Households production in State and stateless societies: three tales and one letter

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Households production in State and stateless societies

Three tales and one letter

**Francesco Angelini · Guido Candela ·
Massimiliano Castellani**

Abstract Interpreting three tales based on the words of Hume, Hobbes, and Nozick, and a letter by Vilfredo Pareto, we present a comparative analysis of household production in several societies with and without State. The community we analyse is formed by two households, which may either follow a selfish or an altruistic logic. Furthermore, unless the stateless community has a common defence against external marauders or implements protection in cases of bad weather, the household production can be stolen or damaged. The society with State is ruled by a Government that can be either partisan or bipartisan. The economic analysis of the private and public choice of this community allows us to compare the efficiency and inequality of several configurations of society, as depicted by classical political economy.
JEL Codes: H11, H23, H41

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1 Introduction

An age-old philosophical debate, dating back to Socrates, Plato, and Aristotle, focuses on the nature and role of the State in a community formed by private agents.[1] In the economic debate, analysis of the community has focused on the governance of the community, on the behaviour of the agents that are part of the community, and on how the community defences are organized.

Two opposite visions of the role of the State emerge in analyses of community governance: communities governed by the State, in other words societies with State, and communities self-governed by private agents, called stateless societies. In the first case, following Stiglitz (1989), the State produces the goods and services which are essential to community life (public goods) or alternatively plays the role of an organiser managing these goods and services, which are accessible to all members of the society (common goods) (Ostrom 1990). In the second case, societies without State can be governed by private agents if market mechanisms and other institutions are able to enforce cooperation and coordination without a State.

This lively debate is also found in the political economy literature (Acocella 2018), where the State is generally considered a benevolent dictator or a benevolent policy-maker. Different views have been proposed in this strand of literature, e.g. the hypothesis of a State controlled by a lobby or governed by a partisan or political party, whose main or unique goal is to pursue the lobby interests of political party members.[2]

The main studies that focused on agent behaviour cover the theory of altruism and reciprocity and the selfish and altruistic behaviour of agents when they interact or they have to contribute to a public good. In the altruism theory of Margolis (1982) the agents act non-selfishly and are motivated by a concern for the welfare of others. An alternative approach, for example, suggested by Harsanyi (1980) supposes that agents pursue self-interest while being subjected to moral constraints, which are rules that everyone should follow in their own interest.[3] Following this line, Sugden (1984) introduced the reciprocity principle in the supply of public goods through voluntary contributions and compared it to the Margolis altruism theory and to the rule called the "Kantian" principle. Roemer (1996) introduced the formal definition of Kantian allocation and, more recently, he called Kantian behaviour a cooperative kind of optimizing behaviour that produces Pareto efficient outcomes and solves

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[1] According to Socrates, the State is an ethical institution that should educate individuals to become better citizens. For Plato the philosophers should govern the community, the warriors should defend it, and the artisans and tradesmen should produce and trade goods. In addition, philosophers and warriors should share their property with the community, to avoid conflicts of interest. Finally, according to Aristotle, the three political forms of the State are monarchy, aristocracy, and *politeia*. However, these political forms could degenerate and become, respectively, tyranny, oligarchy, and democracy.

[2] An example of the lobby controlling the State is the model by Grossman & Helpman (1994), where different lobbies can bid for protection and the policy outline is supported by the contribution of these lobbies. For a review of the economic studies on the implications of a State controlled by a partisan or political party see Hibbs (1992).

[3] Another framework to analyse the agents' behaviour and to compare different societies with respect to the levels of public good provided and efficiency uses the I-rationality and the we-rationality paradigms (Arena & Conein 2008). The distinction between these two types of behaviours is part of the literature on individual and collective rationality and choices. See, for example, Sugden (2000) and Becchetti et al. (2010, 2013).

different kinds of commons' tragedies (Roemer 2015).[4] Levine (1998) examined a theory of altruism where the players' payoffs are linear in their own and their opponents' monetary income, showing that, in a market game, the theory of altruism and the theory of selfish players result in exactly the same predictions.

