Guns, Lawyers, and Markets: What Conflict Implies for Economics*

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SUMMARY: We argue that conflict is a fundamental economic phenomenon with implications that have received insufficient attention in economics. We define conflict as interactions in which parties choose costly inputs that are adversarially combined against one another — distinct from the collaborative input combinations typical in economic models. We make four key contributions: First, we demonstrate that conflict induces economically significant costs that considerably exceed estimates of traditional deadweight costs. Second, we show how incorporating conflict into economic models leads to substantially different predictions than traditional models — including inverse relationships between compensation and productivity; distortions in comparative advantage; prices determined by power rather than solely by preferences, endowments, and technology. Third, we explain how these costs vary across contexts based on property rights protection, state capacity, and cultural norms. Fourth, attributes of modern states such as centralization in the presence of law, checks and balances, other forms of distributed power, and the bureaucratic form of organization can partly be thought of as restraining conflict and appropriation, with implications for governance and economic development. Overall, in the presence of conflict and appropriation, power considerations cannot be separated from economics, and first-best models are not empirically plausible. The specific distortions from conflict have a different structure than those from taxation or externalities, and require distinct modeling tools and policy responses.

Keywords: Conflict, appropriation, security, property rights, power, the modern state, lobbying, contests

JEL codes: A12, D30, D51, D61, D72, D74, F51, K00, P00

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> The first of economics is that every agent is actuated only by self-interest. The workings of this principle may be viewed under two aspects, according as the agent acts without or with, the consent of others affected by his actions. In wide senses, the first species of action may be called war; the second, contract.

Edgeworth, *Mathematical Psychics,* 1881 (pp.16,17)

> "[T]he efforts of men are utilized in two different ways: they are directed to the production or transformation of economic goods, or else to appropriation of goods produced by others.

Vilfredo Pareto, *Manual of Political Economy,* 1906 [1971, p. 341]

1 Introduction

Despite Edgeworth's or Pareto's references to "war" and "appropriation" as central aspects of economic behavior, the dark side of self-interest has not had a place in the paradigm that Edgeworth helped develop and which has dominated economics for more than a century. Arming, fighting, stealing, defending, rioting, resisting, or protesting have had no place in economic modeling as an integral part of the economy. Moreover, non-violent forms of conflict such as lobbying, rent-seeking, or litigating can have similar characteristics and effects to those of violent conflict.

Although there have been areas of research that have emphasized the economic approach to crime or conflict, the feedback from these activities as generic *economic* activities that affect resource allocation in any systematic way has had virtually no influence on the thinking of economists and on economic policy. Instead, over the past century, political scientists and public policy analysts have had the monopoly in integrating economics and security concerns into social-scientific analyses.[1]

We define *conflict* to involve interactions in which two or more parties choose costly inputs that (i) are adversarially combined against one another. Condition (i) is fundamentally different from the collaborative combination of inputs that are usually considered in economics through production functions or utility functions. Arming by adversaries is one stark example of the adversarial combination of inputs, but is far from being the only one as conflict can take non-violent forms. The expenditures on lobbying and rent-seeking by political adversaries, pure influence activities in organizations, or legal expenditures by litigants are other examples of such adversarial combinations of inputs.

Furthermore, we can define *pure conflict* to involve interactions in which two or more parties choose costly inputs that in addition to satisfying (i) also satisfy condition (ii): there are no positive externalities on third parties. Condition (ii) in the definition does not allow efforts to play any socially productive role, and for the cases where this approximately holds, it is useful for making welfare comparisons.

Examples that satisfy condition (i) but not condition (ii) include tournaments within organizations, sports contests, and other interactions. For tournaments in organizations,

[1]For example, the field of International Political Economy that integrates issues of trade policy with international security concerns is a recognized and important field of political science proper (for an overview, see Gilpin, 2001). There is however, no similar field in economics and the integration of security concerns with trade policy is barely recognized as an issue worthy of concern within the profession. In view of recent geopolitical developments, economists have started paying attention to a new area called geoeconomics (see Thoenig, 2024)

one employee's higher level of effort might increase that employee's probability of successful promotion and lower the probability of promotion of other employees and therefore efforts could be considered adversarial and satisfy condition (i). Yet that effort, to the extent that it is productive, contributes to the organization output so as not to satisfy condition (ii). Likewise, in sports, athletes and teams exert effort against one another, but the level of effort affects the quality of the game or match for the enjoyment of the sports audience, which is external to athletes and teams.

Our definition of pure conflict could apply to civil and international wars, lower-levels of domestic conflict, crime and crime-fighting, as well as to any situation in which there is arming or other costly input expenditure without necessarily having any active warfare or overt conflict.[2] In addition, some economic environments of non-violent conflict to the extent that involve adversarial activities like litigation and lobbying, but do not have too large positive externalities relative to their costs, could be considered to follow similar principles as well. Such cases of non-violent conflict, which are important for modern economic activity, involve to a great extent, expenditures on resources that attempt to persuade one or more decision-making actors. For instance, in the case of litigation, the litigants attempt to persuade a judge or members of a jury whereas in the case of lobbying, lobbyists produce arguments to persuade politicians, their staff, administrators, or the general public.[3]

As suggested by Edgeworth's quote above, conflict follows directly from the methodological principle of self-interest, a principle widely adhered to in modern economics. When espousing that principle, the complete absence of conflict - in the sense that we have defined as the absence the adversarial combination of costly inputs - is a strong assumption to make about empirical reality. Nevertheless, that assumption is rarely invoked explicitly or even consciously acknowledged, except in the guise of perfect and costless enforcement of property rights (or "Nirvana," to use Demsetz's (1969) colorful term). Given, as we shall see, the large economic costs of enforcement, the question then emerges of whether this assumption of perfect and costless enforcement of property rights is inconsequential for resource allocation.

In this work we synthesize a diverse set of research contributions about the implications of costly conflict for how actual economies functions and for the practice of economics as a social science. It is not an overview of the economics of conflict or other related literature; that would be a different and, perhaps, much bigger task. Rather we focus on some key issues that have implications both for the practice of economics and for the strong tendency to employ solely economic factors in order to explain economic phenomena, without their political context.

First, we show that conflict induces costs that are economically very significant, far exceeding estimates of the deadweight cost of taxation and trade protection. These costs can be thought to be induced in the case of violent conflicts by insecure property rights. Even when property rights are thought to be reasonably secure, however, their enforcement by the state and by citizens is expensive and therefore economically significant that may not just be considered "frictions." The fact that deadweight costs and the distortions

[2]Violent conflict can have positive external effects that we discuss in section 8.

[3]It is in general difficult to find any economic activity that does not involve some positive or negative externalities. Litigation and lobbying do have a positive effect on the discovery of *the truth* that usually has social value. However, as discussed in detail in Oreskes and Conway (2010) (in the context of lobbying efforts by tobacco and fossil fuel industry), it can also induce ignorance through deliberate production of misinformation. This is one reason that in this work, we do not dwell much on the welfare effects of non-violent forms of conflict, although we discuss some implications and open issues in section 8.

that they may induce are exhaustively analyzed in our teaching of economics, as well as in much of our research, should make us at least as interested in the economic effects and possible distortions induced by the costs of conflict.

Second, conceptualizing conflict within an economic framework leads to different findings and predictions than those derived in the absence of conflict. In particular, by incorporating conflict through straightforward extensions of basic models of exchange, it can be seen that compensation can easily be inversely related to marginal productivity; prices depend on relative power (the costly inputs to conflict), as well as on preferences and endowments; exchange itself can be foreclosed by enforcement costs; the costs of enforcement themselves critically depend on norms of behavior and bargaining; and, comparative advantage can be significantly distorted in the presence of conflict. Overall, in the presence of conflict, Nirvana or first-best models are not empirically plausible. Assuming perfect and costless enforcement of property rights in addition to other assumptions of Arrow-Debreu-type models are hardly helpful in conceptualizing the economy. From a practical perspective, the Theorem of the Second Best (Lipsey and Lancaster, 1956) is much more relevant than the first and second theorems of welfare economics. The specific distortions from conflict are considerably different from those induced by taxation, trade protection, externalities, or public goods, and require distinct ways of conceptualizing, modeling, and recommending policies.

Third, we demonstrate why the costs of conflict can vary significantly across time and space. They depend on the degree of legal protection, on state capacity and governance in general, as well as on cultural factors such as norms. These factors can significantly reduce the costs of conflict in ways that can make a large difference in economic outcomes.

Fourth, controlling and governing conflict are thus important activities as well, and that leads to some consequences about the relevance of political institutions for economics. In particular, the modern state as it emerged and evolved over more than two centuries, has features that appear to provide controls to limit conflict and facilitate economic development. Checks and balances, rule-and-law-based governance, and other features of modern states allow reasonable long-term commitment to property security and limit conflict within the jurisdiction of the state. Pre-modern states, with their greater reliance on persons - especially that of the ruler - have difficulties making long-term commitments and reducing conflict; even the notion that the state should have the monopoly of violence did not become normalized until modern times. Modern governance appears better suited to at least partially control the dark side of self-interest.

The main arguments developed in this work arise from the theoretical and empirical literatures on conflict. However, its implications go way beyond that literature and are related to at least two other broad areas of research within economics. One area of research has emphasized the central role of transaction costs and institutions in the economy (see, e.g., North, 1990, or Coase, 1992). Although the term "transaction costs" has been widely used, it has rarely been modelled or identified in concrete cases. The costs of conflict, appropriation, and enforcement that we examine and model in this work are important components of such transaction costs. A major theme pursued here is how different institutions, governance, or norms induce different transaction costs and affect welfare and efficiency in ways that are very different from those predicted by first-best Nirvana models, in which there are zero transaction costs. The project of examining a world with positive transaction costs is one that Coase had emphasized as important (eg. Coase, 1992) but for which there was scarcely any follow-up.

The second area of complementary research is work on institutions and economic

performance that has emphasized the crucial role of power (Olson, 2000, Moe, 2005) and conflict (Bowles and Gintis, 1993, Acemoglu, Johnson, and Robinson, 2005, Besley and Persson, 2011). Perhaps even more than such research, we emphasize the quantitative significance and central importance of the costs of conflict and appropriation, even in rich countries with the most highly evolved state institutions. That is, even in modern economies the costs of (mostly non-violent) conflict are important enough so that markets cannot be viewed in isolation from such costs and the particular governance arrangements. As Harcourt (2011) has demonstrated even the markets facilitated by the Chicago Board of Trade that we might consider as quintessentially "free" are governed by very detailed and numerous regulations about the place and time of transactions, the identity of the traders, and myriad other matters that depend both on the legal system and the private rules of the organization in question, with the private rules themselves partly depending on the legal system as well. Modern, impersonal markets can hardly exist without costly governance, whether public or privately-arranged. And, this is true because in the absence of such governance, the conflict costs would likely be even higher and high enough in some cases so as to foreclose the existence of many markets that exist under what some might consider seemingly high levels of regulation and governance.

In the next section we provide some basic theoretical underpinning of conflict as the adversarial combination of inputs. In section 3 we provide evidence on the high empirical relevance of conflict, especially in comparison with the costs typically associated with economic distortions. Section 4 shows how prices and incomes depend on the level of security and how international trade and security considerations are related. In section 5 we present a model in which marginal productivity and compensation are inversely related and how this can have empirical relevance. In section 6 we review a simple model that demonstrates how the costs of conflict vary with governance and norms. In section 7 we argue that some key functions of the modern state play an important role in increasing security and facilitating economic exchange and production. Section 8 offers some implications of conflict for economics and discusses some open issues.. We conclude in section 9.

2 Conceptualizing Conflict as the Adversarial Combination of Inputs

The main attribute of our definition of conflict is the adversarial combination of inputs. Since inputs in ordinary production functions are typically combined cooperatively, such functions cannot accommodate the inputs to conflict. We thus briefly describe here approaches to conceptualizing functions that allow for the adversarial combination of inputs.

We can think of two categories of inputs, depending on the type of conflict - violent or non-violent. For cases of violent conflict, the main category of inputs that actors can command is the *capacity to inflict violence*, from having knives and swords to fifth-generation fighters and nuclear weapons. For cases of non-violent conflict, one important category of inputs that actors may have at their disposal could well be described as the *capacity to persuade.* This way we can encompass in non-violent conflict diverse activities such as lobbying, litigation, influence activities within organizations, or political campaigning.

In stark settings like war, the main possible outcomes of conflict are wins and losses.

These outcomes can be considered probabilistic, as functions of the inputs expended by the adversaries. Peace settlements or cold wars under the threat of hot wars are typical outcomes as well, as we will discuss later. However, what could occur in the case of a hot war affects both the bargaining power and the outwardly peaceful outcomes of a settlement or a cold war. Similarly, in cases of influence or lobbying, the outcomes of all-out competition between adversaries are wins or losses, but compromises often take place as well. Nevertheless, any compromise would ultimately depend on the adversaries' expenditures on influence and lobbying, just as peaceful settlements of potential enemies would at least partly depend on their arming expenditures.

The functions that translate conflictual inputs in probabilities of wins and losses have been described as "technologies of conflict" (Hirshleifer, 1989), rent-seeking functions (Tullock, 1980), or in general as contest success functions or, simply, contest functions (Konrad, 2009, Jia et. al., 2013).[4] To define such functions, consider two adversaries, labelled A and B, and denote their choice of input (or effort) levels as g_a and g_b. For any given combination of effort levels, we can expect each party to have a probability of winning and a probability of losing. Denote the probability of party A winning as $q_a(g_a,g_b)$ and the probability of party B winning as $q_b(g_a,g_b)$.

