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# The contribution of Herschel I. Grossman to political economy

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## Abstract

Herschel Grossman was one of the most creative and productive economists of his generation in the field of political economy. This paper surveys his scientific contributions to the field.  
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## 1. Introduction

Throughout history the responses of human societies to the problems of distributing property and of allocating resources between productive and appropriative activities probably have had greater consequences for welfare than have their responses to the problem of allocating resources among different productive activities taking property as given, which is the problem on which economic analysis traditionally has focused (Herschel Grossman, 1994).

When Herschel I. Grossman left this world on October 9, 2004 while attending a conference in Marseilles, the economics profession lost one of the most creative and productive economists of his generation. His heritage is some 80 publications in refereed journals, unfinished projects, and inspiration to colleagues and students. His

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publications suggest two scholars, one in the field of Keynesian macroeconomics and another in political economy and contest theory. Herschel Grossman began his career very much inspired by Keynesian economics and he was especially puzzled by the economic rationale for and the consequences of inflation. His textbook with Robert Barro (Barro and Grossman, 1976) is a classic in its field. Interestingly, there exists a direct path from Herschel Grossman's early research to his work on conflict and political economy (which he emphasized in an interview with Webpondo).<sup>1</sup> At the heart of the Keynesian view of the economy is the connection between monetary and real variables, which contrasts with neoclassical neutrality. This latter placed the burden of proof on Keynesians, who had to explain how monetary policy could influence the real variables of the economy. Among the many answers, credibility, time consistency, and reputation most attracted Herschel Grossman's attention.

It is a commonplace in economics that every problem of credibility or time consistency can be solved by either a complete and perfectly (and costlessly enforceable) ex-ante contract, or by the design of a threat strategy in a repeated interaction as long as the discount factor of the contracting parties is sufficiently low. It is determination of this discount factor that is at the heart of the problem of time inconsistency and credibility. From a broader perspective, Grossman's attempt to explain lack of credibility and time consistency can be seen as part of the "Coasean program" (based on the seminal papers by Coase, 1937, 1960) that has been fruitful in the development of modern contract theory, information, conflict, and institutional economics: why should rational individuals not be able to find a way to exhaust all gains from trade? The common textbook answer "because of transaction costs" provides a convincing perspective from which the problem of sustainable inefficiencies can be analyzed. However, left unanswered are questions about the nature of and reasons for transaction costs. Exogenous costs can be incorporated into the standard models without difficulty because these are costs like 'ordinary' costs of production. A fruitful approach to the problem of transaction costs needs, however, to endogenize the concept. Yet, in that case, transaction costs of a particular institution are nothing more than losses due to a deviation between the realized and the fully efficient allocation, which brings the concept close to a tautology. However, it is an interesting tautology because it focuses attention on economic forces that underlie persistent deviations between a fully efficient and an actually implementable allocation: economists trying to explain persistent frictions and inefficiencies have to come up with convincing arguments that explain why it is impossible for individuals to overcome the obstacles that impede a Pareto-improving trade. Even more, in order to understand the advantages and disadvantages of specific institutions, one has to identify the institution-specific obstacles that explain the institution-specific transaction costs, which ultimately gives rise to a theory of optimal institutions.

Although he did not explicitly refer to the concept of transaction costs, Grossman's solution to the problem of non-neutrality was deeply rooted in this program: in any type of state or more general society, be it democratic or dictatorial, it is the ruling elite that is

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<sup>1</sup> See Grossman (2004e).

responsible for the determination of monetary and fiscal policies. The rate at which the elite discounts the future is related to the survival probability of the political regime, which is influenced—but not completely determined—by the ruling elite’s chosen policies. This idea marked a turning point in the scientific career of Herschel Grossman. The political system was identified as the key influence on frictions in the economy. From Herschel Grossman’s point of view, a careful study of the process of policy-making therefore had the potential to provide understanding of the reason for and the structure of frictions that create long-term inefficiencies. It is my purpose here in this scientific obituary to provide an overview of the evolution of Herschel Grossman’s thinking as a political economist, which began from this observation.

