Decisions are Made

In the first round of each match, you and Other will each make two decisions.

### *Decision 1:*

In the first decision, you along with Other will determine privately how many tokens you wish to purchase to be used in the second decision. I will explain in a moment how exactly these tokens are used in the second decision. You may choose to purchase anywhere between 0 and 5 tokens (in whole numbers). Each token purchased will reduce your earnings by 10 E\$'s for each round it is used in. This will again be further explained momentarily.

Once you and Other have purchased your respective tokens, then the experimenter will notify each of you how many tokens the other person purchased. In other words, you will be told how many tokens Other purchased, and she or he will in turn be told how many tokens you have purchased.

### *Decision 2:*

After being told how many tokens each of you has purchased, you and Other will each make your second decision. This second decision is used to determine how to allocate the entire sum of E\$'s. You may choose either **Option A** or **Option B**. If both you *and* Other choose **Option A**, then the sum of E\$'s will be divided between you and Other. If either you *or* Other chooses **Option B**, then the sum will go to only one of you.

## How Earnings are Determined

### *Option A:*

If both you and Other choose Option A, then the entire sum of E\$'s will be distributed according to you and Other's investment in tokens. Specifically, this will be distributed according to the following formula:

$$\text{Your share of sum of E\$'s} = \frac{\text{Your tokens}}{\text{Your tokens} + \text{Other's tokens}}$$

In other words, the entire sum of E\$'s will be distributed according to your share of the total tokens purchased by you and Other. For example, if you purchase 3 tokens and Other purchases 2, then under Option A you will receive 60% of the total E\$'s. In the event that you and Other both decide to purchase zero tokens, your and Other's

respective shares would each be one-half of the sum of E\$'s since you would have an equal amount of tokens.

Thus, if both you and Other choose Option A in Round 1, then you will earn E\$'s for the round according to the following formula:

$$\text{Your Earnings for Round 1} = \frac{\text{Your tokens}}{\text{Your tokens} + \text{Other's tokens}} \times 100 \text{ E\$'s} - (\text{number of tokens you purchased} \times 10 \text{ E\$'s})$$

Other's earnings are determined in a similar fashion.

$$\text{Other's Earnings for Round 1} = \frac{\text{Other's tokens}}{\text{Your tokens} + \text{Other's tokens}} \times 100 \text{ E\$'s} - (\text{number of tokens Other purchased} \times 10 \text{ E\$'s})$$

Under Option A you will use your tokens in each round played and therefore must pay a purchase price for the use of these tokens in each round. Also under Option A, the outcome for each round will be exactly the same as the outcome for Round 1. In other words, to determine your earnings for the match, simply multiply your earnings in Round 1 times the total number of rounds.

#### *Option B:*

If either you *or* Other chooses Option B, then the entire sum of E\$'s will be distributed according to the following probability:

$$\text{Probability of receiving all E\$'s} = \frac{\text{Your tokens}}{\text{Your tokens} + \text{Other's tokens}}$$

So though Option B uses the same formula  $\frac{\text{Your tokens}}{\text{Your tokens} + \text{Other's tokens}}$ , it is now a probability to determine who will receive *all* of the E\$'s rather than a fraction representing one's *share* of the E\$'s. The person who receives the entire sum of E\$'s will be determined by a computer program that uses the above probability.

To illustrate this option using the same example as above, if you purchase 3 tokens and Other purchases 2, then under Option B you will have a 60% chance of receiving all E\$'s for the match. In the event that you both choose to purchase zero tokens, your and Other's respective probabilities would each be 50% since you would have an equal amount of tokens.

If you receive the E\$'s in Round 1, then your earnings for Round 1 will be determined by the following formula:

Your Earnings for Round 1 =  $100 \text{ E\$'s} - (\text{number of tokens you purchased} \times 10 \text{ E\$'s}) - 10 \text{ E\$'s}$

Your earnings for each additional round will be determined as follows:

Your Earnings for each additional round =  $100 \text{ E\$'s} - 10 \text{ E\$'s}$   
In the case that you receive the E\$'s in Round 1, Other will have to pay out of his or her endowment the number of tokens she or he purchased times 10 E\$'s for Round 1 only. Other will not receive any earnings for any subsequent round.

If Other receives the E\$'s in Round 1, then the opposite occurs with Other's earnings determined by the following formula for the first round:

Other's Earnings for Round 1 =  $100 \text{ E\$'s} - (\text{number of tokens Other purchased} \times 10 \text{ E\$'s}) - 10 \text{ E\$'s}$

And as follows for each additional round:

Other's Earnings for additional rounds =  $100 \text{ E\$'s} - 10 \text{ E\$'s}$

In the case that Other receives the E\$'s in Round 1, you will have to pay out of your endowment the number of tokens you purchased times 10 E\$'s for Round 1 only. You will not receive any earnings for any additional round.