For these to be probabilities, they need to take values between 0 and 1, and add up to 1, or that $q_b(g_a,g_b) = 1- q_a(g_a,g_b)$. Moreover, we can expect an increase in one party's level of effort to increase that party's winning probability and reduce the winning probability of his opponent; that is, we should have $q_a(g_a,g_b)$ be increasing in g_a and decreasing in g_b.

A wide class of functional forms that has been examined is the following additive form:

$$q_a(g_a, g_b) = \frac{f_a(g_a)}{f_a(g_a) + f_b(g_b)} \tag{1}$$

provided g_a or g_b is positive and where $f_i(\cdot), i = a, b$ is a non-negative, increasing function with $f_i(0) = 0, f_i' > 0$ and $f_i'' \leq 0$. A popular variant of such a functional form is one where $f_a(g_a) = \psi.g_a^m$ and $f_b(g_b) = (1 - \psi).g_b^m$ where $\psi \in (0, 1)$. With this, party A's win probability is given by:

$$q_a(g_a, g_b) = \frac{\psi.g_a^m}{\psi.g_a^m + (1 - \psi).g_b^m} \tag{2}$$

In the above expression, $m > 0$ is referred to as "mass effect" parameter which captures the decisiveness of conflict efforts. It is typically assumed that $m \leq 1$ to ensure the existence of pure-strategy Nash equilibrium. Also observe that if $\psi = \frac{1}{2}$, then the contest is symmetric so that $q_a = q_b$ if $g_a = g_b$. However, when $\psi \neq \frac{1}{2}$, then the contest is asymmetric. If $\psi < \frac{1}{2}$, then party B is favored, as when both A and B exert equal effort ($g_a = g_b$), A's win probability is lower than B's ($q_a < q_b$). Similarly, if $\psi > \frac{1}{2}$, then A is favored, since $g_a = g_b$ implies $q_a > q_b$. If $g_a = g_b = 0$, then $q_a = \psi$. For violent conflicts, $\psi > \frac{1}{2}$ can be interpreted as a parameter capturing an edge to party A due to military technological superiority or some other innate advantage such as favorable geography. For most of the work, we will mainly refer to violent forms of conflict and in doing so, we will be using such functions for the rest of this manuscript. For the greater part, for

[4]Probably the first economist to use such functions, as well as introducing conflict in general equilibrium, is Haavelmo (1954) More recent approaches and overviews include Hirshleifer (1988, 2001), Skaperdas (1992), Garfinkel (1994), Anderton et. al. (1999), Esteban and Ray (1999), and Garfinkel and Skaperdas (2007).

simplicity we will assume symmetry ($\psi = \frac{1}{2}$) and $m = 1$. With these assumptions, party A's win probability simplifies to:

$$q_a(g_a, g_b) = \frac{g_a}{g_a + g_b} \tag{3}$$

We also note that such win-probabilities can be conceptualized to capture the outcomes of non-violent forms of conflict such as litigation or lobbying. In this context, it can sometimes be convenient to think of the expenditures as comprising of both long-term components or "capital" ($K_i, i = a, b$) (such as funding of think-tanks, buildings and permanent staff), as well as ongoing expenditures or "labor" ($L_i, i = a, b$) (such as hiring lawyers and lobbyists for specific disputes or issues). These can be thought as inputs towards producing evidence or arguments in a party's favor. The evidence production process can be either stochastic or deterministic. A convenient representation of deterministic evidence production process $f_i, i = a, b$ can take the following form:

$$f_a(K_a, L_a) = \psi(f(K_a, L_a))^m \tag{4}$$

$$f_b(K_b, L_b) = (1 - \psi)(f(K_b, L_b))^m \tag{5}$$

In the above functions, m captures the sensitivity of evidence production to resources invested. As discussed earlier, the parameter ψ captures an advantage or a disadvantage in the production process for party a depending on whether $\psi > \frac{1}{2}$ or $\psi < \frac{1}{2}$. If the evidence production process is geared towards the discovery of truth, then one can think of the party arguing for the truth or closer to public interest as having the advantage. That is, $\psi > \frac{1}{2}$ if a argues for the truth and the closer it is to 1, the easier is to prove the truth. In cases of property rights disputes or other litigation, ψ could be thought as representing the court's discriminatory power in judging the correctness of competing claims. With such a representation, under some assumptions (as discussed in Skaperdas and Vaidya, 2012), the win-probability in a contest of persuasion can take the following intuitive form:

$$q_a((K_a, L_a), (K_b, L_b)) = \frac{\pi\psi(f(K_a, L_a))^m}{\pi\psi(f(K_a, L_a))^m + (1 - \pi)(1 - \psi)(f(K_b, L_b))^m} \tag{6}$$

In above function, π can capture a decision's maker's cognitive bias, such as their prior about the correctness of party A's stance. Hence $\pi > \frac{1}{2}$ would represent a cognitive bias in the decision making process in favor of party A.[5] The above functional form provides an intuitive representation of the various drivers in determining odds of success in a non-violent contest of arguments. It indicates that (i) both long-term and short-term investment of resources (ii) the discriminatory nature of the evidence production process and (iii) cognitive bias of the decision-maker all impact the win probability of each party.[6]

[5]Such a bias need not be aligned with the party arguing for the truth or the public interest. Kwak (2013) and Carpenter (2013) discuss "cultural capture" of the regulators by the finance sector and pharmaceuticals industry whereby the regulators views, rather than remaining independent, became intellectually aligned with those of the regulated. Hence the set up allows for the possibility that a well-resourced party which is favored cognitively by the decision maker can have an advantage over a party arguing for the truth or public interest. Issues of cognitive capture of regulators are likely to be even more important than in the past with respect to the framework that will develop for the regulation of AI as discussed in Carvalho (2025). Skaperdas and Vaidya (2025) models how such frameworks can deviate significantly - even be orthogonal - to the desires of the majority.

[6]The win probabilities from a contest of persuasion can also take alternative forms under different sets of assumptions as discussed further in Skaperdas and Vaidya (2012).

3 Are the costs of conflict just "frictions"?

> Every gun that is made, every warship launched, every rocket fired signifies, in the final sense, a theft from those who hunger and are not fed, those who are cold and are not clothed. This world in arms is not spending money alone. It is spending the sweat of its laborers, the genius of its scientists, the hope of its children... This is not a way of life at all, in any true sense. Under the cloud of threatening war, it is humanity hanging from a cross of iron.
>
> US President Dwight Eisenhower (from 1953 speech)

In economics teaching and research, a theoretically important source of inefficiency is that of *deadweight* costs which are associated with interventions such as taxation and trade protection. Students even in principles of economics courses learn about *Harberger* triangles -measures of deadweight costs - as a fundamental source of economic inefficiency. This is repeated through all levels of economics education and is emphasized in research fields such as public finance and international trade. However, since Harberger (1964), estimates of the size of deadweight costs have been found to be surprisingly low. Currently, estimates of the cost of taxation range between 0.5 percent and 2.48 percent of GDP whereas estimates of the cost of trade restrictions range between 0.01 percent and 0.2 percent of GDP.[7]

Stiglitz and Bilmes (2012) estimated the cost of the Iraq and Afghanistan wars to the US alone - not to the Iraqis and Afghanis - to be between 4 and 6 trillion dollars, which a quarter to 40 percent of US GDP at the time of the estimate.[8] This one small example of the costs of a particular war. In this section we provide examples of costs associated with conflict and appropriation. We show that, by any measure, the costs of conflict far exceed those estimates of deadweight costs and, therefore, the costs of conflict cannot be dismissed as simple "frictions" that are inconsequential to the functioning of the economy. The types of conflict that exist - and their associated costs - are pervasive, diverse, and embedded in many parts of the economy. We review different types of conflict and provide samples of their economic costs that have been examined in the vast related literature. However, our approach is neither comprehensive nor exhaustive and we do not seek to review all the relevant literature. Our objective is to show some areas in which the costs of conflict are quantitatively significant and, therefore, of their empirical relevance for economics.

We review the costs of conflict at two broad levels: first, at the level of international and transnational conflict, encompassing military expenditures, interstate wars,

[7] In his pioneering work, Harberger (1964) estimated the deadweight loss from personal income taxation in the USA to be approximately 0.5% of GNP based on labour supply elasticity. Feldstein (1999) measured deadweight loss of personal income tax based on taxable income elasticity (taking into account all behavioral responses that affect reported taxable income) and produced a much larger estimate of 2.48 percent of GDP. He estimated the marginal excess burden of a proportional increase in all personal income tax rates to be \$2 per \$1 of revenue raised. Subsequent literature, as noted by Saez et. al. (2012), have formed a consensus around much lower measures of marginal excess burden of taxation, approximating to about \$0.195 per dollar of revenue raised by a proportionate increase in all personal income tax rates and \$0.34 for every extra dollar raised from increasing the tax rate of the top 1% of the income bracket. Irwin (2020) provides a historical perspective on the costs of trade protection and notes that the contemporary estimates of the deadweight loss from trade restrictions typically range from 0.01% to 0.2% of GDP.

[8] Since these estimates are a stock, not a flow one would have to use a discount rate to convert them into perpetual flow costs. Using a 5 percent discount rate would then convert these estimate between 1.25 and 2 percent of GDP.

and cross-border resource contestation; and second, at the level of domestic and internal conflict, encompassing civil wars, organized crime, terrorism, and common crime. Within each level, we distinguish where appropriate between direct costs — expenditures and physical destruction — and indirect costs arising from static and dynamic distortions to production, investment, and trade. *Transnational insecurity and conflict*

All sovereign states expend resources on (external) defense expenditures. However, such

military expenditures vary widely across different countries, rarely going below 1% of GDP but in a few cases, as in the case of Saudi Arabia - tend to be around 7% of GDP (as per Tian et al. (2024, p.5)). Japan is probably an outlier with its military expenditures hovering around or just below 1% of GDP, although these expenditures have been large in absolute numbers and have consistently exceeded US$40 billion over the past decade. In contrast, the US military spending in 2023 stood at 916 billion dollars or 2.3 % of its GDP (Tian et. al., 2024, p.2).[9] For the same year, world military spending was estimated to be over 2 trillion dollars, which amounts to approximately 2.3% of world GDP (Tian et. al., 2024, p.1). Further, these official estimates may also under-report the extent of military spending as they do not include some other defense expenditures on intelligence, long-term care of veteran or on that civilian R&D that is in practice military R&D.[10]

Further, in addition to defense expenditures, some countries have experienced interstate wars and therefore they have incurred additional costs associated with such wars (such as mass casualties and destruction of infrastructure) during the post-WWII period. Stiglitz and Bilmes (2012) did not estimate the costs of the Iraq and Afghanistan wars to these countries, but they must certainly have been substantial. An estimate of Iraq's welfare cost of conflict (a measure that includes both direct and indirect costs of not just its war with the US) by Blomberg and Hess (2012, p. 430) is at least 67 percent of potential welfare.

While interstate wars had been relatively rare during the Cold War period, their frequency has increased lately as both unipolarism and international norms and laws are receding. Interstate rivalries and wars seem to be on the rise and are of two broad kinds: those that are dyadic or regional in character and those that are more global in character and are connected with the emergence of power poles that rival that of the United States.

Though dyadic or regional rivalries may be associated with ethnic, religious or ideological disputes, resource contestation is often an important economic reason, and as observed by Caselli et al. (2015), oil is considered to be probably the most important such resource. Caselli et al. (2015) find that when only one country has oil and it is located very near the border, the likelihood of conflict is 3 times higher than when neither country has oil. It is therefore not surprising that the discovered and yet-to-be-discovered

[9]To put this expenditure into context, the US Congressional Budget Office has reported that in Fiscal Year 2023, the total US federal expenditure towards Defense (US$805 billion) was almost the same size as the federal spending towards Medicare (US$839 billion) and exceeded the federal spending on Medicaid (US$ 616 billion). See https://www.cbo.gov/publication/59727.

[10]However, some military R&D expenditures have direct civilian applications or are disguised civilian R&D. In fact many major breakthroughs in technology – the internet, various high-tech materials, computers, and shipbuilding have their roots in military R&D. One could possibly argue then that military spending is worth it just for the tremendous technological spillovers that it has had in history. However, why should one spend money on military R&D in the hope of receiving some uncertain technological spillovers in the future, instead of directly spending them on R&D for targeted civilian applications?

oil wealth of Central Asia is fuelling disputes and arming in the area and beyond that could approach a new "Great Game." The states surrounding the Caspian Sea - Russia, Kazakhstan, Turkmenistan, Iran, and Azerbaijan - have still not settled on a formula for dividing rights of exploration and exploitation for oil. Where claims are settled, oil companies and their governments vie for contracts, rival pipeline routes, bids to buy local rights as well as local firms, and the whole endeavor is tinged with subterranean geopolitical calculations that involve the United States as well as all the other powers of Russia, China, and Europe. Further South, the Middle East has been a battleground for some time now. Other areas with suspected oil reserves like the South China Sea (around the Spratly and Paracel islands) have been already contested in minor hot incidents as well as diplomatically by seven countries (China, Taiwan, Vietnam, the Philippines, Indonesia, Malaysia, and Brunei).