Finally, another strand of economic literature studies how a community's private and public goods are provided and how they are protected from risks, such as plunders. For example, the community could be raided by external individuals, or plundered by agents that are part of the community. In both cases, the community has to protect its production from damage and pillage, but the defence action taken way it defends itself can be more or less efficient. In particular, Olson (1993) stated that "roving bandits" make anarchy inefficient and a "stationary bandit" such as a dictator who monopolizes and rationalizes theft in the form of taxes can increase the efficiency. Kurrild-Klitgaard & Svendsen (2003), following Olson (1993), showed that, in a world of roving bandits, a sub-optimal provision of public goods and of security exists. Thus, the most efficient bandits can monopolize violence, levy taxes and provide public goods to improve the efficiency. For Leeson (2007) it is possible to transform roving bandits in traveling traders by transforming the incentive to banditry into an incentive to trade, and by reducing the producers' costs associated with trade. Young (2016) explained when competition among roving bandits does not lead to the emergence of a "non–predatory state". Moselle & Polak (2001) argued that poverty may result in statelessness rather than vice versa, when "predatory states" emerge from organized banditry. Skaperdas (2001) stated that organized crime can emerge in the absence of state power. Grossman (2002) showed that having a "king", who can enforce a collective choice to allocate resources thereby securing the product for the producers, may be better for both producers and potential predators compared to not having a king.

To link these three strands of literature, we introduce a comparative analysis of efficiency level in various political frameworks, by means of three tales and one letter: the "production tale", following Hume (1740), the "defence tale", which comes from our interpretation of the contribution about agencies made by Nozick (1974), the "Leviathan tale" as narrated by Hobbes (1651), and the letter written by Vilfredo Pareto for Benjamin Tucker's anarchist periodical *Liberty* (Pareto 1889). Our contribution is also related to the theoretical model of Baker & Bulte (2010) that presents the incentives motivating the defending population to agglomerate into larger groups to better defend against attacks, and the model of Konrad & Skaperdas (2012) that examine a theoret-

[4] In order to define this concept as a new ethics, Laffont (1975) postulated that an agent assumes that the other agents will act as he does, and he maximizes his utility function under this new constraint. Harsanyi (1980) called this rational behaviour "rational commitment principle" since it requires each agent to contribute in the same way he would want others to do, regardless of whether others actually make this contribution. Sugden (1984) called it the principle of unconditional commitment, while he called the conditional commitment principle "the reciprocity principle". Indeed, for this principle, under certain qualifications, if everyone else contributes a particular level of contribution to a public good, one must do the same.

ical setting in which protection can be provided by self-governing groups, even though self-governance faces long-term viability problems because welfare can be as low as, or even lower than, welfare in the absence of State. Compared with these papers, our model allows us to consider a single framework for both the issue of common defence and the problem of governance.
The model we use to represent the three tales and the letter describes a community of two agents (or two groups of agents), A and B, who live in a valley where corn production is purely the results of man's labour. The harvest can be damaged by bad weather unless a protection against severe weather is installed. There are early and late season varieties of corn and the harvest is not simultaneous, but B's corn ripens first. The valley is not naturally defended from marauders who are not part of the community and thus outsider could steal part of the harvest if the agents do not defend the corn they cultivate. Hence, opportunism may arise in various forms inside the community, as we will demonstrate.
In our model, bad weather and marauders could undermine the existence of the community and damage its members. A and B can cooperate to manage the problems arising because of bad weather and marauders: they can either defend the valley and protect the harvest from bad weather by themselves, through self-governance, or thanks to the coordination of an institution such as a State.

The remainder of the paper is organized as follows. Section 2 introduces the production and the defence tales, and models the game between the two agents in absence of a State. Section 3 presents the Leviathan tale and Pareto letter, and studies the equilibria of the game in the presence of a bipartisan and a partisan State. Section 4 concludes the paper.

2 The stateless societies

In this Section, following Hume (1740) and Nozick (1974), we present the first two tales on life in a community that must decide how to defend its production from bad weather and marauders. We model these social choice problems by using a game between the agents who make up the community.