A systematic treatment of the scientific work of an economist as productive as Herschel Grossman must necessarily be selective. I shall focus on political economy, leaving aside most of his research on monetary and information economics as well as labor contracts. I start with a systematic treatment of the scientific paradigm on which Herschel Grossman’s research was based. This methodological excursion allows an understanding of his uncompromising focus on economics as a positive science and on the close relationship of his research to research programs as diverse as the theory of the firm, contract theory, political philosophy, and anthropology.

## 2. Institutions as rules of the game or institutions as outcomes of a game?

A key characteristic of Herschel Grossman’s economic research was his uncompromising insistence on the assumption of self-interest of all economic actors, and the observation that individuals seek their advantage by all possible means, legal or illegal. This, of course, he had in common with the public choice school of economics. More fundamentally, the concepts of legality and rights are themselves social constructions serving a specific aim. As an implication of this view, it follows that the equilibrium distribution of goods and resources is necessarily a result of the initial distribution of power among members of a society. These observations may sound almost trivial, given the concept of *homo oeconomicus*, yet major parts of modern mainstream economics explicitly or implicitly depart from rigorous application of the concept of self interest or take it as given that there are rules that cannot be violated by definition. Such an assumption, while a useful simplification for the analysis of some problems, may lead to serious misperceptions.

Before further developing the implications of Herschel Grossman’s approach and in order to obtain a better understanding of the systematics of Grossman’s scientific contributions to political economy, it is useful to start with a systematic treatment of institutions as introduced by Williamson (2000). Williamson distinguishes four levels of social analysis.

- L1: Norms, religion, morality, cognitive models, and the like that influence individual behavior are located at the social *embeddedness* level.
- L2: The *institutional environment* comprises the basic “rules of the game”, for example, the constitution and the legal system of a society.

L3: The institutional environment creates space for legal actors such as the executive or public and private firms (or *governance structures*).

L4: Last but not least, levels L1–L3 influence the periodical interactions of individuals; this is the level of *resource allocation*.

These levels are interdependent. For example, the institutional environment influences the institutional actor, and the institutional actors influence the evolution of the institutional environment.

In one of his last extended interviews, Grossman stressed that a proper understanding of the economic role of institutions requires that institutions be understood to be the result of a social process. This apparently harmless remark is a direct attack on the mainstream approach towards institutions that has best been exemplified by [Kreps \(1990\)](#) and [North \(1990\)](#). According to their view, institutions are the rules of an adequately defined game. Individual incentives can then be influenced by adequate design of the rules of the game. Given the above scheme, this implies a ‘top–down’ causality where higher-level institutions influence the structure of lower-level institutions. This approach has been extremely successful and influential in the field of mechanism design and also in the Brennan–Buchanan type of political economy.<sup>2</sup> However, it relies on the (implicit) assumption that the rules of the game can be credibly enforced. As [Hirshleifer \(2001\)](#) has pointed out, because any form of enforcement in the end is carried out by someone within the society, this assumption is in general inconsistent with individual rationality. Therefore, analyses based on this assumption have sometimes been referred to as the “outside-enforcement approach”. This approach can be useful for explaining a number of economic phenomena, as for example the design of employer–employee contracts. It is a good approximation in the analysis of such a situation to assume that—disregarding information asymmetries—the enforcement of such a contract by the state is exogenous, or, to put it differently, that the state is an impartial actor that enforces individual contracts.

The standard paradigm of this view of the constitution is that economic behavior can be systematically influenced by the choice of constitutional rules. The focus on voting rules and the like relies on the (implicit) assumption that the outcome of such a decision rule can be credibly implemented. Individuals have neither the opportunity nor the interest to circumvent the outcome of an election. Hence, the choice of a ‘good’ constitution is, from this point of view, a two-step procedure: one first has to study the allocative and distributive properties of different constitutional rules by modelling them as rules of a game, and then one has to choose the best rule.