Beyond oil, scarcity of fresh water has the potential to create havoc in many areas with rapidly increasing populations, economic growth, and economic globalization.[11] It is not well-known, for instance, that Egypt had threatened its upstream neighbors, especially Ethiopia, with bombing water facilities if they were to go ahead with irrigation projects on the Nile (Klare, 2001, p.153). In the coming years, we cannot predict how, or whether, such disputes will be resolved peacefully. De Bruin (2023) notes the increased tension between Ethiopia, Sudan and Egypt following the commencement of operation of the Grand Ethiopian Renaissance Dam in February 2022. She also suggests that under status quo arrangements regarding management of water use in transboundary river basins, 920 million people in Africa will live in very high to high conflict-risk basins by 2050. Some other examples of rivers that have induced or are likely to induce contention include the Jordan river (involving Israel, Jordan, Syria, and the Palestinians), the Tigris and Euphrates (involving Turkey, Syria, and Iraq), the Indus (Afghanistan, Pakistan and India), the Brahmaputra (China, India, and Bangladesh), and the Mekong (China, Thailand, Laos, Cambodia, and Vietnam).

The second type of insecurity that is looming on the horizon is the rise of China as a peer competitor to the military and economic preeminence of the United States. Before September 2001, the role of China had been widely debated especially in connection with its WTO accession. The proponents of China's admission into the WTO were offering the liberal gains-from-trade and peace-through-trade arguments, whereas its opponents were offering the realist it-will-come-back-to-bite-you argument as well as more ideological arguments regarding the nature of China's polity and its relation to Taiwan. Although now Japan is not a nuclear power, North Korea's nuclear status or higher perceived threats from China could well make Japan a nuclear power, after sufficient preparation of its domestic opinion. A nuclear Japan would change the world's balance of power, even if it does not evolve to a US peer competitor. Faith in multilateralism has also been waning due to a gradual erosion of international institutions, treaties, and norms that had emerged in the aftermath of World War II to promote international peace and safeguard territorial integrity of nations. This has increased perceptions of transnational insecurity, and it is likely to lead to even higher military expenditures in the future.

[11] Milne (2021) notes that "In 2017, severe droughts contributed to the worst humanitarian crisis since World War II, when 20 million people across Africa and the Middle East were forced to leave their homes due to the accompanying food shortages and conflicts that erupted." Unfried et al. (2022) find that a one standard deviation decline in local water mass (that follows from droughts and an intensifying water cycle) more than triples the local likelihood of social conflict (such as protests, riots and inter-communal conflict).

Domestic Conflict: Civil wars

More than 70 countries have experienced a civil war since World War II (Fearon and Laitin, 2003, p.75). The causes of civil wars are varied and include factors such as weak state capacity, ethnic, religious or sectarian divisions, cold war proxy conflicts, and resource contestation to name a few.[12] The median length of such wars is approximated to be seven years and the costs include: arming, the wages or opportunity cost of soldiers or guerrillas, the loss of life (at least 16 million in such wars), injuries and psychological incapacitation that can be long-lasting and leading to lower life-expectancy and higher mortality, the destruction of crops, buildings, infrastructure, and other collateral costs that have been analyzed by World Bank researchers (Collier et al., 2003; see also Blattman and Miguel, 2010, for an overview of the economics literature).

In addition to these direct costs of civil wars, there are indirect costs via the economic distortions that are due to war. These include static and dynamic misallocation of resources including the persistence of heightened military expenditures. Such diversion of resources to conflict reduces capital formation that, in turn, reduces production possibilities and welfare in the future. Using a data set covering 115 conflicts and 145 countries over the past 75 years, Benmelech and Monteiro (2025) find significant long term negative macroeconomic effects of conflict. The war-torn economies suffer on average a cumulative 13 % GDP loss over a 10 year period since the initiation of conflict relative to similar unimpacted countries. Further for countries experiencing civil wars, this effect is much larger, amounting to 20% GDP reduction. This is typically also associated with persistently low levels of investment and government revenues and high inflation. Such low-levels of growth, in turn, increase the risk of civil wars (Miguel et al., 2004) that can lead to a vicious cycle of war and lower incomes. Based on accepted methodology, Blomberg and Hess (2012) have estimated the welfare costs of conflict (that does not include just civil wars) for a large sample of countries over thirty years to be on average 8 percent of steady-state consumption. Whereas the costs for high income countries are typically below that, for many low-income countries, these costs are much higher, approximating half of consumption.[13] Countries with greater degree of ethnic fractionalization suffer much larger costs due to erosion of trust between different ethnic groups. Bove et. al. (2017) find that on average, civil war reduces the GDP by 9.1%. On the other hand, Costalli et al. (2017) find that on average, civil wars cause an annual loss of 17.5% of per capita GDP.[14]

[12]Using a panel data set involving 193 countries over 1946 - 2008, Lei and Michaels (2014) find that on average, giant oilfield discoveries increase the likelihood of internal armed conflicts by about 5 - 8 percentage points within 4 - 8 years of discovery, compared to a baseline probability of 10 percentage points. Such effects are more pronounced for countries with recent prior exposure to armed civil conflict or coups in the past decade prior to discovery.

[13]Ndoricimpa and Ndayikeza (2023) estimate that the 1993-2003 civil war in Burundi resulted in an average annual loss of 34% of per capita GDP.

[14]Some countries like Japan (Davis and Weinstein, 2002), Germany (Brackman et al., 2004) and Vietnam (Miguel and Roland, 2011) have avoided the persistence of post-war poor economic outcomes. For example, Miguel and Roland (2011) find that in a period of 25 years, no persistent differences remained between Vietnam's intensely bombed regions (during the U.S. bombing over the period 1964-1973) and other regions in terms of poverty, physical infrastructure, and human capital indicators. Their analysis points to the important role of institutional factors such as the degree of cohesion and quality of governance in aiding the recovery. Similarly, Bove et al. (2017) note that for some countries, civil wars can lead to positive outcomes by disrupting extractive regimes.

Domestic Conflict in the form of Oganized crime

Even in the absence of active interstate or civil conflict, a nation does not typically have complete monopoly in the provision of security within its geographic boundaries. From Southern Italy (Gambetta, 1993) to Russia and other post-Soviet states (Varese, 2005 and Klebnikov, 2000), Afghanistan, Bolivia, Peru, and Colombia (Clawson and Lee, 1996; Blattman et. al., 2024), to Mexico, Japan (Hill 2003), and U.S. inner cities (Jankowski, 1991), organized crime groups have control over sizable chunks of economic activity including some outwardly legitimate organizations (Jacobs, 2020).[15] Organized crime emerges out of the power vacuum created by an absence of state enforcement due to prohibition of drugs and other commodities, illegal human trafficking, geography, ethnic or social distance from the seat of government, or simply collapse of state institutions as it occurred in many post-Soviet countries or Afghanistan. The costs of organized crime have similarities to those of civil wars, both in terms of their direct effects and their long-term indirect welfare effects: contract enforcement is expensive and primitive compared to that available in modern states; the rents attract unproductive competition between mafias and gangs; productive investment in physical or human capital is discouraged. Broadly consistent with the empirical findings on economic cost of civil wars, Pinotti (2015a) finds that a sudden intensification of mafia activity in Apulia and Basilicata regions of Southern Italy resulted in a 16% reduction in per capita real GDP relative to the synthetic control region over the period 1975 - 2007 due to contraction in private investment.[16] Acemoglu et al. (2020) find that increased strength of mafia activity in regions of Sicily had adverse impacts on literacy, provision of public goods and political competition in the 1910s and 1920s. Brown et al. (2024) provide evidence of significant indirect economic costs of organized crime in El Salvador through extortion induced price distortions. Gutie'rrez-Romero and Oviedo (2018) show that areas in Mexico most plagued by drug-cartel related violence suffered from an increase in poverty and unemployment and a steep decline in production, profits and salaries in manufacturing. These findings suggest that the economic costs of organized crime can be both acute and multi-dimensional.

Other forms of domestic conflict, terrorism and common crime

Besides civil and mafia wars, there are many other forms of conflict within countries. Dispute over land use (sometimes between state officials and traditional farmers) is a common cause of civil unrest in Africa, China and other economies.[17] In India, rural Russia and many low and middle-income countries, such disputes are underpinned by the absence of a well-defined and enforceable land ownership law.[18] In China, Lin et. al. (2018) note that from June 2006 to November 2016, "serious" and "tremendous" land conflicts account for about a third of total conflicts in that period.[19] Ethnic, religious,

[15]Mirenda et al. (2022) find that firms infiltrated with mafia in Italy were exposed to greater financial risk and a higher likelihood of failure over the period 2006-2016. Danielle and Geys (2015) and Di Cataldo and Mastrorocco (2022) show that mafia infiltration into local councils negatively impacted the education levels of elected officials, tax revenue collection and quality of government expenditure.

[16]In a cross-country study, Pinotti (2015b) finds that a 1-standard deviation increase in the organized crime index is correlated with a 35% reduction in economic output per capita.

[17]See Bergius et al. (2020) and McGuirk and Nunn (2024) for examples of such disputes in Africa.

[18]For example, Lewis (2004, p.199) reports: "It is not clear who owns land in India. Over 90 percent of land titles are unclear."

[19]The September 2011 large-scale violent protests by villagers in Wukan province against local gov-

or social rivalries can also lead to exclusion and violence with long-term economic consequences as in the case of 1969-1994 Northern Ireland conflict ("The Troubles").[20] Military coups and security force rivalries also commonly occur in many countries, without them necessarily breaking out in civil war. Civil unrest involving activities such as protests, strikes, lockouts, and their possible suppression by governments are other examples of domestic conflict. Rodrik (1999a, 1999b) considers them critical in understanding the economic performance in low-income countries. Similarly, Matta et. al. (2022) find that over the period 1970-2011, non-violent political regime crises when accompanied by mass civil protests had a negative persistent impact on per-capita GDP (4.3%), over a 5 year horizon.[21]

Terrorism generally refers to violent attacks carried out by domestic or transnational operatives located within a nation's boundary to destabilize and/or gain leverage over the relevant state authorities. Such operations can be random/sporadic/one-off, or they can be endemic. Hence, as observed by Sandler and Enders (2008), and Gaibulloev and Sandler (2019), the costs of such terrorist activities can be high for specific regions while being muted on average in cross-country studies. For example, Abadie and Gardeazabal (2003) estimate that the average economic cost of terrorism in the Basque region of Spain was approximately 10% of per-capita GDP in 1980s and 1990s. Similarly, Singhal and Nilakantan (2016) estimate the economic dividend from counter-insurgency operations in the Indian state of Andhra Pradesh to be 16.11% of per capita state GDP over the period 1988-2000. The channels by which terrorism can inflict economic costs include adverse impacts on trade, stock market valuations, tourism, and foreign direct investment. In their cross-sectional study, Abadie and Gardeazabal (2008) find that a standard deviation increase in terrorist risk is associated with reduction in foreign direct investment of about 5% of GDP. In the context of USA, Brodeur and Yousaf (2022) find that even random acts of violence, such as those perpetrated during mass shootings, can have persistent adverse economic effects such as a 2.4% decrease in earnings per capita at the county level.

The cost of common crime and its avoidance is also relevant and quantitatively important. For example, the State of California's correctional and rehabilitation expenditure in 2023-24 general budget stood at 14.75 billion US dollars which is approximately 65% of the amount the state spent on higher education.[22] Further, as reported in Hahnel (2020), correctional expenditures nearly tripled over the period 1977 - 2017. In contrast, higher education expenditures grew by a factor of 1.7 over the same period. Stullich et al. (2016) find that across the country as a whole, state and local government spending on prisons and jails have increased about 3 times as fast as spending on elementary and secondary education over a similar time frame (1979-80 to 2012-13).[23] Given the

ernment and a private developer provides a vivid example of such conflicts (See Jacobs, 2011).

[20]Besley and Mueller (2012) find that peace in Northern Ireland brought an average increase in house prices between 1.3 percent and 3.5 percent. However, the improvements were greatest for high violence areas like Belfast where the estimate of increase in house prices due to peace ranged from 5.9 percent to 16.6 percent.

[21]Hadzi-Vaskov et al. (2023) also find a persistent negative impact of social unrest on GDP with adverse impacts on manufacturing, services, and consumption. Acemoglu et al. (2018) and Barret et al. (2024) report negative impact of social unrest on stock market performance particularly in middle and low-income countries.

[22]See https://ebudget.ca.gov/budget/2023-24EN/#/Home.

[23]They find that even after adjusting for population changes, in 24 states, the growth rate in per-capita corrections spending was more than 100 percentage points higher than the rate for per-pupil PK-12 education spending.

well-established positive linkages between education opportunities, better employment prospects and crime reduction, the opportunity costs of prioritizing spending on incarceration over education may be considerable.

In the opening quote of this section US President Eisenhower - who had also earlier served as Supreme Commander of all allied forces in Europe's Western front in 1944-45 - connected warships and rockets to the hunger, cold, and truncated futures of ordinary people. His argument is economic with a more concrete appreciation of how conflict deeply affects lives. Our selective overview of the costs of conflict from the global to the local level demonstrate that the costs are large, empirically well-documented, and consistently exceed the conventional estimates of deadweight costs that have dominated economics teaching and research.

It would therefore be difficult to consider conflict costs as mere frictions that can be easily abstracted from theory, empirical research, and policy considerations in settings in which conflict is likely to be present. We proceed by first examining a series of models of production and exchange in which there is insecurity and potential conflict. We ask whether the essential insights from existing Nirvana models continue to hold and, if not, how the results change and how they help us understand questions about the role of international trade in the presence of insecurity or the distribution of income. We also ask whether the costs of conflict are inevitable and what kind of mechanisms and institutions can reduce them.