2.1 The production tale

Your corn is ripe to-day; mine will be so to-morrow. 'Tis profitable for us both, that I shou'd labour with you to-day, and that you shou'd aid me to-morrow. I have no kindness for you, and know you have as little for me. I will not, therefore, take any pains upon your account; and should I labour with you upon my own account, in expectation of a return, I know I shou'd be disappointed, and that I shou'd in vain depend upon your gratitude. Here then I leave you to labour alone: You treat me in the same manner. The seasons change; and both of us lose our harvests for want of mutual confidence and security. (Hume

1740)

In order to model the "production tale", we define R as the harvest obtained by each agent. In order to protect the harvest from bad weather, A has to help B and B has to help A, by means of extra work. We define $\ell = \{\alpha, \beta\} \geq 0$ as the extra work; α is the extra work by A to help B, and β the extra work done by B to help A. Extra work is optional and costs $S(\ell)$, where $S(\ell)$ is assumed to be increasing at an increasing rate. The protection from bad weather for A's harvest is increasing in B's extra work and vice versa.
Analytically, we assume a probability of protecting the harvest $0 < P(\ell) < 1$, where $P(\ell)$ is a concave function in the support $[0, 1]$. We also assume that good weather has a probability of occurring equal to π and, thus, bad weather occurs with a probability $1 - \pi$. We define the combined probability of bad weather and protection as follows:

$$\Pi(\ell) \equiv \pi + (1 - \pi)P(\ell)$$

Consequently, A's and B's expected net benefits will be equal to:[5]

$$\begin{aligned} \mathbb{E}\left[\mathbb{N}^A\right] &= \pi R + (1 - \pi)RP(\beta) - S(\alpha) = R\Pi(\beta) - S(\alpha) \\ \mathbb{E}\left[\mathbb{N}^B\right] &= \pi R + (1 - \pi)RP(\alpha) - S(\beta) = R\Pi(\alpha) - S(\beta) \end{aligned} \tag{1}$$

Each agent's expected net benefit is given by a part of harvest R, with a certain risk of be damaged by bad weather measured by the combined probability $\Pi(\cdot)$, and a part given by the cost of extra work $S(\cdot)$.
We assume that B's corn ripens first but the speed of the corn's growth does not affect the quantity of corn harvested. The timing of the game is then the following:

1. B cultivates his corn and possibly uses A's extra work to protect the corn from bad weather, harvesting either R or $RP(\alpha)$, depending on the weather;
2. A cultivates his corn and possibly uses B's extra work to protect the corn from bad weather, harvesting either R or $RP(\beta)$, depending on the weather.

Clearly, B's opportunism arises if he uses the extra work α and he does not help A by exerting β. That is because agent B may simply avoid helping agent A, since B has no commitment and there is no State or agreement that obliges him to exert extra work.

2.2 The defence tale

The two agents can cooperate and create a defence agency, by using part of their harvests as a payment for the soldiers of fortune, commanded by a general. The soldiers can stop the marauders from entering the valley and stealing

[5] Hereafter, the superscript of a variable indicates the agent.

the corn. The agency defends the harvests of A and B, so the defence action has a public good feature. The marauders arrive when B has already harvested his corn while A has not yet harvested. Hence, opportunism could emerge, since A could enjoy the benefit that comes from the defence paid entirely by B, refusing to return what he owes to B when A's corn is ready to be harvested.[6]

The "defence tale" introduces an army into the model, led by an external agent since both A and B are completely busy working in the fields. In what follows, the existence of the army is represented with $D = 1$, while its absence with $D = 0$.
In fact, Nozick (1974) assumes that agreements may arise among agents in order to defend themselves from marauders, in the form of protective associations, also called protective agencies. The task of these agencies is to defend all the members of the association, who pay a fee and do not 'take law into their own hands'. Therefore, agencies are but companies that supply their protection and get paid for it. Each agency's protection is reserved for the members of the association and is territorially limited.
Thus, the army defends the valley and prevents the marauders from stealing the harvest, that would otherwise be reduced by a percentage $0 < K < 1$. This service has a cost equal to H. If the agents decide to turn to the protective agency ($D = 1$), they have to share the cost H, and A will pay $C^A = \{0, \frac{1}{2}H\}$, while B will pay $C^B = \{H, \frac{1}{2}H\}$. In particular, if the agreement among them is respected, they will both pay $\frac{1}{2}H$, otherwise A will pay nothing and B will pay for the defence. Since B initially has to bear the whole cost of defence, being the only one with harvested corn available, he does so awaiting A's contribution, when his corn is ready. A enjoys the benefit of the defence, paid entirely by B, and he may find it favourable not to respect his commitment to pay his part of the protection cost against marauders.
The expected net benefits of the two agents from (1) become:

$$\mathbb{E}\left[\mathbb{N}^A\right] = \begin{cases} R\Pi(\beta) - S(\alpha) - C^A, & \text{if } D = 1 \\ KR\Pi(\beta) - S(\alpha), & \text{if } D = 0. \end{cases}$$

$$\mathbb{E}\left[\mathbb{N}^B\right] = \begin{cases} R\Pi(\alpha) - S(\beta) - C^B, & \text{if } D = 1 \\ KR\Pi(\alpha) - S(\beta), & \text{if } D = 0. \end{cases}$$

Given these expected benefits, we report the conditions for which it is convenient that both agents turn to the protective agency:

$$\begin{aligned} \frac{1}{2}H &\leq (1 - K)R\Pi(\beta) \\ \frac{1}{2}H &\leq (1 - K)R\Pi(\alpha) \end{aligned} \tag{2}$$

When the two conditions in (2) hold, both agents prefer to have their harvests defended, since the damage from marauders through the theft of corn would

[6] This tale is based on our interpretation of the concept of agency introduced by Nozick (1974).

be high enough with respect to the cost of defence. Notice that B will not find it profitable to pay for the whole cost of defence in case:

$$(1-K)R\Pi(\alpha) < H \tag{3}$$

Considering both tales together, it is clear that both A and B may behave opportunistically: B may use A's extra work α and decide not to help him when he needs B's extra work β, while A may behave opportunistically by enjoying the benefits of the defence paid by B and not reimbursing the cost he owes for the agency.

In the next section, we analyse the game equilibrium in the case that neither of these two possibilities occurs, assuming that the two agents follow Kant's Universal Law, in order to identify a benchmark level of production as a comparison to the production levels we obtain in cases where opportunism arises.

2.3 Equilibrium of the benchmark model

Assume that A and B both follow Kant's categorical imperative, namely that each of them acts in the way he would like to have the other act. In Kant's words:

> I ought never to act except in such a way that I can also will that my maxim should become a universal law. (Kant 1947)

Suppose that B fixes his extra work following the rule $\beta = g(\alpha)$ and A does so following the function $\alpha = g^{-1}(\beta)$, so that each agent chooses his extra work conditioned on the other agent's extra work (or expected extra work). In order to have this choice mechanism follow Kant's categorical imperative, we assume that $g(\cdot)$ is an involutory function, meaning that it is equal to its inverse.

Formally, A and B will choose their extra work maximizing the following equations:

$$\max_{\alpha} R\Pi(\beta) - S(\alpha) - C^A$$
$$s.t.\ \beta = g(\alpha)$$
$$\max_{\beta} R\Pi(\alpha) - S(\beta) - C^B$$
$$s.t.\ \alpha = g^{-1}(\beta)$$

The FOCs of these two problems are respectively $R\Pi_\beta g' - S_\alpha = 0$ and $R\Pi_\alpha {g'}^{-1} - S_\beta = 0$.[7] Given our assumption on $g(\cdot)$, the solution of the system of the two FOCs is:

$$\alpha^* = \beta^* > 0$$

[7] Hereafter, derivatives of first order with respect to a variable are respectively indicated by a single subscript.

The two agents choose the same positive level of extra work, leading to full protection from bad weather and thus the highest probability of saving the harvest if bad weather occurs.
Notice that this solution is a Kantian equilibrium (Roemer 2010). In particular, since the Kantian equilibria dominate the Nash-Walras equilibria in terms of efficiency (Roemer 2015) and guarantee the elimination of the incentive to behave opportunistically, the equilibrium we found is the benchmark to use in the comparison with the model equilibria with selfish and altruistic agents.
Thus, when defence is convenient for the agents, i.e. (2) holds, A and B rely on the defence agency ($D = 1$) and they will share the cost equally, since they behave taking into consideration Kant's categorical imperative, i.e. $C^A = C^B = \frac{1}{2}H$. Thus, the equilibrium results in $\alpha^* = \beta^* > 0$, $D = 1$: each agent enjoys half of the total harvest that is defended against bad weather and marauders.
Following a similar reasoning, in case (2) does not hold, both agents will not find it convenient to turn to the protective agency, and will let the marauders enter the valley and seize the harvest. Hence, the equilibrium will be such that $\alpha^* = \beta^* > 0$, $D = 0$, where the agents will see a part K of their harvest taken by the marauders, and they will both pay 0 for the protective agency ($C^A = C^B = 0$).