However, the outside-enforcement approach reaches its limit when the institutional structure of the state as such is to be explored. In such a situation there is no natural outside enforcer, and the problem of self-enforcing institutions becomes of crucial relevance. Theoretically, this shift in perspective requires a shift in the idea of an institution, or a shift in the scientific paradigm. Institutions are no longer the rules of an endogenously designed but exogenously enforced game but are themselves outcomes of an adequately designed (meta-) game. In the above scheme this view implies a shift in causality from top–down to

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<sup>2</sup> Compare, for instance, [Brennan and Buchanan \(1985\)](#).

bottom–up: for example, institutions such as the constitution emerge as an equilibrium of a game among individuals. This constraint may severely limit the ability to influence individual incentives by means of institutional rules, because the institutional rules need to be compatible with the rational behavior of individuals in an adequately designed environment.

The view that institutions themselves need to be equilibria of a game has been fruitfully explored by now because it helps to formulate answers to the above-mentioned “Coasean” conjecture that individual rationality alone should create a tendency towards efficiency without recourse to ad-hoc restrictions on the space of contracts or political instruments. Herschel Grossman was among the first to have systematically taken and explored this approach. His contributions range from explanations for the emergence of property rights to the explanatory variables determining war and peace (both  $L4 \rightarrow L2$ ); and from the ability of a ruling elite to exploit the general public ( $L4 \rightarrow L3$ ) to the economic role of morality ( $L4 \rightarrow L1$ ). In order to provide an impression of his thinking, the following section follows a simple logic. We first focus on the forces that explain the emergence of rules beginning from a situation of anarchy. Then we turn to the forces that explain the centralization of power. Given that power is partly centralized, we then enquire into the constraints under which a ruling elite acts and into the consequences for the internal as well as external expansion of power.

### 3. The paradigm of conflict

Given the paradigm of self-enforcement of institutions, it is only a small step towards the paradigm of conflict. Since institutions have to be the equilibria of an adequately defined game, what is an adequate definition of such a game?

#### 3.1. *The emergence of property rights and the emergence of the state*

Standard economic thinking following the outside-enforcement approach, for example general-equilibrium theory, takes as given that the enforcement of property rights is one of the undisputed responsibilities of the state. This concept of a ‘night-watchman’ state becomes less obvious as soon as one focuses attention on the technological process of the enforcement of property rights. Starting with a pioneering paper by [Bush and Mayer \(1974\)](#), economists began to recognize that (1) in distinction to the production of ‘ordinary’ economic goods, the production of secure property rights is more adequately seen as a contest where individuals can invest resources in appropriation and defense and that (2) the economic forces explaining the emergence of property rights and the economic forces explaining the centralization of enforcement in general differ. In this class of models, the intensity of conflict and the conditions for the emergence of stable institutions are themselves determined by the technological and resource constraints of a society.<sup>3</sup> However, expectations about future scarcity may also be a key explanatory variable for

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<sup>3</sup> See [Grossman and Kim \(1996\)](#) for more details.

the intensity of conflict at a given point of time, as proposed by Grossman and Mendoza (2003).

A short look around the world and into human history reveals that reality is much more diverse than traditional economic analysis would suggest. There are regions where property rights have evolved over time. However, during some periods of time and in some of these regions, the enforcement of these rights was more or less decentralized, for example in the United States during the time of the California land run and in continental Europe during the time of the *Lex Mercatoria*.<sup>4</sup> All ‘modern’ states with well-defined property rights have a mixture of centralized and decentralized law-enforcement activities, as for example investments of the software and music industry to prevent illegal use.<sup>5</sup> In addition, in regions of the world where people still live as hunter–gatherers, property rights have never emerged,<sup>6</sup> and it becomes a relevant question as to whether this non-emergence is simply a historical coincidence, or whether property rights would have been the wrong mechanism for achieving ‘good’ outcomes. As with technological innovations, there exists no historical pathway towards optimal organizational innovations and the fact that institutions like property rights have evolved in some areas of the world and not in others may be partly explained by historical coincidence. However, given this caveat, it is also obvious that there is no ‘one-size-fits-all’ solution to the problem of optimal institutional design. The existence of property rights together with the implied law-enforcement mechanism is superior to alternative mechanisms only if—in a very broad sense of the word—the technological environment is such that alternative institutions imply larger transaction costs.