4 Trade and Security

In the standard neoclassical framework with full security, prices of goods and services reflect scarcity as determined by preferences, technology and endowments. Hence resources are guided to their most efficient use and the resulting resource allocation is pareto efficient. In this setting, any differences in relative prices across regions or countries represent true comparative advantage, and specialization and exchange through trade are typically associated with welfare gains. Hence when evaluated through the lens of such models, trade-restrictions and redistribution policies are generally considered to be inefficient, even if they are beneficial for a specific segment of the society. In this section, we explore the robustness of these insights, when we allow for imperfect specification or enforcement of property rights. Suppose that economic agents divert resources towards defense or appropriation in the face of insecure property rights - either domestically or internationally. How do these activities impact the determination of relevant prices and resource allocation? Are the effects of endogenous security provision relatively minor or do they significantly challenge the conventional wisdom?

To explore such questions, we first consider domestic insecurity and then discuss the case of international insecurity, a topic that has become salient lately in connection with *Geoeconomics* (see, for example, Thoenig, 2024).

For ease of exposition we begin with a very simple competitive model of an economy with N agents, indexed by i, two consumption goods, Oil (O_i) and Butter (B_i), and where each agent has the same Cobb-Douglas utility function $O_i^{\alpha} B_i^{1-\alpha}$, with $\alpha \in (0,1)$. Let $\overline{O}$ denote the economy's aggregate endowment of oil, $\overline{B}$ the total endowment of butter, and let p denote the price of oil relative to butter.

Consequently, the economy's total income ("GDP"), measured in units of butter, would equal $p\overline{O} + \overline{B}$. Since all agents have identical homogeneous of degree 1 utility

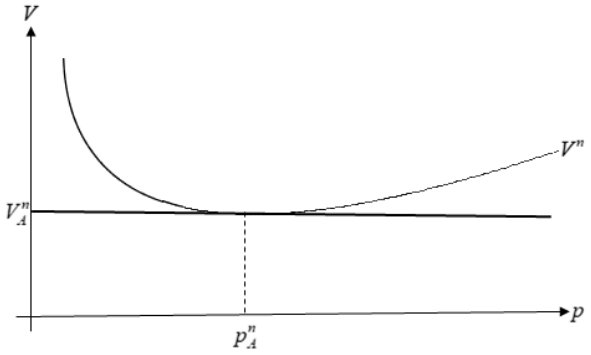

Figure 1: Welfare under free trade without conflict

functions, we can aggregate welfare into the following indirect utility function:

$$V^n(p, p\overline{O} + \overline{B}) = \mu(p)(p\overline{O} + \overline{B}) \tag{7}$$

where $\mu(p) = (1-\alpha)^{1-\alpha}\left(\frac{\alpha}{p}\right)^{\alpha}$.

If the economy were to be completely closed off to international trade and be *autarkic*, then the equilibrium price of oil would be the following:

$$p_A^n = \frac{\alpha}{1-\alpha}\left[\frac{\overline{B}}{\overline{O}}\right] \tag{8}$$

Note how endowments and the preference parameter α affect this relative price in predictably intuitive ways.[24]

Now suppose the country is exposed to international trade with the international price of oil (p) determined in international markets and the country is "small" so that it is price taker. Figure 1 shows how the country's welfare (in (21)) varies with the international price of oil.

Welfare is minimized, as expected, at the autarkic price p_A^n. If the international price of oil were to be greater than the autarkic price, then the country could increase its welfare relative to autarky by exporting oil and importing butter; that is, in such a case the country would have a comparative advantage in oil production. If the international price of oil were to be lower than its autarkic price, the country would have a comparative advantage in butter production and import oil in exchange for butter. Note that the further away from the autarkic price is the international price of oil - regardless of whether it is higher or lower - the higher are the gains from trade in terms of welfare.

In this simple model we introduce insecurity and trace its effects on prices, incomes, and welfare under both autarky and free trade (the model is based on Garfinkel, Skaperdas, and Syropoulos, 2008). Suppose oil is produced one-for-one from land and butter is produced, also one-for-one, from labor. The population is now evenly divided between two groups, a and b. The way we introduce insecurity is to have some of the land being insecure and subject to capture by the two groups. Labor can be used to produce not just butter but also "guns" that are used in capturing some of the insecure land.

[24]The superscript "n" conveys the assumption of no conflict (that is, full security) used in deriving this price.

Let $\overline{T}$ denote the total amount of land and $\overline{L}$ the total amount of labor. Each group is endowed with the same quantity of a secure amount of land $\frac{\sigma}{2}\overline{T}$, where $\sigma \in (0,1)$ and a secure amount of labor $\frac{1}{2}\overline{L}$. As earlier, σ is a measure of property rights protection or the efficiency of governance. $(1-\sigma)\overline{T}$ is the amount of land that is insecure and contested - its sharing depends on competitive arming between the two groups based on the contest function given by (3). This is reproduced below.[25]

$$q_a(g_a, g_b) = \frac{g_a}{g_a + g_b} \tag{9}$$

Hence, given the level of arming of the two groups, each group's ($i = a, b$) land holding is given by $T_i = \frac{\sigma}{2}\overline{T} + q_i(1-\sigma)\overline{T}$. Given the simple linear production functions, one unit of land translates into one unit of oil (so that $O_i = T_i$), and one unit of labor translates into either one unit of butter or one unit of gun. Assuming butter to be the numeraire good (with each group's butter production being $\frac{1}{2}\overline{L} - g_i$), and letting p_A be the autarky relative price of oil, group i's income is $R_i = p_A T_i + (\frac{1}{2}\overline{L} - g_i)$. The timing of arming choices, production, and trade (either domestic or international) is as follows:

1. Arming (g_a and g_b), and butter production ($B_i = \frac{1}{2}\overline{L} - g_i$) are chosen by each group.
2. Contested land is distributed according to the relative amount of guns (23), and oil is produced given each group's landholding (i.e., $O_i = \frac{\sigma}{2}\overline{T} + q_i(1-\sigma)\overline{T}$).
3. Butter and oil are traded competitively either (i) domestically within the county under autarky or (ii) in international markets with world price taken as given.

For any g_a and g_b, The market clearing autarkic price of oil is given by

$$p_A = \frac{\alpha}{1-\alpha}\frac{\overline{L} - g_a - g_b}{\overline{T}} \tag{10}$$

If there were no arming ($g_a = g_b = 0$), then (24) would be identical to (22) ($\overline{T} = \overline{O}$ and $\overline{L} = \overline{B}$). In the presence of arming, and given that all land is used for oil production, butter production would be lower than $\overline{B}$. Therefore, the autarkic price of oil under conflict is generally lower than the "Nirvana" price in (22) because of the resources diverted away from the production of butter. As this diversion makes butter scarcer, it lowers the price of oil relative to butter. Thus, we see in this simple example how arming and conflict can change prices.[26] Taking into account equilibrium arming under autarky, the autarkic price of oil can be shown to be the following:

$$p_A^* = \frac{\alpha}{1-\alpha}\frac{\overline{L}}{\overline{T}}\frac{2(1-\alpha)}{2(1-\alpha) + \alpha(1-\sigma)} \tag{11}$$

[25] Note that interpretation of the function is not probabilistic but deterministic, the same as $v^\beta(g_a, g_b)$ in (13) with $\beta = 1$; a different value of β could be used without affecting any of the qualitative results. However, the analysis also holds under the alternative winner take all probabilistic interpretation of the contest outcome because of risk neutrality.

[26] The reason for this difference between prices under conflict and prices in the absence of conflict is the difference in factor intensities between the production of the goods - see Dal Bo and Dal Bo (2011) for the case of domestic conflict and Garfinkel, Skaperdas, and Syropoulos (2015) for the case of international conflict. Dube and Vargas (2013) provided evidence on conflict over resources with different capital intensities while Anderston and Marcoullier (2002) were the first ones to our knowledge to show evidence on how domestic conflict affects international trade.

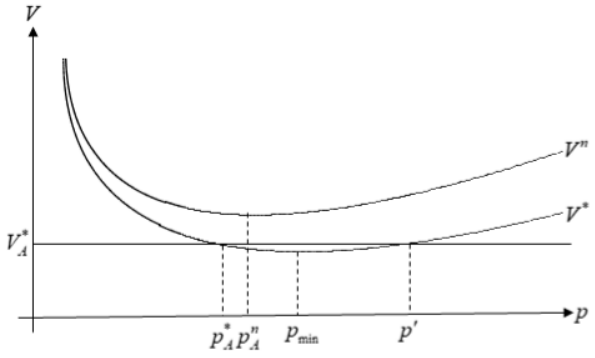

Figure 2: Welfare under free trade with conflict

As can be seen from this equation, the higher is the level of insecurity (the lower is σ), the lower is the price of oil as arming reduces the available quantity of butter that can be produced.

Next suppose that the economy in question is open and the price of oil, p, is determined in international markets. Since land (and its produced oil) is contested, its value depends on its price that is now taken as given. Arming, therefore, should depend on the price p. In fact, equilibrium arming can be shown to be proportional to both the price of oil and the amount of contested land (in particular, $g_a^* = g_b^* = \frac{p(1-\sigma)\overline{T}}{4}$).[27]

In engaging in international trade, the country now can enjoy the typical gains from trade as the international price of oil varies but also has a source of costs that varies with the same price but which is absent in the typical Nirvana case. For $p < p_A^*$, the country has a comparative advantage in butter production and therefore imports oil; oil is less valuable than in autarky and the costs of arming are also lower than in autarky. Then, for this case, the country's welfare improves not just because of the gains from trade but also because of the lower costs of conflict.

For $p > p_A^*$, the country has a comparative advantage in oil production. Oil is more valuable than in autarky but that induces greater arming, which as we have seen is proportional to the price of oil. Because the gains from trade are small in the neighborhood of autarky, it turns out that the increase in the cost of arming exceeds the gains from trade for a range of the international price of oil that is higher than the autarkic price. This range of international price is wider, the higher is the level of insecurity and contestable land. It is easier to discuss the effects of insecurity in the face of international trade by considering the indirect utility function for national welfare as a function of the international price of oil:

$$V^*(p) = \mu(p)(\frac{p(1+\sigma)\overline{T}}{2} + \overline{L}) \tag{12}$$

Note that this function reduces to welfare in the Nirvana case in (21) when there is perfect security $\sigma = 1$ (by setting $\overline{T} = \overline{O}$ and $\overline{L} = \overline{B}$). Figure 2 depicts $V^*(p)$ and how it compares to the social welfare in (21) in Figure 2.

[27]The payoff function of group $i = a, b$ is the following indirect utility function: $V_i = \mu(p)(\frac{p\sigma}{2}\overline{T} + q_i p(1-\sigma)\overline{T} + \frac{1}{2}\overline{L} - g_i)$. The Nash equilibrium with these two payoff functions yields the reported levels of g_a^* and g_b^*.

As expected, the welfare under conflict is uniformly lower than the welfare in the absence of conflict, and the higher is insecurity (the lower σ), the lower is the curve of $V^*(p)$. Furthermore, because $p_A^* < p_A^n$, the oil price range for which the country exports oil is greater than the price range in the absence of conflict. We summarize the main difference between the cases of insecurity from those of the Nirvana canonical model as follows:

- When the international price of oil is below its autarkic price, the country gains unambiguously compared to autarky - its gains from trade by exporting butter and importing oil are enhanced by the reduced costs of conflict because oil is less valuable relative to autarky.

- When the international price of oil is higher than the autarkic price but not too high ($p \in (p_A^*, p')$), then the country has lower welfare than under autarky. The gains from trade are lower than the increase in the costs of conflict because oil is more valued than under autarky. Only when the international price of oil is high enough (higher than p') do the gains from trade exceed the increase in the costs of conflict.

- The presence of conflict distorts a country's comparative advantage. When the international price of oil is between p_A^* and p_A^n, a country that would naturally be a net importer of oil in the world markets, ends up being a net exporter of oil in the presence of conflict.

- Over the price range (p_A^*, $p_{\min}$), an increase in p which represents a favorable terms of trade shock for the exported good oil, results in a reduction in welfare, which can be thought as an instance of the "resource curse".[28]

The above analysis first illustrates how prices, incomes, and social welfare are shaped by costly and imperfect enforcement of property rights. That is true in an extension of a simple model of production and trade; models of different settings under costly insecurity would need to be analyzed for their specific effects.

Moreover, our analysis shows how, contrary to the conventional wisdom, a "small" country would not unambiguously gain by opening itself up to international trade when property rights of a valuable resource are insecure. With insecure property rights, competition between groups through arming can distort a country's comparative advantage and opening up to trade can also reduce welfare. A pragmatic trade policy would therefore need to consider both the gains from trade as well as its associated security costs. When the latter are taken into account, a restrictive trade policy may be welfare improving even for a small open economy.

[28]There is of course a vast literature on the topic of the resource curse. Mehlum, Moene, and Torvik (2006) show how "institutions" - security of property rights in our case - is a major source of the phenomenon. Dube and Vargas (2013) examine the impact of commodity price shocks on the intensity of conflict in Colombia. Consistent with our hypothesis, they find that an increase in the pice of natural resources (which are less labor intensive) such as oil lead to an increase in the intensity of conflict. The 137% increase in oil prices over 1998 to 2005 led paramilitary attacks to increase by an additional 14% in the average oil producing municipality. They also find similar effects for increases in the international prices of coal and gold. Berman et. al. (2017) find that historical rise in mineral prices (commodity super-cycle) accounted for 14 percent to 24 percent of the average violence observed in African countries over 1997-2010. Similarly, in their Meta-Analysis, Blair et. al. (2021) also find that increases in the price of capital intensive natural resources such as oil provoke conflict.