2.4 Equilibria of the model with altruism

To take the altruism in individual and collective choices into account, we can modify the agent's preferences as in Levine (1998).[8] In particular, if a^A and a^B are the agents' coefficients of altruism and λ^A and λ^B measure the levels of fairness, we can assume that $a^A, a^B > 0$, meaning that each of the agents has a positive regard for the other agent, and $\lambda^A, \lambda^B \geq 0$, meaning that a positive level of fairness may exist, so that an agent is more willing to be altruistic toward an agent who is altruistic toward him. We then write each agent's adjusted objective function, which also considers the other agent's net expected benefit, as follows:

$$\mathbb{R}^A = \mathbb{E}\left[\mathbb{N}^A\right] + \frac{a^A + \lambda^A a^B}{1+\lambda^A}\mathbb{E}\left[\mathbb{N}^B\right]$$
$$\mathbb{R}^B = \frac{\lambda^B a^A + a^B}{1+\lambda^B}\mathbb{E}\left[\mathbb{N}^A\right] + \mathbb{E}\left[\mathbb{N}^B\right]$$

Fixing $\theta^i \equiv \frac{a^i+\lambda^i a^j}{1+\lambda^i}$, where $i = A, B$ and $j = -i$, the agents will maximize the following objective functions with respect to their own extra work:

$$\mathbb{R}^A = \mathbb{E}\left[\mathbb{N}^A\right] + \theta^A\mathbb{E}\left[\mathbb{N}^B\right]$$
$$\mathbb{R}^B = \theta^B\mathbb{E}\left[\mathbb{N}^A\right] + \mathbb{E}\left[\mathbb{N}^B\right]$$

[8] The adjusted utility in Levine (1998) is as follows: $v_i = u_i + \sum_{j\neq i} \frac{a_i+\lambda a_j}{1+\lambda} u_j$, where u_i is agent i's utility.

The FOCs of the maximization problems $\max_\alpha \mathbb{R}^A$ and $\max_\beta \mathbb{R}^B$ are respectively $-S_\alpha + \theta^A R\Pi_\alpha = 0$ and $\theta^B R\Pi_\beta - S_\beta = 0$, and the solution of their system is:

$$\begin{aligned} R\Pi_\alpha &= \frac{S_\alpha}{\theta^A} \\ R\Pi_\beta &= \frac{S_\beta}{\theta^B} \end{aligned} \tag{4}$$

Notice that the results in (4) are the same as the benchmark model ($\alpha^* = \beta^*$) when both a^A and a^B are equal to 1. This case also comprehends both a situation of "pure altruism" when $\lambda^A = \lambda^B = 0$, as defined in Levine (1998) according to Ledyard (1995) analysis of the results of public good contribution games, and a situation of full reciprocity when $\lambda^A = \lambda^B = 1$. The first situation refers to a community where two agents are purely altruistic, and their choices do not depend on the behaviour of the other agent. The second case considers a community made of agents that follow Kantian preferences, since each agent evaluates the other as himself and takes into account the action of the other agent, acting in a more altruistic way if the other agent is more altruistic toward him.

In the defence against marauders, in case (2) does not hold, the equilibrium with altruistic agents will be such that (4) holds and $D = 0$. Conversely, when (2) holds, the choices of the two agents for α and β will be the same (i.e. those that make (4) hold), and the cost of defence is split between the two agents, since they are altruistic and thus they will contribute equally to the army cost H, even in the case where agent B finds it convenient to cover the cost of the defence all by himself (i.e. when (3) holds).