In his 2001 paper in the *American Economic Review*, Grossman (2001) introduced two canonical models of endogenously enforced property rights and a definition of an effective property right that emerges in anarchy. In accordance with the literature on the nature of the firm (e.g. Grossman and Hart, 1986), property rights are control rights. However, the ability to control a good or resource is itself the result of an investment in defense and/or appropriation. Given this definition, what are the economic forces that explain the emergence of property rights? In order to answer this question, Grossman distinguished between common-pool and initial-claims models. In a common pool, there is either no initial possession of a good or resource, or initial possession has no influence on the defensive ability of an individual. Because of this property, one does not have to distinguish between appropriative and defensive activities. This class of models has been extremely influential, both in the literature on property rights and in the literature on rent seeking.<sup>7</sup> However, there may be a number of situations where the initial possession of a resource may create an advantage for the possessor. This relative advantage influences the final distribution of the contested good or resource. In addition, this class of models is able to identify situations in which perfectly secure property rights in the sense of unchallenged

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<sup>4</sup> Interestingly, the economic success of the *Lex Mercatoria* advanced centralization of law enforcement in the hands of the ruling nobility, who wanted to participate in its success.

<sup>5</sup> See Grossman (2005) for an analysis of intellectual property rights.

<sup>6</sup> See Diamond (1999) for further references.

<sup>7</sup> As two examples out of the by now huge literature on endogenous property rights, see Hirshleifer (1995) and Skaperdas (1992). The idea and canonical model of rent seeking are due to Tullock (1967, 1980).

initial claims emerge. Grossman and Kim (1995) showed that, in a situation where defensive investments are made before appropriation takes place, initial possession remains unchallenged if the defensive advantage is sufficiently large. This result creates a foundation for models that start with the assumption of perfectly enforced property rights because the conditions are characterized under which such a situation can be expected to emerge, and resources necessary for defense in order to begin from such a situation are quantified. Hence, from the point of view of transaction-costs economics, this class of models is extremely important in allowing an endogenous concept of transaction costs of a market mechanism in a very natural way, which is an integral part of a theory of optimal institutional design. Furthermore, these models allow a better understanding of the economic role of morality as a conflict and therefore transaction-costs reducing device, and the evolutionary forces that created a moral disposition in human beings (Grossman, 2000b).

This theory of the emergence of property rights requires no centralization of responsibilities. Property rights emerge because of decentralized investments in enforcement. The resulting situation has more the character of ordered anarchy than of a minimum state. However, if there is mutual agreement among the individuals who accept the resulting allocation of goods and resources, this agreement is fully compatible with the idea of a minimum constitution, and with this interpretation ordered anarchy has all the ingredients that usually constitute a state. However, following the tradition of Thomas Hobbes (1982 [1651]), some kind of centralization seems to be constitutive for a state. One reason for centralization is obviously the existence of economies of scale in the enforcement of property rights (Konrad and Skaperdas, 2003). However, economies of scale need not be the only reason why centralization might have advantages, despite an emerging ruling elite is selfish and tries to maximize its own rents.

In his 2002 paper in this journal, Grossman (2002) proposed a public-choice problem of decentralized enforcement of property rights as a potential explanation for the emergence of centralized enforcement of property rights. In this model, individuals have the choice of becoming producers or predators. If they become producers, they can invest part of their resources in the defense of their possessions. The resulting decentralized equilibrium has two types of inefficiencies compared to the first best. First, total output is lost because some individuals decide to make a living as ‘predators’. Second, the existence of predators makes it necessary to invest in defense. Centralization implies the establishment of a ruling elite with the power to tax the producers. The ruling elite wants to maximize rents and has, therefore, no direct incentive to create property rights. However, it has an indirect incentive to do so because defensive investments influence the decision to become a producer and thereby affect total tax revenues. A centralized decision regarding defensive investment changes the individual trade-off between becoming producer or predator because the ruling elite can commit to a level of defense before the individual’s decision is made. This centralized equilibrium suffers from two types of inefficiencies. As before, part of potential production is lost because of defensive investments. Second, part of potential production is lost as rents consumed by the ruling elite. These different trade-offs suggest that the optimality of either regime depends on the producer–predator trade-off that is decisively influenced by the conflict technology. If defense is relatively difficult compared to appropriation, the costs of decentralization are large compared to the costs of