Going beyond the particular model we have presented here, the presence of conflict costs associated with insecurity implies that we are in a second-best world. Depending on the economic environment we are interested in, we need to allow for the possibility that policies that would seem inefficient in the first-best setting, might not be so.

Based on similar there are a number of second-best explanations of seemingly inefficient policies on wages, land, and other inputs. For example, as shown by Grossman (1995), redistribution through a wage subsidy can be an optimal response of the propertied class to the threat of extralegal appropriation by the labor class. The paper shows that when the share of labor income relative to property income is small in comparison to the effectiveness of time allocated to extralegal activities, the propertied class face a credible threat of appropriation from the labor class. In this circumstance, the capitalists may prefer a tax-financed redistribution in the form of a wage subsidy to entice the labor class to avoid appropriative activities. This can be Pareto improving as long as the cost of administering the subsidy is not very high. Hence, the conventional understanding of welfare losses associated with a wage subsidy need not hold. Similarly, Zak (2002) also considers the role of wage subsidy financed by taxes as an optimal institutional response to curb appropriation and stimulate output growth.

With a similar logic, Grossman (1994) shows the optimality of land reform under insecurity. Grossman identifies conditions on the technologies of production and conflict (appropiration) under which the propertied class may offer land reforms as an optimal response to the threat of appropriation of land rents by the poor, and this may increase aggregate welfare by deterring conflict activities. Hence, contrary to the conventional wisdom, the paper shows that a redistributive policy can lead to a Pareto improvement in a market economy with insecure property rights.

In another contribution, Dal Bo and Dal Bo (2011) introduce social conflict in two canonical models of trade in a small open economy: the Heckshcher-Ohlin and the Ricardo-Viner models. They study how different types of economic shocks affect the intensity of appropriation and the remedial policy measures that take this into account. Under the assumption of the appropriation sector being labor intensive, the authors find that a positive shock to the capital intensive sector, may, by reducing the opportunity cost of appropriation, lead to more appropriation and make society economically worse-off as a whole. Negative shocks on the labor intensive sectors can also land up increasing conflict and worsening overall welfare. A wage subsidy funded by a tax on capital, can reduce appropriation by raising the opportunity cost of such activity. Workers benefit both in terms of higher wages and lower appropriation. Owners of capital can benefit as well if the benefit from reduced appropriation is larger than the tax paid. Hence under some circumstances, such a scheme can be welfare improving for all. This contradicts the traditional neoclassical perspective which sees these policies as distortionary and aiming to achieve purely redistributive goals. Similarly, trade policy interventions like tariffs that contribute to a reduction in appropriation can be welfare enhancing.

International Economics and Transnational Insecurity

Recent developments in international economics and politics are increasingly making both laypersons and economists newly aware that economic interactions among countries are taking place within an essentially anarchic setting. During the post-WWII period, international institutions and organizations such as the UN and the WTO as well as international norms have been providing restraints on countries' behavior, but those

institutions and norms have been gradually eroding in the past few decades.

Political scientists and international relations scholars have always been interested in the interaction of security and trade policies. For example, Gowa (1995) has discussed the problem of the "security externality of trade," according to which trading with a potential adversary makes them richer with resultant spillovers into increased military capabilities of the same adversary (which in turn can necessitate increased military spending on your side that is greater than the gains from trade). During the recent period of globalization, such considerations were almost completely absent in public discourse, and with a few exceptions such as those mentioned above, there was scant interest in economics research as well. This of course reflects the tendency of modern economics, at least since the marginalists, to ignore such considerations a tendency which is also associated with the dominant thinking during the particular era we have gone through.

The related economics literature, just as with other issues that concern insecurity and conflict in economics, is rather limited. Models using similar logic as the one under domestic insecurity that we just presented exist for the case of transnational insecurity between two "small" countries (Skaperdas and Syropoulos, 2001, Garfinkel, Skaperdas, and Syropoulos, 2015). Autarkic prices, incomes, and social welfare are affected by the degree of conflict over a disputed resource. Trade openness affects comparative advantage and the efficiency of trade openness depends on how international prices affect the costs of conflict. Contrary to the case of small countries always preferring free trade to aurarky in received trade theory, that is no longer the case in the presence of insecurity.

For "large" countries - those that have significant effects on international prices - restrictions on trade can be optimal even under complete security. Garfinkel, Syropoulos, and Zylkin (2022) have examined the interaction of two countries under the threat of conflict in the future. They show how the smaller country reaps a relatively higher level of gains from trade than the larger country, and also its level of arming is relatively higher than would otherwise expected. To counter that effect, a sufficiently larger country - because of the threat of future conflict - chooses to completely cut off its trade with its potential adversary. The model illuminates the US sanctions against Japan before WWII and other historical instances.

Different international trade regimes can have different effects on peace and conflict themselves. Martin, Mayer, and Thoenig (2008) provide theory and evidence that multilateral trade regimes tend to induce less peace. Garfinkel, Syropoulos, and Yotov (2020) show how two "enemy" countries that are similar in terms of endowments can reduce their arming when they trade directly with one another than when they do not but both trade with a third, presumably "friendly," country. And, sanctions on vital natural resources can induce wars as studied by Bonfatti and O'Rourke (2018).

More recently, and as a signal of the change in the global landscape, with sanctions and other trade restrictions imposed between Western countries, Russia, China, and others, interest and research on the interactions of politics and economics at the global level has been revived (see, Morgan, Syropoulos, and Yotov, 2023, for research related to sanctions). There is even interest in a relatively new term, Geoeconomics, on the part of economists (Thoenig, 2024, Clayton, Maggiori, and Schreger, 2024). We can surely expect this area of research to pick up steam in the coming years.

5 Productivity and compensation in general equilibrium

In neoclassical economics, markets operate under perfectly secure property rights and it is well-known that voluntary production and exchange ensure that prices and compensation are commensurate with scarcity, consumer preferences, and productivity. One important policy corollary of this approach is that "markets get it right" - incomes closely reflect the productivity of those who receive them, the derived demand for inputs similarly reflect their productive use in the economy, and prices are free of non-economic interference, including conflict and power-seeking considerations.

As we'll demonstrate in this section, once we allow for appropriation and conflict in an otherwise standard model of exchange or production, these generally accepted properties about prices and incomes in a market equilibrium need not hold. To illustrate this, we begin with a simple textbook model of exchange of the type examined by Edgeworth (1881).

Consider two individuals, labeled a and b, who have identical preferences, and two goods, fish (f) and corn (c). a holds an endowment e_a that can be converted one-to-one into fish and b holds and endowment e_b that can be converted also one-to-one into corn. Individual i's consumption of fish (f_i) and corn (c_i) induces a utility of $U(f_i, c_i)$, $i = a, b$, which, for simplicity, we assume to be linearly homogeneous and normalized so that $U(0, 0) = 0$.

Neoclassical economics has exhaustively analyzed such settings. The determination of prices (or, exchange ratios) by bargaining or competition, their relationship to scarcity and preferences, and the compensation of different agents have been main concerns of this literature. Regardless of the approach taken, there is a tendency for outcomes to have the property that goods that are more valued have higher prices, and those who hold such goods receive higher incomes and utility. For instance, under competitive pricing, the final utility received by a can be shown to equal $e_a \frac{\partial U(e_a,e_b)}{\partial f}$ and the utility received by b is $e_b \frac{\partial U(e_a,e_b)}{\partial c}$. Suppose $e_a = e_b = E$. Then, the person who would receive higher utility would also be a if and only if $\frac{\partial U(E,E)}{\partial f} > \frac{\partial U(E,E)}{\partial c}$. That is the person who, other things being equal, holds the endowment that contributes a higher marginal utility also would receive a higher compensation.[29]

Moreover, such a property does not hold just for the case of exchange and utility. The simple problem of exchange we are discussing is analytically isomorphic to the basic problem of production, whereby the endowments of a and b are inputs used in the production process. In this simple model discussed thus far, we'll now introduce insecurity regarding the ownership of fish and corn produced. Specifically, who owns the stock of fish and corn depends probabilistically on the competing levels of appropriative activities (or guns $g_i, i = a, b$) of the two parties via a contest success function. Assuming that the winner of the contest takes control of all fish and corn that is produced with probability of $q(g_a, g_b)$, the expected payoffs to the two parties are,[30]

$$V^a(g_a, g_b) = q(g_a, g_b)U(e_a - g_a, e_b - g_b) \tag{13}$$

[29]For exceptions, see literatures on "manipulation of endowments" (Postlewaite, 1979) or "immiserizing growth" (Bhagwati, 1958).

[30]It is assumed that, $0 < q(g_a, g_b) < 1$, $q(g_a, g_b) = 1 - q(g_b, g_a)$, $\frac{\partial q}{\partial g_a} > 0$, and $\frac{\partial q}{\partial g_b} < 0$.

$$V^b(g_a, g_b) = (1 - q(g_a, g_b))U(e_a - g_a, e_b - g_b) \tag{14}$$

Observe that an increase in one side's guns increases their probability of winning (or share of total utility received) but it also decreases the production of consumables, fish in the case of a and corn in b's case. This tradeoff appears when we take the partial derivative of each side's payoff with respect to own guns:

$$\frac{\partial V^a(g_a, g_b)}{\partial g_a} = \frac{\partial q(g_a, g_b)}{\partial g_a} U(e_a - g_a, e_b - g_b) - q(g_a, g_b)\frac{\partial U(e_a - g_a, e_b - g_b)}{\partial f} \tag{15}$$

$$\frac{\partial V^b(g_a, g_b)}{\partial g_b} = -\frac{\partial q(g_a, g_b)}{\partial g_b} U(e_a - g_a, e_b - g_b) - (1 - q(g_a, g_b))\frac{\partial U(e_a - g_a, e_b - g_b)}{\partial c} \tag{16}$$

The first term in each of the two derivatives represents the marginal benefit of a small extra unit of guns whereas the second term represents the marginal cost of guns. Note how the second component of the marginal cost of guns is the marginal utility of the good produced by that side. Thus the higher the marginal contribution of one side, the higher is its marginal cost of guns. As we shall see shortly, this property has significant implications for the pattern of distribution. A unique Nash equilibrium (g_a^*, g_b^*) can be shown to exist under mild conditions.[31] An interior equilibrium is characterized by setting (15) and (16) equal to 0. By doing that it can be shown that,

$$\frac{\frac{\partial q(g_a^*, g_b^*)}{\partial g_a}}{-\frac{\partial q(g_a^*, g_b^*)}{\partial g_b}} \frac{1 - q(g_a^*, g_b^*)}{q(g_a^*, g_b^*)} = \frac{\frac{\partial U(e_a - g_a^*, e_b - g_b^*)}{\partial f}}{\frac{\partial U(e_a - g_a^*, e_b - g_b^*)}{\partial c}} \tag{17}$$

Under the same conditions that ensure existence of equilibrium, the left-hand-side of this equation can be shown to be greater than 1 if and only if $q(g_a^*, g_b^*) < \frac{1}{2}$ or if and only if $g_a^* < g_b^*$. Then, say, for b to be *more powerful* and receive the larger share of the total pie ($g_a^* < g_b^*$), by (17) we must have $\frac{\partial U(e_a - g_a^*, e_b - g_b^*)}{\partial f} > \frac{\partial U(e_a - g_a^*, e_b - g_b^*)}{\partial c}$, or that b must be *less marginally productive* at the equilibrium point. To facilitate comparison with the simple exchange model of the previous section, let $e_a = e_b = E$. It can then also be shown that b is more powerful if and if only if $\frac{\partial U(E,E)}{\partial f} > \frac{\partial U(E,E)}{\partial c}$.[32] Note that this is the exact opposite outcome from the case of completely secure property rights that we discussed earlier. When property is insecure, the side that is more productive has a comparative disadvantage in grabbing and, in equilibrium, it prefers to contribute relatively more to production and relatively less to guns which in turn results in a lower compensation than its opponent. The less productive side has a comparative advantage in grabbing as it faces a lower opportunity cost of guns (in terms of useful production) and receives a bigger part of the total pie.

We do not have to go far back in history to find evidence of the relationship between productivity and power. Warriors, knights, lords and generally specialists in violence

[31] For existence, it is sufficient that the contest success function $q(\cdot, \cdot)$ is not too convex in its first argument ($\frac{\frac{\partial^2 q(g_a, g_b)}{\partial g_a^2}}{\frac{\partial q(g_a, g_b)}{\partial g_a}} < \frac{\frac{\partial q(g_a, g_b)}{\partial g_a}}{q(g_a, g_b)}$). For uniqueness, it is sufficient that $q(g_a, g_b) = \frac{f(g_a)}{f(g_a) + f(g_b)}$ for some positive and increasing function $f(\cdot)$. Proofs can be found in Skaperdas and Syropoulos (1997).

[32] For the proof, see Skaperdas (1992). For additional comparative static results of a more general model, see Skaperdas and Syropoulos (1997).

appeared to have enjoyed higher consumption than the peasants who were the actual producers and over which those specialists ruled.

Of course, the possibly inverse relationship between productivity and power is just a tendency that is not absolute. Someone who is better compensated could have the absolute advantage in production as well. But allowing for appropriation casts serious doubt on the presumption that those who are better compensated are also necessarily more productive, a presumption that appears widespread in empirical assessments of relative worth.