2.5 Equilibria of the model with pure selfishness

In the case of selfish agents, several potential problems arise, including issues related to free riding and the convenience of side contracting. In stateless societies, side contracting may correct the inefficiency caused by selfishness: inefficiencies can be reduced and externalities overcome by internalizing efficiency gains.[9]

Let's consider the situation when defence from the marauders is convenient for A and B if they share the cost H, that is, the conditions in (2) hold and the condition in (3) does not. Considering the timing of the model, a potential agreement between the agents would see B paying for the whole cost of defence as soon as his corn is ready and receiving the benchmark-level extra work α^* from A, and then A receiving β^* and paying back $\frac{1}{2}H$. The agents will find it profitable to respect this agreement if and only if the following conditions

[9] Economic literature studied the interplay between agents and firms in the creation of side contracting, finding equilibrium conditions of efficiency (Yamada 2003). These equilibria are not always efficient (Jackson & Wilkie 2005) and may be multiple (Huck et al. 2012).

hold together:[10]

$$\begin{aligned} R\,(\Pi(\beta^*)-\Pi(0)) &\geq S(\alpha^*) \\ R\,(\Pi(\alpha^*)-\Pi(0)) &\geq S(\beta^*) \end{aligned} \tag{5}$$

Notice that the participation constraint in (5) is not always verified. In fact, if the cost of exerting α^* and β^* extra work is too high, the agreement is not respected, thus the agents' extra work levels will be null and there will be no defence. So, if (2) holds and (3) and (5) do not hold, a coordination failure arises: they will both exert zero extra work and will not turn to the protective agency against marauders, even though they would find it profitable.
When agent B finds it convenient to cover the costs of the defence all by himself (namely, condition (3) holds), it would be profitable to respect the same agreement depicted above if and only if the following conditions hold together:

$$\begin{aligned} R\,[\Pi(\beta^*)-\Pi(0)] &\geq S(\alpha^*)+\frac{1}{2}H \\ R\,[\Pi(\alpha^*)-\Pi(0)]+\frac{1}{2}H &\geq S(\beta^*) \end{aligned} \tag{6}$$

Notice that now the participation constraints are no longer symmetric, converse to (5), and A's constraint is more binding than in (5), while B's is less binding than in (5). This is because of the timing of the game and the fact that (3) holds: B will pay for H in any case, since he finds it particularly convenient to have the valley defended; agent A will follow, and cooperate only if the case of paying back $\frac{1}{2}H$ to B is convenient for him. These constraints are obtained by comparing the situation of both agents not exerting any extra work, yet B paying for all the costs of defence since he finds it profitable, and the situation of the agents respecting the agreement. Hence, when (3) and (6) both hold, the agents will reach the benchmark levels of extra work and defence, while when (3) holds but (6) does not hold, the equilibrium of the model is such that $\hat{\alpha}=\hat{\beta}=0$, and $D=1$. In other words, the two agents do not cooperate in order to protect crops against bad weather, and agent A enjoys the protection against marauders paid entirely by agent B, so there is a situation of free riding.
Finally, in the case where the agents do not find it convenient to pay for defence (namely, when (2) does not hold), the agreement between them will be limited to the extra work need for bad weather protection: A exerts extra work α^* to help B and B exerts β^* to help A. The only equilibrium in this coordination game is that both agents exert zero extra work, so both α and β will be equal to 0 ($\hat{\alpha}=\hat{\beta}=0$) and there will be no defence ($D=0$).

So, in the case of selfish agents, side contracting might be a way to avoid coordination failures, but the agreement between the agents will not always be respected. In our model, side contracting is feasible and leads to the benchmark-equilibrium levels of extra work if (2) and (5) hold and (3) does not hold, or

[10] It is straightforward to demonstrate that when agents do not cooperate, they do not exert extra work and will fix $\alpha=\hat{\alpha}=0$ and $\beta=\hat{\beta}=0$.

if (3) holds together with (6). Otherwise coordination failures and free riding arise; in these cases, the State's intervention may lead the society toward a more efficient equilibrium.