centralization. Hence, this theory implies a tendency towards the establishment of ruling elites in all situations where appropriation is relatively easy compared to defense, and vice versa. From a long-term perspective, it follows as an immediate extension of this result that the optimal degree of centralization is not time invariant but depends on the conflict technology, which may change over time.

When property rights are no longer assumed to be exogenously enforced, the distributional consequences of change in the economic environment may be turned upside down in different dimensions. For example, the comparative statics of conflict models may differ drastically from the comparative statics of general-equilibrium models (see for example Skaperdas and Syropoulos, 1997) and the existence of organizational structures may be given a totally different explanation.

Distributional issues are discussed in a number of papers by Herschel Grossman. Two papers stand out. In his 2002 paper with Kim, Grossman and Kim (2002) analyzed the consequences of redistributing resources among individuals in an economy where individuals can specialize in the production and guarding of goods or in predation. The model is constructed so that every allocation of resources would be Pareto-efficient in a conflict-free economy. However, the presence of conflict has substantive implications for the normative evaluation of different allocations of resources. For example, not only the Paretian irrelevance result breaks down but an egalitarian allocation is no longer Pareto-efficient. It is even Pareto-dominated by the allocation that maximizes the consumption of the worst-off individuals (the Rawlsian allocation). To put it differently: even for the most egalitarian criterion of justice, some degree of just inequality emerges in the presence of conflict. This result illustrates the importance of incorporating the potential of conflict into normative economics: conclusions about consequences of policies that are derived without explicit consideration of the underlying frictions imposed by appropriative policies may be highly misleading.

Distributional issues matter not only in normative economics but may also play a major role in the explanation and interpretation of social institutions. Redistribution from the rich to the poor can be based on altruism by the rich, or can be a consequence of self-interest in a narrow sense of the word. If the latter is so, then, without the potential for conflict and social unrest by the poor, one would not observe voluntary redistribution by the rich. In addition, historically we know that most advances in the development of the welfare state have their origins in the risk of social unrest by the poor. For example, Bismarck, the founding father of the German welfare state, viewed a small pension as the best instrument to pacify the masses. Following the line of argument, in two papers, Herschel Grossman (1994, 1995a) developed a theory of voluntary redistribution based on the idea of conflict between rich and poor.

### *3.2. The behavior of the state*

#### *3.2.1. A political Coase theorem?*

Irrespective of the economic forces that explain the emergence of a centralized state, such a state exists in almost all countries of the contemporary world. It is therefore important to understand the logic of centralized decision making. One dividing line between mainstream public economics and the public choice/political economy view is the

former's reliance on the fiction of a benevolent dictator, whereas the latter insists that states are governed by individuals who care about their own utility.

Institutional economists are always pleased when persisting inefficiencies can be explained. Despite the apparently overwhelming commonsense evidence that institutions matter, it has been surprisingly difficult for economists to come up with convincing theories that explain persistent institution-specific inefficiencies. This puzzle finds expression in different theoretical challenges that are all variations of the same theme, for example:

- the standard Coase Theorem, which suggests that the outcome of exchange is efficient as long as property rights are perfectly defined and costlessly enforceable;
- the Williamson Puzzle (Williamson, 1975), which suggests that—by the principle of selective intervention—the replacement of market transactions by hierarchical structures is at least neutral from a Paretian point of view, which, in the end, implies that the creation of one huge centralized ‘world firm’ should be optimal;
- the McGuire and Olson (1996) Conjecture (reintroducing an idea from Hobbes, 1982 [1651]) that a selfish dictator with unlimited power has an incentive to create efficient institutions.