Moreover, regardless of absolute advantage, the dynamic incentives created by the possible static disadvantage that higher productivity confers can be seemingly perverse. As Gonzalez (2005) shows, even superior technologies that are available at zero cost could be easily rejected in favor of inferior technologies to avoid the strategic disadvantage associated with the former. The water mill for example had been used by the first century AD in the Roman world but was not generally adopted until the eleventh century. Similar fates had befallen numerous other innovations from the classical world as well as China (see Baumol, 1990, for examples and arguments).

Another obvious difference from the received economic model of exchange concerns the costs of arming and conflict themselves.[33] These costs can be both static and dynamic. In growth models that allow for appropriation, either as non-durable output (Grossman and Kim, 1996, Mehlum et. al., 2003) or as durable non-productive "enforcive" capital (Lee and Skaperdas, 1998), its growth-stunting effects become compounded over time. If we were to briefly reflect on the types of capital and large-scale organizations that most human societies had created up to about two centuries ago, we can easily see that it had been heavily weighed towards the appropriative type; protective walls, castles and moats, and elaborate siege machines (Hoffman, 2015). No civilian equivalent could approach the organizational and logistical sophistication of many armies.

Up to this point we have maintained that appropriative expenditures and other associated costs are primarily due to arming. There are however numerous other forms of appropriative activities that are important and are very different from arming. Whether private or public, almost all organizations are not organized as markets but as bureaucracies. At least some activities within bureaucracies can be considered to be influence activities which have been analyzed in a broadly similar fashion to the model described above (see, e.g., Milgrom, 1988, or Mueller and Warneryd, 2001). The problem of the conflict between shareholders and managers is of course very old and at least one part of post-Soviet states' dismal economic performance during the 1990s, where asset-stripping and outright stealing of productive assets in the face of weak legislation and enforcement have been rampant. Other activities that can be, at least partly, considered appropriative include litigation expenditures (Farmer and Pecorino, 1999, Hirshleifer and Osborne, 2001) and of course lobbying, "corruption", and rent seeking.

How much of such activities can be considered unproductive or non-productive and therefore in some need of control and governance is not a priori clear. However, the point is not where precisely to draw the line but the need to look more closely to the vast world

[33]We have not distinguished here the conditions under which actual conflict occurs versus those that support settlement under the threat of conflict. Incomplete information is obviously one possible reason for parties engaging in actual conflict despite its additional costs (for formal models on this point, see Brito and Intriligator, 1985, and Bester and Warneryd, 2006). Actual conflict can also occur without incomplete information because of the compounding rewards to the winner of a conflict, a point that we will discuss in the next section.

of non-market activities; to begin recognizing that the governance of those activities takes a significant portion of human resources; and that we cannot keep assuming that all of these activities are simply deviations or distortions of an ideal world of costless market interactions in which everybody behaves as a saint, except when they need to haggle over price.

6 Enforcement costs as a function of norms and governance

We have seen that military expenditures differ widely across countries. The same is true in terms of crime rates, rates of incarceration, and the costs associated with both. However, the relationship between security - the public good that military expenditures and anti-crime spending are considered to buy - and the expenditures themselves can be hardly related. In a "Nirvana" or a "cross-my-heart" society (Schelling, 1960), where crossing one's heart implies perfect commitment, one can have perfect security without incurring any enforcement costs. Such a level of security would be difficult to achieve in a Hobbesian polity regardless of expenditures. These expenditures would be included in the measured GDP of a proverbial Hobbesian polity of "war of all against all," which could well be higher than the measured GDP of the "cross-my-heart" society despite the latter's much higher security and possibly higher overall welfare. Actual economies and societies fall in between such two extremes, yet the variation in enforcement costs and security expenditures can nevertheless vary widely. In this section, we will discuss some of the determinants of differential security costs using a very simple model.

Consider two parties, labeled A and B, to have total (gross) income Y.[34] Suppose A has secure possession of σ_a portion of that income whereas $B's$ secure share is σ_b. Thus, a share $\sigma \equiv \sigma_a + \sigma_b \in [0, 1]$ of total income is secure. If the parties are within the same country, the security of that income can be considered to be guaranteed by the state. If the parties are located in different countries or if they are countries themselves, security could emanate from practically enforceable international law, the international collective security arrangements that have prevailed in the post-WWII period, or through other bilateral and multilateral agreements. We can think of that security as being due to "governance".[35]

The remainder insecure income, $(1 - \sigma)Y$, is contestable by the two parties through arming. If parties end up fighting, then we assume that it leads to the destruction of some of the insecure income so that only $\phi(1 - \sigma)Y$ $(\phi \in (0, 1))$ is left to the winner of fighting. To be clear, we consider the following sequence of moves:

1. A and B choose costly levels of arming, g_a and g_b.

2. Each side makes a choice of whether to fight or to divide the contested income according to a given division rule $v^\beta(g_a, g_b)$ (to be specified below), where $v^\beta(g_a, g_b)$ is the share of insecure income received by A and $1 - v^\beta(g_a, g_b)$ is the share received by B. If either side chooses to fight, the two sides fight with the following expected incomes:[36]

[34] The model and analysis is based on Garfinkel, McBride, and Skaperdas (2012).

[35] We can think of governance as encompassing both political institutions and arrangements as well as conventions or norms about property that may not be supported by particular institutions.

[36] Note that, if $g_a = g_b = 0$, then $\frac{g_a}{g_a + g_b} = \frac{1}{2}$.

$$y_a^f(g_a, g_b) = \sigma_a Y + \frac{g_a}{g_a + g_b}\phi(1-\sigma)Y - g_a \tag{18}$$

$$y_b^f(g_a, g_b) = \sigma_b Y + \frac{g_b}{g_a + g_b}\phi(1-\sigma)Y - g_b \tag{19}$$

3. If both sides choose to settle, then their incomes are the following:

$$y_a^\beta(g_a, g_b) = \sigma_a Y + v^\beta(g_a, g_b)(1-\sigma)Y - g_a \tag{20}$$

$$y_b^\beta(g_a, g_b) = \sigma_b Y + (1 - v^\beta(g_a, g_b))(1-\sigma)Y - g_b \tag{21}$$

Note that in place of the more general contest success function as in (1), for simplicity we have used the specific functional form in (3) for party A's probability of winning. Furthermore note that, since fighting is always a best response to the other player's fight decision in stage 2, fighting is always a subgame perfect equilibrium. Along such an equilibrium, the level of arming is given by:

$$g_a^f = g_b^f \equiv g^f = \frac{\phi(1-\sigma)Y}{4} \tag{22}$$

The corresponding equilibrium incomes are equal to:

$$y_i^f(g^f, g^f) = \sigma_i Y + \frac{\phi}{4}(1-\sigma)Y \quad i = a, b \tag{23}$$

It is apparent from the above that the lower is σ, and therefore the weaker is formal governance, the higher is arming and the lower are equilibrium incomes. We will now concentrate on the case in which settlement is a possible equilibrium.

Given the settlement incomes in stage 3 and the conflict expected incomes described in stage 2, in stage 2 party A can choose to settle only if

$$v^\beta(g_a, g_b) \geq \frac{g_a}{g_a + g_b}\phi \tag{24}$$

and, similarly, party B can choose to settle only if

$$(1 - v^\beta(g_a, g_b)) \geq \frac{g_b}{g_a + g_b}\phi \tag{25}$$

Because $\phi < 1$, for any given choice of guns (g_a, g_b), there is a range of possible division rules that could satisfy both (24) and (25). For simplicity, we consider the following class of rules parameterized by $\beta \in [0, 1]$:

$$v^\beta(g_a, g_b) = \beta\frac{g_a}{g_a + g_b} + (1-\beta)\frac{1}{2} \tag{26}$$

This class of rules includes the following three possibilities:

a. ($\beta = 0$) This is an example of a "cross-my-heart" society, where the insecure income is divided in half regardless of each side's choice of guns.

b. ($\beta = \phi$) When the insecure income is divided according to any symmetric axiomatic bargaining solution (including the Nash and Kalai-Smorodinsky solutions) where the disagreement payoffs are those under fighting as described in (18) and (19) in stage 2.[37]

c. ($\beta = 1$) When the insecure income is divided according to the probability of winning ($\frac{g_a}{g_a+g_b}$ for A and $\frac{g_b}{g_a+g_b}$ for B).

The settlement incomes in (20) and (21) along with a specific rule in (26) constitute a well-defined game.[38] The Nash equilibrium choices of guns, denoted by (g_a^β, g_b^β), are the following:

$$g_a^\beta = g_b^\beta \equiv g^\beta = \frac{\beta(1-\sigma)Y}{4} \tag{27}$$

The corresponding equilibrium incomes are equal to:

$$y_i^\beta(g^\beta, g^\beta) = \sigma_i Y + \frac{2-\beta}{4}(1-\sigma)Y \quad i = a, b \tag{28}$$

Note how both gun choices and equilibrium incomes depend on the security or governance parameter σ and on the rule of division or "norm" parameter β. It turns out that as long as conflict is sufficiently destructive ($\phi \leq \frac{1}{2}$), settlement can be supported as a subgame perfect equilibrium for any $\beta \in [0, 1]$.[39] Observe that along such subgame perfect equilibria, if either $\sigma = 1$ (so that all property were to be perfectly secure) or $\beta = 0$ (the case of cross-my-heart society where guns were to play no role in dividing any surplus), no guns would be chosen, and incomes would be maximal. However, there is an important caveat: for $\phi > \frac{1}{2}$ (fighting is not too destructive), under $\beta = 0$, settlement cannot be a subgame perfect equilibrium.[40] More generally, when $\phi \in (\frac{1}{2}, 1)$, for settlement to be a subgame perfect equilibrium, we need $\beta \geq 1 - 2\sqrt{\phi(1-\phi)}$. The less destructive is the conflict (the closer is ϕ to 1), the higher β has to be to support settlement as a subgame perfect equilibrium.[41]

In general, as property becomes more insecure (σ becomes lower) or as more weight is given to the disagreement point in bargaining (β is increasing), more resources are spent

[37] All axiomatic solutions coincide in this case because the Pareto frontier is linear. When the Pareto frontier is strictly concave, then the axiomatic bargaining solutions do not coincide in general, they induce different levels of arming, and could therefore be Pareto-ranked (see Anbarci, Skaperdas, and Syropoulos, 2002, for such an analysis).

[38] Note that the equilibrium of this game does not involve any fighting, any overt conflict. How and why actual fighting may occur is a very important issue that we did not discuss in this paper. Fearon (1995) has provided an early overview of rational-choice reasons for conflict for a political science audience. Skaperdas (2006) provided an overview using economic models while Blattman (2022) an over-arching an easily accessible perspective.

[39] To appreciate this, consider the limiting case of $\beta = 0$. In this case, as per (27), $g^\beta = 0$ and the payoff to each player under settlement as per (28) is $\sigma_i Y + \frac{1}{2}(1-\sigma)Y$, $i = a, b$. Suppose now that one of the sides, say A, unilaterally chooses to deviate from $g^\beta = 0$ and opts to fight. In that case, since $g_b^\beta = 0$, and given the contest function in (3), A needs to expend only an arbitrarily small arming amount ($g_a = \epsilon > 0$) to ensure their certain victory in the ensuing conflict. Hence their optimal payoff from such a deviation would be $\sigma_a Y + \phi(1-\sigma)Y - \epsilon$ as per (18). This deviation is however not in A's interest as the associated payoff is strictly less than their payoff under settlement as long as $\phi \leq \frac{1}{2}$.

[40] To see this, suppose that $\beta = 0$ and one side were to choose $g^\beta = 0$. Then recall that as per footnote 39, the other side could best-respond by choosing a very small positive amount of arming and win the conflict with probability 1. When $\phi > \frac{1}{2}$, this would yield a payoff that is higher than the settlement payoff. Hence such a deviation would unravel settlement as a subgame perfect equilibrium.

[41] Similarly, Chang and Luo (2017) find that exogenous increases in the destructiveness of conflict due to an advancement in military technology improve the likelihood of armed peace under the shadow of conflict relative to an all out war.

on guns and less income is left for consumption or other purposes. Therefore, we can see how enforcement costs and incomes can vary widely between different jurisdictions depending on the governance and norms that determine how parties in actual or potential conflicts interact.[42]

How and why do security and norms vary between jurisdictions? We have discussed briefly in the previous section how difficult it is to define and enforce basic property rights in land (let alone define and enforce such rights on complex financial products). It requires a strong and non-corrupt state that has been investing in the legal system and internal security over long periods of time (McBride, Milante, and Skaperdas, 2011). Such investments are also complementary with other forms of state capacity and are key to modern economic development (Besley and Persson, 2011). Thus, the level of security cannot be increased instantaneously, as it is a long-drawn process that may be path dependent, and it is likely more difficult to invest in security than it is to destroy it. In the long-run, societies can drift apart in terms of their respective levels of security, their concomitant resources devoted to conflict and levels of social welfare.

Likewise, norms and culture evolve over time and can converge to very different outcomes (see, for example, Carvalho, 2017, and Young, 2015). Although Schelling's "cross-my-heart" society (β=0), as we have seen, might not be an equilibrium in our static model in some cases (when conflict is not destructive enough), it might still be possible for a society's members to be able to *commit* to a low enough β in suitable dynamic settings. That is more likely to occur in small-scale societies in which its members can sanction one another over time in cases of deviations from the norm.