3 The societies with State

In this Section, we present a tale on the emergency of the State and a letter on the influence of a partisan State on the ruling and ruled classes. Agents may live in a community without an authority that defends them, but they can use their reason to leave this state of nature. Indeed, Hobbes (1651) indicates two ways to leave the state of nature: the spontaneous order and the Leviathan. The spontaneous order is the result of voluntary choices dictated by human reason:

> Reason suggesteth convenient Articles of Peace, upon which men may be drawn to agreement. (Hobbes 1651)

The spontaneous order corresponds to the cooperation agreement between A and B to create a defence agency that we have analysed in the previous section. On the other hand, the Leviathan is the personalization of the State (Candela 2014), and leaving the state of nature by relying on the Leviathan is dictated by reason too, since the authority attributed to the Leviathan comes from a voluntary human choice.

> I authorise and give up my right of governing myself to this man, or to this assembly of men, on this condition; that thou give up, thy right to him, and authorise all his actions in like manner. This done, the multitude so united in one person is called a Commonwealth; in Latin, *Civitas*. This is the generation of that great Leviathan, or rather, to speak more reverently, of that mortal god to which we owe, under the immortal God, our peace and defence. (Hobbes 1651)

Using its coercive power, the Leviathan can force each agent to take on extra work and can finance defence through a tax on the corn harvest. The Leviathan is by nature neutral with respect to A and B, so it coincides with the benevolent dictator (Candela 2014). However, the Leviathan can become a partisan State if it is biased towards either A or B. Hence, two hypotheses on the nature of the State can be developed: the bipartisan and the partisan State.[11] We analyse these two State forms in the following subsections.

3.1 The bipartisan State: The Leviathan tale

When the State is governed by a benevolent dictator, the agents are afforded equal weight when the State designs its policies. This is due to the agents'

[11] In both cases, we assume that the State defence action is implicit and its army is financed by levying a tax on the agents' harvest.

delegation of political power to a bipartisan State.

One way to get out of the state of nature is the creation of an authority who commit men to order. "Again, men have no pleasure (but on the contrary a great deal of grief) in keeping company where there is no power able to overawe them all". This authority is the Leviathan.
"[The Leviathan] is but an artificial man, though of greater stature and strength than the natural, for whose protection and defence it was intended; and in which the sovereignty is an artificial soul, as giving life and motion to the whole body; the magistrates and other officers of judicature and execution, artificial joints; reward and punishment [...] are the nerves, that do the same in the body natural; the wealth and riches of all the particular members are the strength; salus populi (the people's safety) its business; counsellors, by whom all things needful for it to know are suggested unto it, are the memory; equity and laws, an artificial reason and will; concord, health; sedition, sickness; and civil war, death. Lastly, the pacts and covenants, by which the parts of this body politic were at first made, set together, and united, resemble that fiat, or the Let us make man, pronounced by God in the Creation" (Hobbes 1651).

If the State is bipartisan, A and B are weighed the same in its objective function and the taxes collected from A' and B's harvest of corn are the same by assumption ($C^A = C^B = \frac{1}{2}H$).[12]
The problem facing the bipartisan State is to maximize the sum of the expected net benefits of the two agents with respect to α e β:

$$\max_{\alpha,\beta} R\Pi(\beta) - S(\alpha) - C^A + R\Pi(\alpha) - S(\beta) - C^B$$
$$s.t.\ C^A = C^B = \frac{1}{2}H$$

The FOCs of the problem are:

$$\begin{cases} R\Pi_\alpha = S_\alpha \\ R\Pi_\beta = S_\beta \end{cases} \tag{7}$$

The system of the FOCs in (7) has the same result of the system of the FOCs of the benchmark problem ($\alpha^* = \beta^* > 0$). Thus, in presence of a bipartisan State that weights the two agents in the same way, the community reaches the benchmark solution, where both agents exert the optimal level of extra work, with a highest probability of saving the harvest from bad weather.