Of course, the implication is not that we live in a Panglossian world of efficiency where the institutional structure is more or less irrelevant but that one has to identify and quantify the frictions that are idiosyncratic to specific institutions. A number of influences have been identified over the last decades that assist in explaining these frictions, for example, asymmetric information, problems of verifiability, renegotiation, and time consistency.

From this point of view, the outside-enforcement approach and the benevolent-dictator assumption are the two sides of the same coin used as currency in the game of mainstream economics. Whether or not—or more precisely under what conditions—the assumption of a benevolent planner is a good simplifying approximation of reality is therefore of primary importance in deciding whether the benevolent-dictator assumption is a good basis for a research strategy. That is, one has to be able to establish the conditions under which a political Coase Theorem does or does not hold. Driven by the explanatory deficits of Keynesian macroeconomics, Herschel Grossman was among the first who systematically analyzed this question. Given that we maintain the assumptions of methodological individualism and egoistic preferences, we have to focus on the incentive structure that is imposed upon the ruling elite. In general, this incentive structure should be compatible with two conditions. First, an expected-externality mechanism is required in order to induce behavior by the ruling elite that is consistent with welfare maximization. Second, self-enforcement is required to solve the puzzle of guarding the guards. In two papers with Noh (Grossman and Noh, 1990, 1994), Herschel Grossman developed a theory that provides an answer based on the three elements: survival, accountability, and credibility. The basic mechanism is as follows: a ruling elite is constrained in its attempts to exploit the citizens by the threat of being replaced through an election, a revolution, or a coup d'état. The threat of being replaced depends on the political institutions that can either promote or suppress the emergence of new political groups. The elite more or less faces

the same constraints as a monopoly in a contestable market<sup>8</sup>. The potential for entry is called the accountability of the system. The survival probability of a ruling elite depends on a potential survival probability that is mainly affected by stochastic external (geopolitical and economic environment, etc.) factors, and the possibility of the citizens replacing the elite. A high survival probability creates credibility for the elite's policies but at the same time implies limited control by the citizens. Grossman and Noh show that the higher the potential survival probability, the more accountability is possible without violating the credibility constraint. It is exactly under these conditions that the ruling elite has an incentive to behave benevolently.

### 3.2.2. *The logic of internal expansion of power: competition among ruling elites*

Herschel Grossman used historical case studies in the sequel of his papers on credibility and accountability to exemplify the theory (Grossman, 2000a). He attributed the long-term success of the British political system to the historical coincidence of a high external survival probability. The implications of this theory differ substantially from other theories of political systems, for example Brennan and Buchanan (1985) or Besley and Coate (1997): whereas for example the design of voting rules is a key factor in explaining political outcomes in the traditional theory, according to Herschel Grossman, the key characteristic of a political system is degree of openness towards outsiders entering the political arena.<sup>9</sup> This openness is partly but not only determined by the institutions of the society. Repeated interaction between established political parties and lobbying by special interest groups affect the interests of the established parties and determine the ruling elite. Threat of potential entry may have a much deeper impact on actual policies than competition between established parties. The technological and regulatory environment that determines the behavior of a monopoly thus also determines the behavior of the established political clique, and it is therefore of primary importance to identify the technological factors that promote or deter entry. However, as Karl Popper (1971) pointed out, openness of the political system is no value in itself. Openness threatens the survival of the ruling elite and may therefore create incentives to excessively exploit society.

Given that the openness of the system is key to understanding the logic of political action, potential outsiders have a choice: they can either challenge the ruling elite by legal means (for example, Ross Perot in the USA or Le Pen in France) or by revolutions or insurrections (for example, Lenin, Mao, or Castro). The decision is determined by the technological factors that underlie political power. The conditions under which one ruling elite tends to be replaced by another, and the resulting implications for policies, have been analyzed in a series of papers. Herschel Grossman's main interests were the phenomena of insurrections (1991, 1992, 1995b), civil wars (2004d), and revolutions (1999), and he also applied his ideas to the logic of colonialism in a paper with Iyigun (Grossman and Iyigun, 1997).

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<sup>8</sup> See Baumol et al. (1982).