The simple model of this section could also be applied beyond domestic interactions within one country to relations among countries. Whereas there is no ultimate enforcer in interstate relations - there is anarchy in the literal sense of the term - there are norms and international law that have evolved over the past few centuries or even longer that can have significant influence on arming, the incidence of conflict, and economic welfare. In the post-WWII period, in particular, international organizations such as the UN provided constraints and an admittedly highly imperfect enforcement of international law and norms that nevertheless significantly limited interstate wars and forcible border changes (see, for example, Herbst, 2014, about the significant role of international institutions in maintaining stable borders in Africa). This followed the experience and apparent lessons of the interwar period when the League of Nations - a predecessor of the UN - and other mechanisms and institutions proved inadequate in preventing WWII.

Over the past few decades, however, we have been going through a period during which the effectiveness of international law and norms appears to be waning. Instructive as an example is the difference in the international legitimacy between the 1990-91 and 2003 Iraq wars. The first one was explicitly authorized by by the UN Security Council with its avowed purpose of promoting international law by countering Iraq's invasion of Kuwait. By contrast, the second Iraq war was without any formal legal approval and, as an invasion of a sovereign state, went against the UN charter. Since then, the number of such violations on international law and norms have increased that have further eroded the post-WWII seeming consensus. Our simple model - even without taking into account the effects of trade and general equilibrium - clearly shows that the erosion of

[42]Similarly, in the realm of non-violent conflict such as civil litigation, corporate exposure to litigation risk can vary considerably across jurisdictions and depend on institutional traditions. For example, Arena and Ferris (2018) find that corporations exposure to litigation risk is lower in civil law countries as compared to common law countries.

such institutions can be expected to lead to higher levels of arming, reduced welfare, and higher risk of war.

One factor outside the model that could affect internal conflicts within countries is that of external third-party interventions, from simple mediation to militarized responses to economic incentives. The overview of the relevant literature by Rohner (2024) shows that, at best, the results are mixed in terms of their effectiveness in reducing conflicts. Dube and Naidu (2015) show how US military assistance in Colombia appears to have strengthened militarily some non-state actors in a way that undermined state institutions and overall security within the country. A key reason that external interventions have difficulties in bringing peace is that external powers have their own interests in mind and often civil wars occur precisely because of external powers, especially when competing external powers are using different constituencies within a country to pursue proxy wars (see Sambanis, Skaperdas, and Wohlforth, 2020). The Democratic Republic of the Congo is a tragic example which has been experiencing war for thirty years now, which started first as spillover of the Rwandan genocide and has since then involved interventions by many states from Africa and beyond (see Prunier, 2008).

Having shown that the costs of conflict can vary substantially across societies, the question is whether economic outcomes can be in any sense "neutral" to those costs, regardless of their level. That is, do standard results of economic theory - and the assumption that they hold in reality - about marginal productivity, scarcity, preferences, technology and their effects on prices, incomes, and social welfare continue to hold when conflict costs are non-zero?

7 Security and the Modern State

How do you solve the problem of the high costs of conflict and insecurity? The previous section illustrated how social and cultural factors - that we have lumped under the term of "norms" - and political factors (the level of security of resources) have large effects on the costs of conflict. While social and cultural factors can play an important role in modern economies and societies in reducing conflict, in this section, we concentrate on political factors, and in particular on the role of the modern state in providing formal, enforceable property rights.[43]

The types of modern mass markets that have evolved and expanded over the past few centuries have been characterized as *impersonal* (North, 1990) or as *socially contrived* (Olson, 2000), as opposed to *personal* and *self-enforcing* markets, respectively. Such markets require a suitable definition of property rights, proper adjudication of disputes when they arise, and the enforcement of decisions that emerge to resolve such disputes. How do you create and enforce such property rights?

Why pre-modern states could not provide modern property rights

Before trying to answer this question, we discuss some attempts by economists to determine whether pre-modern states could solve the problem of modern economic de-

[43]Hodgson (2015) provided a summary and a cogent critique of having solely norms as a way of fully enforcing modern property rights. Skaperdas (2003) covered similar territory of political factors as those in this section.

velopment, including that of modern property rights and markets. For about the past three millennia, the larger such states were authoritarian. [44] Grossman and Noh (1994) called such states *proprietary*, in which, following the model of the profit-maximizing firm, the ruler's objective is to maximize the difference between taxes (revenues) and the cost of running the state, including the cost of extracting taxes, maintaining a military, and providing public goods.

One idea that has evoked considerable interest is that of Olson (1991) and McGuire and Olson (1996) who argued that a *stationary bandit*, a ruler who has a long-time horizon, can actually have the incentives to provide public goods, including effective property rights, so as to facilitate economic development.[45] Contrary to a *roving bandit*, the stationary bandit, as the proprietor of the state, provides protection against other bandits and thieves by using the state apparatus that is more efficient than the protection that can be provided privately by each subject individually.[46] That is, more security can be bought with a larger share of the population devoted to useful production and fewer subjects resorting to banditry and robbery. Higher levels of security, in turn, induce the ruler to provide the more traditional infrastructural public goods and stimulate trade and economic development. With a longer time horizon, the profit-maximizing ruler could lower taxes and further stimulate productive economic forces.

There are several problems with this basic idea of an autocratic ruler (or a dynasty of rulers) with a long time horizon in providing adequate modern property rights and they include the following:

- The profits and rents of autocratic rulers typically attract continual internal and external challenges in ways that make rulers uncertain about the future and even paranoid (e.g., Wintrobe, 1998, for the latter). The challenges and uncertainty reduce the ruler's effective horizon. Moreover, given that rulers have high extractive powers, they can behave in short-termist ways and not only impose high taxation but even expropriate those they deem as potential challengers (models that yield such results include Moselle and Polak, 2001, Konrad and Skaperdas, 2012, and Marcouiller and Young, 1995.)

- The presence of a long horizon without the aforementioned problems does not necessarily imply stable property rights and the promotion of economic development. As Robinson (1997) has argued, promoting economic development can go against the interests and viability of the ruler. Those who acquire wealth, such as merchants and industrialists, may demand a share of power; expanding education can make more of the lower classes politically conscious and demand changes in the

[44] There were many exceptions among smaller city states. And, before and after the first states appeared in Mesopotamia, Graeber and Wentgrow (2021) have argued forcefully that self-governing, democratic politics was far more common than assumed. Approximately over the past three millennia, and before the emergence of modern states, authoritarian kingdoms and empires became dominant.

[45] To our knowledge, Findlay (1990) was the first to specify a model of the autocratic state within an optimizing framework. Besides McGuire and Olson (1996), others include Grossman and Noh (1994), Hirshleifer (1995), Marcouiller and Young (1995), Skaperdas and Syropoulos (1995), Robinson (1997), Konrad (1999), Konrad and Skaperdas (2012), and Moselle and Polak (2001). Wintrobe (1998) has engaged in an in-depth examination of dictatorships, as he considers the many different control problems that dictatorships typically face. Usher (1989) has developed an elaborate model of anarchy out of which autocracies may emerge.

[46] McGuire and Olson (1996), as well as Findlay (1990) and others, model the services provided by the state as an ordinary public good, without any explicit reference to the provision of security. The interpretation discussed here follows that of Konrad and Skaperdas (2012).

status quo; even building roads can make it easier for rebels to reach the capital and drive out the ruler.[47] Robinson's (1997, pp. 23-26) review of the evidence on dictatorships suggests that those with dynastic pretensions and therefore longer horizons have been the most predatory during the twentieth century.

- Even a long-established dynasty, with each of its members having long time horizons, cannot make iron-clad commitments about property rights, even if it wanted to do so. The old king might have respected the rights to land of nobles and commoners, but the new king might have different ideas about particular individuals and their progeny. Because rule is personalized in a proprietary state, commitment depends on the ruler's character which cannot extend beyond the ruler's life.[48] Modern property rights require commitment of the state itself as an impersonal entity and, as we seek to demonstrate below, it is a complex and difficult task to an extent that cannot be ignored simply as economic "frictions." What is required is the perception of the state not as long-lived but, according to North, Wallis, and Weingast (2009), as *infinitely lived*.

Modern property rights and modern markets

Coming back to the issue of modern markets and modern property rights, first consider property rights in land. Land, contrary to financial assets such as stocks and bonds, is concrete: it can be measured and surveyed with high accuracy and its contents - structures, trees, other characteristics - can be easily ascertained and recorded. To delineate property rights in land, you need to have laws. To have laws, you need a legislative body that will write and pass them and an executive that will validate them. For the laws to be effective, the state will have to commit to them and the power and legitimacy to enforce them for the long haul. The state's commitment includes the title and other agencies that will record and deposit titles and related documents; courts and police that will enforce the laws; the trained professionals like surveyors, lawyers, judges, bureaucrats, legislators, and police who are needed to staff the different organizations; the institutions of higher learning that will educate all these professionals; and the belief that the whole chain from legislation to the different levels of enforcement and legal appeals is close to 100 percent free of corruption.

It is by no means easy or inexpensive to specify and enforce modern property rights. A country can have perfectly good laws but difficulties in enforcing them.[49] Or, a country can have fine enforcement of its laws but have difficulty creating laws that are adapted

[47] As quoted in Robinson (1997, p.2) former President of Zaire Mobuto Sese Seko said to former President Juvenal Habyarintha of Rwanda: "I told you not to build any roads... Bulding roads never did any good.. I've been in power in Zaire for thirty years and I never built one road. Now they are driving down them to get you." President Mobuto was following the same policies of the former owners of Congo, the kings of Belgium and especially King Leopold.

[48] Sovereigns typically did have restraints to their rule through the military power of rival nobles and customary law, but the difficulty of providing the commitment necessary for modern property rights can be seeming in the discussion below. However, formal representative bodies did provide restraints on the ruler's behavior (Konrad and Skaperdas, 2007) and could even benefit the ruler in the long run (Myerson, 2008).

[49] Colombia, for example, has apparently good laws but for some time had more than 3 million of its rural population displaced not just because of insurgencies but also because of land expropriation by gangs and paramilitaries.

to a modern economy. Britain is a good example - and the first one - of the process of adaptation of its legal system to modern times. Property rights in much land in the 17th and even in the 18th century often had *entails* that made selling or mortgaging land almost impossible (Bogart and Richardson, 2009, 2011). There was no outright owner of the land. The head of an extended family was more like the custodian of a collective property, with even distant cousins having rights to crops or income from the land. The enclosures of the commons was another change in property rights that took place over centuries. This process perhaps contributed to an increase in efficiency but also an increase in inequality (Heldring, Robinson, and Vollmer, 2023), and this is without taking account of the conflict costs associated with the enclosures (Sekeris, 2014). The form of property in land that legally co-evolved with industrialization was the *fee simple* personal private property, which includes the right to use, sell, rent, improve or transfer ownership, has indefinite duration, and minimal other restrictions. That type of property, with which are are nowadays familiar, had been uncommon historically and has spread quickly around the world over the past two centuries.[50]

Modern property rights made the sale of land far easier than in the case where one had to compensate her or his first, second, and third cousins before selling. Hence, not only a market in land became viable, but using land as collateral became possible, necessarily accompanied by the creation of suitable laws about how mortgages would be handled and how foreclosures would be performed. In turn, using land as collateral further stimulated the market for land. Underpinning all the above is a very high degree of confidence on the part of all market participants that none of the contractual terms, the basic laws, and their enforcement will change during the life of the loan. It is difficult to see how an autocrat with few restraints could inspire enough confidence so that markets such as today's mortgage markets could evolve.

A further step in market evolution was to make the mortgages themselves tradable by bundling them together in the form of Mortgage Backed Securities (MBS); laws and the apparatus for enforcing these laws became a necessary accompaniment. An even further step was undertaken in the US by dividing individual mortgages into different tranches and bundling the different tranches into different securities (Collateralized Debt Obligations - "CDOs") catering to investors with different tolerances for risk. This last type of market was at least partly responsible for the Great Financial Crisis of 2008, which can be attributed to inadequate legal enforcement for the protection of buyers of those securities (Johnson and Kwak, 2011).[51]

This last case demonstrates the difficulties in defining and enforcing property rights for complex financial instruments and for many virtual goods and services. There is no fail-safe system of ensuring perfect enforcement. Nevertheless, the modern state is able to provide the level of commitment to support modern property rights and markets, to which we now turn.

The Modern state and security: Centralization, checks and balances, rule and law-based governance

[50]Blaufarb (2016) argues that fee-simple modern property was invented only after the French revolution, which he argues is difficult to recognize today because modern property is taken for granted even though it could not have existed under previous political and social regimes such as feudalism.

[51]In addition to "simple" CDOs, securities based on CDOs - CD0-squared or CDO-cubed - as well as "synthetic" CDOs - based on essentially unregulated insurance products called Credit Default Swaps (CDWs) - became common as the culminating point of the crisis was approaching. Parenthetically, the failure of the largest insurance company at the time (AIG) was due to the underpricing of its CDWs.

Compared to their pre-modern antecedents, modern states are much more centralized. The majority of taxes are administered by central governments, there are no internal tolls, and there is no differentiation in terms of taxing individuals according to ascriptive characteristics such as class or caste.[52] Furthermore, fiscal expenditures by modern states dwarf those of pre-modern states. Pre-modern state expenditures typically were below 5 percent of estimated GDP, often they were less than 2 percent, and very rarely exceeded 10 percent of GDP (Stasavage, 2020, Ch.6). Given that incomes per capita have been much higher than they were in pre-modern times, the fiscal capacity along with centralization of modern states has been historically unprecedented. Therefore, the power of modern states to coerce has been immense, accompanied by the legitimate monopoly of the means of violence within their territories. How can such states, then, commit to upholding property rights and not abuse that coercive capacity?