Thus under Option B, tokens are only used in Round 1 so the purchase price must be paid by you and Other in Round 1 only. However, under Option B, an additional amount equal to 10 E\$'s is removed from the 100 E\$'s in *each* round including Round 1.

Finally, the results of each match will be given to you by the experimenter after the match ends. We will notify you of your total earnings for the match and the total number of rounds that were played in the match. In the event that your earnings are negative for the match, we will automatically round your earnings up to \$0. Your earnings in each match will in no way affect your earnings in any other match.

You will keep these instructions throughout the session as a reminder of how E\$'s are allocated.

Any questions?

I will now pass out a short quiz to ensure that you understand these instructions. After a few minutes, I will come by and give you an answer sheet that contains answers with explanations for each question. Please verify your answers privately. After you have verified your answers, the experiment will begin.

We are now going to alter the way earnings are determined so please pay close attention. Starting this match, any tokens purchased will now cost 30 E\$'s. This changes the way earnings are determined as follows. Note that these changes are also highlighted for your convenience.

### **How Earnings are Determined**

#### *Option A:*

If both you and Other choose Option A in Round 1, then you will earn E\$'s for the round according to the following formula:

$$\text{Your Earnings for Round 1} = \frac{\text{Your tokens}}{\text{Your tokens} + \text{Other's tokens}} \times 100 \text{ E\$'s} - (\text{number of tokens you purchased} \times 30 \text{ E\$'s})$$

Other's earnings are determined in a similar fashion.

$$\text{Other's Earnings for Round 1} = \frac{\text{Other's tokens}}{\text{Your tokens} + \text{Other's tokens}} \times 100 \text{ E\$'s} - (\text{number of tokens Other purchased} \times 30 \text{ E\$'s})$$

#### *Option B:*

If you receive the E\$'s in Round 1, then your earnings for Round 1 will be determined by the following formula:

$$\text{Your Earnings for Round 1} = 100 \text{ E\$'s} - (\text{number of tokens you purchased} \times 30 \text{ E\$'s}) - 10 \text{ E\$'s}$$

Your earnings for each additional round will be determined as follows:

$$\text{Your Earnings for each additional round} = 100 \text{ E\$'s} - 10 \text{ E\$'s}$$

In the case that you receive the E\$'s in Round 1, Other will have to pay out of his or her endowment the number of tokens she or he purchased times 30 E\$'s for Round 1 only. Other will not receive any earnings for any subsequent round.

If Other receives the E\$'s in Round 1, then the opposite occurs with Other's earnings determined by the following formula for the first round:

$$\text{Other's Earnings for Round 1} = 100 \text{ E\$'s} - (\text{number of tokens Other purchased} \times 30 \text{ E\$'s}) - 10 \text{ E\$'s}$$



And as follows for each additional round:

$$\text{Other's Earnings for additional rounds} = 100 \text{ E\$'s} - 10 \text{ E\$'s}$$

In the case that Other receives the E\$'s in Round 1, you will have to pay out of your endowment the number of tokens you purchased times 10 E\$'s for Round 1 only. You will not receive any earnings for any additional round.

All other features of the experiment such as your endowment and the number of tokens available for you to purchase are the same. Any questions?

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## CURRICULUM VITAE

Adam Smith was born in Orangeburg, SC, a town known for its good barbecue and fried okra. His parents soon moved to Anderson, SC, where he lived for the next 15 years. In 2001, he set off to Winthrop University, which is located just south of Charlotte. There he became very interested in questions of political economy. In addition to his major in economics, he minored in three areas: math, political science, and music. He also met his future wife Nikki at Winthrop.

After taking a year off to work at a polling research lab at Winthrop, he began his graduate studies in economics at George Mason University. There he became immersed in the writings of James Buchanan, Vernon Smith, Gordon Tullock, Armen Alchian, and Douglass North. He has used these scholars as a template for his own work, which involves among other things experimental applications of questions in political economy.

His work largely explores the economics of decision-making when no external enforcement is readily available. Though this area is most commonly referred as studies in “anarchy,” he sees it as a means to explore the innate cooperative tendencies that undergird our legal and political institutions. His research also includes work on the recent economic crisis of 2008-2010 and more specifically the development of the Troubled Assets Relief Program.

Currently, he is an adjunct professor of economics at Johnson & Wales University in Charlotte, NC and resides in Fort Mill, SC.