<sup>9</sup> This view on the economic role of institutions and the importance, for example, appear in Public Choice III (Mueller, 2003).

### 3.2.3. *The logic of external expansion of power: war and peace*

War is a puzzle for economists: waste of resources gives rational politicians incentives to avoid military action by ex-ante negotiations. In this sense, the outcome of war defines a threat-point from which rational states can bargain to the Pareto frontier. Is war necessarily the result of irrationality or non-dissolvable overconfidence in the probability of victory of at least one of the conflicting parties, or is it possible to identify ‘economic’ explanations for conditions under which war can be expected to be the outcome? [Herschel Grossman \(2003, 2004a,b,c,d\)](#) addressed this question in a number of papers. The theoretical foundation for his analysis is laid out in his [2004c](#) paper, where he assumed that actors are rational and have symmetric information in a territorial conflict. He distinguishes three strategies, war (both parties invest in appropriation of contested territory), peace with a fortified border (both parties negotiate a division of contested territory and invest into the defense of the border), and peace with an unfortified border (both parties negotiate a division of the contested territory and do not invest into defense). All situations can be observed empirically, and the question arises whether it is possible to identify the economic forces that explain the conditions under which the different strategies can be expected to be rational.

Of course, peace can only be expected to be the outcome of a dispute if the payoffs of a peaceful settlement exceed the payoffs from military conflict and if the promises not to attack are credible. Following the same logic as in the literature on property rights, it is also clear that under specific circumstances the fortification of the border may improve the credibility of peace. However, an unfortified border may also be a rational outcome of the game if a country that might act aggressively fears a sufficiently effective counterattack. The regime is consequently determined by two parameters, the ratio of effectiveness of counterattack to attack and the ratio of effectiveness of fortification and attack. If the first ratio is sufficiently high, an unfortified border is an equilibrium of the game; if it is relatively small, the choice between war and a fortified border depends on the latter ratio.

Of course, outcomes depend on assumptions of the model, among which the following are especially important. It is assumed that there are no economies of scale from the control of land and that the negotiated outcome can only be changed in favor of the counterattacking country if the other country attacks first. Implicitly, the latter implies strong assumptions on the nature of defensive investments, namely that weapons used for fortification cannot be used for aggressive purposes, which may or may not be true empirically. Nevertheless, the paper provides an explanation for a phenomenon that is of primary economic relevance and identifies measures that can be falsified empirically.

In a paper with [Juan Mendoza \(Grossman and Mendoza, 2004\)](#), [Herschel Grossman](#) has further developed this idea by means of two model-oriented case studies of the (successful) building of the Roman empire and the (unsuccessful) building of the Nazi–German empire. A state has three principal strategies in building an empire, attempted conquest (the annexation is a result of a military conflict), coerced annexation (the annexation is a result of a sufficient concentration of troops at the border as to force capitulation), and uncoerced annexation (the annexation is a result of side payments to the ruling elite of the conquered country). The choice depends on relative costs, which in turn depend on two parameters, the relative effectiveness of the own troops compared to those of the country to be annexed and the expected value of the expansion. If the strategic

advantage of the conquering troops and the value of the annexed country are sufficiently large, a country would prefer to expand its empire by means of coerced annexation. However, this strategy is relatively expensive in terms of the direct costs of financing an army with the necessary potential for threat, so this strategy may not be feasible. If the conquering troops are sufficiently ineffective and the value of the annexed country is sufficiently great, uncoerced annexation is the most effective strategy. It is only for a relatively small value of the annexed country and a relative balanced strength of aggression and defense that attempted conquest is the dominant strategy for territorial expansion.

#### 4. Concluding remarks

Herschel Grossman devoted his professional life to painting a great picture of the logic of human societies. This picture has all the elements of great art: the starting point is a simple yet convincing idea that is used with subtlety and ingenuity. Because of his sudden unexpected death, Herschel Grossman was unable to finish every element of his picture. The main structure is however clearly visible and will last. His work on property rights and the emergence of the state has substantially broadened the perspective of institutional and political economics, as has his work on the logic of political regimes.

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