It appears that along with centralization, over centuries enough restraints have evolved in richer countries so as to allow for high levels of commitment. Requiring the English Parliament to authorize all taxes and expenditures in addition to the Crown's approval clearly allows for greater long-term commitment than having the Crown decide such matters by itself. North and Weingast (1989) argue that it took almost the whole seventeenth century in England for the Parliament (consisting of nobles) to develop just the beginnings of an effective check on the powers of the Crown. Li, Roland, and Xie (2024) also point to several developments in England over the 17th century that contributed to a further deepening of separation of powers by facilitating the emergence of an independent judiciary.[53] Such checks allowed the transfer of conflicts from the battlefield to legislatures, to courts, and to public debates. Separation of powers, other forms of checks and balances including wider democratic representation, and laws and bureaucratic rules typically prevent governments to use the immense power of the state in order to annul basic property rights protections.

Bureaucracy has come to have a negative connotation, at least in certain quarters. However, a competent and honest civil service is necessary for the state to be able to make commitments to property rights. Otherwise, bribing can be an effective method of dispossessing rightful owners and claimants. Even without any corruption, incompetence and favoritism weaken the functioning of the economy, including property rights enforcement. This is especially the case when a high number of government employees are political appointees, with each change in government accompanied by mass firings and hirings of workers. That has been the historical experience of many countries before they acquired a professional civil service. In the United States, for example, almost all federal employees were presidential appointees up to the late nineteenth century, when a series of reforms created a professional bureaucracy (Johnson and Libecap, 1994).

For the state to have commitment powers, it needs to limit the variation in decision making of government agencies and officials so that they are consistent with laws and rules. That is, part of an effective bureaucracy is its *limited discretion* in deviating from rules and laws. As Weber (1976) has articulated, bureaucracy becomes professionalized though low-powered incentives, by providing civil servants with security of employment that does not depend on which party is in power, salaries that are adequate to deter

[52] Dincecco, 2011, provides in Ch.2 evidence about the long history of gradual centralization in Europe.

[53] Li, Roland, and Xie (2024) suggest that an environment marked by greater interconnectedness and cohesion among the elites, the Treason Act of 1695, the Act of Settlement in 1701, and the considerable expansion of the membership of the House of Lords in the 17th century were important contributors to this development.

corruption for most, and a professional ethic and culture that insulates civil servants for everyday political struggles.[54]

Overall, the modern state - at least in its ideal form - can provide the security that can support modern impersonal, socially-contrived markets. It can do so by being impersonal itself, by not depending on the whims of a few powerful individuals but on the basis of laws; by being perceived as infinitely-lived so that individuals and organizations feel protected from arbitrary future changes in the institutional environment; by being highly centralized with a bureaucracy that has limited discretion to facilitate consistent, if not necessarily speedy, final decisions; by having the legitimate monopoly in the means of coercion so as to be able to provide, if necessary, the ultimate enforcement of its laws and property rights; by having a thicket of checks and balances and other forms of distributed power that check on the centralized power of the executive, to enable, perhaps paradoxically, long-term commitment.

These functions of the modern state are complementary to each other. They mutually reinforce one another, in the sense that an increase in the value of one function increases the marginal return to investing in other functions (following Besley and Persson, 2011). That allows for considerable leeway in having even highly imperfect state institutions. Some states do not even have fee-simple property rights for land; others do, but have trouble enforcing them; some have both adequate definition and enforcement but not a developed legal and framework to use land for collateral; even fewer states have the legal underpinnings and functioning market for Mortgage Backed Securities (MBS) or CDOs.

Ultimately, such adaptations of the modern state have their roots in the costs of conflict and insecurity that we started with. These costs and their reduction lie at the root of some important functions of the modern state that are typically neglected or even considered irrelevant. That is, as a bonus, we review an underappreciated rationale for the existence of government and especially for the apparent complexity of the modern state.

8 Economic Consequences of Costly Conflict: An Interim Assessment and Open Issues

Given the economic costs of conflict, the models we have examined show that the effects on prices, incomes, and social welfare are likely to be substantially different from the outcomes predicted by Nirvana models. The conclusion then, in accordance with the Theorem of the Second Best (Lipsey and Lancaster, 1956), is that, in order to understand any particular economic environment in which conflict is present, one needs to take into account the accompanying costs of conflict and their effects on key economic variables. This is especially the case if one were to make welfare assessments about, for example, the effects of liberalizing markets or the contribution of security expenditures on consumption and welfare. Nevertheless, the default reaction in many economic policy circles, and even in some research, is to use the intuition of the first and second theorems of welfare

[54]Milgrom (1988) and Milgrom and Roberts (1990) have show how the limiting of discretion, equity in compensation, and other procedures that seem inefficient in a market environment can be efficiency enhancing within organizations in the presense of influence activities. Along the same lines, Warneryd (1998)'framework can be used to show that having nultiple levels of hierarchy in influence activities and rent-seeking can increase efficiency. Furthermore, using a traditional principal-agent approach (see Tirole, 1994, and Dixit, 1996), multi-tasking along with measurement problems can lead to the optimatility of low-powered incentives.

economics, which provide simple guidance that is unlikely to be helpful given the significant deviations from the assumptions of Nirvana models. In that respect, the Theorem of the Second Best is more empirically relevant than the first and second theorems of welfare economics, even though the two latter theorems are much more prominent than the former in our teaching, and arguably, as a broad guide to policy.[55]

In all of our analysis, we have examined settings of pure conflict, as defined in the Introduction, in which there are no positive externalities of conflict (on the interacting parties or third parties). Introducing externalities - with and without interventions that internalize them - in the models we have discussed would obviously make the effects on prices, incomes, and welfare even more complex than they can be in the presence of pure conflict. Modeling and recognition of the interaction between the costs of conflict and its externalities has been virtually non-existent in the case of violent conflict and in many cases of non-violent conflict such as lobbying, litigation, and marketing.[56]

Violent conflict can have positive external effects on technological progress (as well as negative externalities in the form of "collateral damage" to third parties). Hoffman (2015) has argued, for example, that the Europeans' ability to conquer much of the rest of the world by the 19th century is largely due to the very slow, over centuries, evolution of military technology developed due to incessant warfare within Europe. This evolution, however, was so slow that it could not have entered the calculations of the European rulers who engaged in warfare themselves, and therefore, could not have entered into any cost-benefit analysis at the time. (The negative externalities of warfare were of course horrific within Europe and beyond.) Dincecco and Onorato (2018) find evidence that cities in Europe that experienced higher levels of conflict in their areas centuries ago have significantly higher per capital incomes today. The phenomenon is explained by the authors as a complex outcome of cities becoming "safe harbors" within areas of conflict that developed the capacity to build successful defenses as well as provide other public goods that has created the conditions for high levels of economic development.

In modern times, there is ample evidence that military technology has had significant spillovers into civilian technology (Ruttan, 2006). Even Apple's main products, including the iphone, owe their key technologies to inventions by military labs and other military-connected organizations such as DARPA (Mazzucato, 2015, Ch.5).

Should we conclude then that spending even more resources than currently expended on the military is justified as a way of accelerating technological innovation? First, note that spending more on warfare can make a war more likely and more destructive. Second, the same amount of funds dedicated to military technology could be dedicated to civilian purposes, and their effect on civilian technology would be at least as great as the mere spillovers that might be enjoyed from military technologies. That is, civilian R&D expenditures should provide at least as great a return - and likely considerably greater - as the same expenditures dedicated solely to military R&D.

Similar issues about the ambiguity of "value" can also be raised for non-violent forms of conflict including litigation, lobbying, political campaigning, marketing, advertising or

[55]There are of course numerous reasons, other than conflict, that should also lead to the same conclusion. They include the presence of externalities, public goods and other collective goods, monopoly, monopsony, and other non-competitive behavior, taxes and subsidies, tariffs and quotas, or transaction costs (other than conflict costs). What we are trying to demonstrate in this paper is that the presence of conflict costs is a quantitatively important class of "distortions" that has been nearly completely neglected in economics.

[56]Partial exceptions include the economics of organizations (e.g., Milgrom and Roberts, 1990) and the economics of sports (Szymanski, 2003).

other persuasive and influence activities. Recall that such non-violent interactions are conflicts according to our definition because they involve the adversarial combination of inputs. Antioch (2013) has built upon McCloskey and Kramer (1995) to estimate that persuasive activities (broadly defined) accounted for as much as 30% of U.S. GDP in 2012. Wallis and North (1986) had earlier provided estimates of the transaction sector of the US economy while Marselian (1998) correlated transactions costs with macroeconomic variables. Laband and Sophocleus (1992) estimated that aggregate rent-seeking expenditures (towards both physical and persuasive conflicts) designed to facilitate and inhibit nonexchange wealth transfers accounted for nearly a trillion dollars or about a quarter of nominal GNP in 1985. Laband and Sophocleus (2019) note the paucity in more contemporary estimates of these costs and discuss more broadly, the challenges in empirically estimating both direct as well as indirect welfare costs of rent-seeking.

Note that the expenditures on such inputs are all included in the measurement of GDP. Because the sides competing in such conflicts could theoretically not expend any of these inputs and have the same outcome (either probabilistic or deterministic) as with the expenditure on the inputs, including them in GDP would imply that the inputs have value in some other way. Positive externalities provided by such activities include the value of information to third parties, better enforcement of property rights (in the case of litigation), or helping with the discovery of truth, but of course those are very difficult to estimate and are external to the contending sides. The private returns to participants in non-violent conflicts - the value of winning a lawsuit, the gain in market share, the adoption of a favorable regulation, and so on - can have social value but in some cases they do not (for example, in rent-seeking for monopoly rights). Therefore, counting the value of adversarial inputs in non-violent conflicts as a proxy for their private and external returns is bound to be highly imperfect.

Given the high levels of contribution of services in modern rich economies and especially of "persuasion" and "transaction costs," and considering GDP as a measure of welfare, the question arises about how close is the correspondence between the measurement of these services and the worth of these services. It is certainly more difficult to ascertain the value of these services compared to other economic sectors (primary and secondary), in which inputs are typically combined cooperatively. There is currently very little discussion of this issue in economic research, which in our view deserves considerable attention.

9 Concluding Remarks

We have conceptualized conflict as the adversarial combination of inputs, contrary to the way that typically economic inputs are thought to be combined collaboratively in production and in exchange. One important implication of this conceptualization is that the expenditure of a greater amount of inputs by adversaries - guns, rent-seeking, marketing - does not imply that anyone is better off; on the contrary, all can well become worse off in a negative-sum game.

War is the starkest example of an adversarial combination of inputs. The empirical significance of conflict costs cannot be overstated. These costs much exceed the deadweight losses traditionally analyzed in economics. Moreover, these costs vary significantly across societies and time periods, depending critically on governance structures, state capacity, and prevailing norms.

Thus, costly conflict represents a fundamental economic reality that also emerges theoretically directly from the principle of self-interested behavior on the part of economic actors, a principle that is a central component of traditional economic theory. When we incorporate conflict into standard economic models, we find that many traditional economic predictions are substantially altered. Compensation, prices, and resource allocation are all shaped differently in a world with conflict costs, pointing to the inadequacy of first-best models that assume perfect and costless enforcement of property rights.

The approach we have reviewed allows for both productive and appropriative (or conflictual) activities on the part of economic actors and offers a more pragmatic approach to understanding economic phenomena by acknowledging that conflict is not an exceptional condition, but rather an inherent feature of economic life. This perspective helps explain why seemingly inefficient arrangements such as wage subsidies or land reforms may be rational responses to environments with high conflict potential. It also explains why comparative advantage can be distorted by security concerns, affecting international trade patterns in ways not predicted by standard models. Such interactions between security and economic exchange suggest that policy interventions must account for second-best scenarios where multiple distortions exist simultaneously.

Furthermore, we have argued that modern economic development cannot be understood in isolation from the political institutions that govern conflict. The evolution of the modern state — with its centralized authority, checks and balances, and bureaucratic structures — has been crucial in reducing conflict costs within states and enabling complex impersonal market interactions and the rise of large organizations that have characterized the modern economy. In our brief review of the relationship between modern markets and the modern state, we sense that we have only scratched the surface and much more research is warranted in order to improve understanding of those interactions.

Economic models and other representations of reality are often mistaken for reality itself rather than simplified tools with built-in assumptions and limitations. Instead of being understood as provisional frameworks, these models become our mental templates for how the world works, obscuring the strong empirical assumptions and qualifications underlying them.[57]

This confusion has significant consequences. For instance, the assumption of perfectly secure, costless property rights — which is merely a modeling convenience — becomes perceived as an empirical reality. The policy implications that follow from such assumptions are then treated as natural economic laws rather than outcomes contingent on specific theoretical choices.

For both scientific and policy reasons, we need to subject these approaches to robustness checks by placing conflict and the exercise of power at the center rather than the periphery of economic analysis. As Naidu, Rodrik, and Zucman (2020) argue, the rising inequality and dysfunction observed in Western economies should not be viewed as natural, inevitable outcomes that cannot be "interfered" with. Instead, they result from specific politico-economic interactions that are both amenable to rigorous economic analysis and open to policy intervention.

[57] There is of course a related literature about how economic ideas and models shape perceived reality, including the well-known last paragraph of Keynes (1936). More recent analyses of how economic models affect perceptions and policy include Blyth (2002) and MacKenzie (2008).

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