3.2 The partisan State: The Pareto letter

The State, in addition to obliging each agent to take on extra work, can use the taxes to pay for the defence of territory in an uneven way, favouring one

[12] Making A and B contribute in the same way to the cost of the agency is not inefficient since the private agents have the same objective function.

of the two agents. When one part is supported in such a way, there will clearly be a redistributive effect.
To introduce this issue, we now present a letter written by Vilfredo Pareto to Benjamin Tucker's *Liberty*, in which he describes the social and political conditions of people in the ex-kingdom of Naples.[13]

[I]n the north of Italy the persons belonging to the bourgeoisie *and the upper classes have not common name to distinguish them from the rest of the people, while in the provinces of the ex-kingdom of Naples, on the contrary, they are known as* galantuomini. *[...] This poverty is really incredible in certain provinces, - Basilicata for instance. [...] In most of the villages the people live in cellars. There in a single room lives an entire family with one or two pigs, its sole wealth. Men and women sleep all in a heap on the same mattress. In this shameless promiscuity the very name of decency is unknown, and incest is frequent. It is not uncommon to see children go naked until the age of ten or twelve; the human creature reduces itself to the level of the beast. [...] In their commune all authority is in the hands of the* galantuomini*, who are in league against them; if some functionary of the central government sees fit to defend them, the appeal to the deputy whose they have elected, and the latter induces the ministry, under some pretext or other, to appoint another in the place of this too zealous functionary. The same fate awaits the judge who is not sufficiently favorable to the* galantuomini*; as for the jury, it being made up from them exclusively, the poor man cannot look to it for justice. [...] The poor inhabitants of the communes are now demanding the division of [the] communal lands, but the* galantuomini*, who manage the communes, are opposing this with all their might, for they rent these lands to their friends at low rates and divide the profits. [...] The central government, which has no interest to defend the poor against the oppression of the* galantuomini*, is on the contrary very anxious to defend the latter. The reason is evident. Through their deputies the bourgeois have the government in their hands* (Pareto 1889).

In this letter, Pareto proposes his definition of the social classes: the upper class, made up by the *galantuomini* who control the political power; the middle class, made up by bureaucrats and judges who accept the power of the *galantuomini*, since they aspire to be part of the *galantuomini* class; the lower class, formed by the inhabitants of the communes who suffer the effects of the political power. In our model, when the State is governed by a social class, the partisan State will pursue the particular interest of this class.
In the presence of a partisan State, we assume that B is the *galantuomo* and A is the poor, omitting the middle class from our model. In this way, the partisan State will pursue B's interest and command A to do all the extra work. The State will also choose the share of taxes H each agent has to pay, by fixing

[13] For a selection of Pareto letters to *Liberty*, see Pareto (2018).

$0 \leq \tau \leq 1$, where τH is paid by A and $(1-\tau)H$ by B. Formally:

$$\begin{aligned}
&\max_{\alpha,\beta,\tau} R\Pi(\alpha) - S(\beta) - C^B \\
&s.t.\ R\Pi(\beta) - S(\alpha) - C^A \geq 0 \\
&\quad C^A + C^B = H \\
&\quad C^A = \tau H \\
&\quad C^B = (1-\tau)H \\
&\quad 0 \leq \tau \leq 1
\end{aligned}$$

The problem is solved for $\tau = 1$, $\alpha = \alpha^*$, and $\beta = \bar{\beta} < \beta^*$. The partisan State forces A to pay all the taxes and to work so that B's harvest is protected from the risk of bad weather in the best possible way, such that $\Pi(\alpha^*) = \pi + (1-\pi)P(\alpha^*)$. B works for A up to the level that he is guaranteed a non-negative expected net benefit. Inequality in this society is due to the dominant role of B who governs the State: B enjoys maximum protection from bad weather, while A is more exposed to the risk of having his harvest damaged. Notice that, since A pays all the taxes, the marauders do not enter the valley and the defence is guaranteed, so there is no reduction of the harvest due to plundering.
Thus, even though the two agents face no possibility of opportunism in this framework, there is a problem of equity in the labour distribution.

4 Conclusion

The three tales and the letter we introduce in our paper define the problems of the households production and community protection from marauders and bad weather, which could lead to opportunism and inequality, in a society made of two agents, who are either selfish or altruistic, and possibly governed by the State, which is either partisan or bipartisan.
Our analysis of household production allows us to identify the best configurations of society with and without State that support the internalization of the inefficiencies generated by exogenous risks. We contribute to the analysis on the efficiency of various society configurations providing a unique analytic framework comparing production levels and we identify the conditions for which a non-Kantian community behaviour leads to optimal results, as obtained by the Kantian behaviour we present in Subsection 2.3.
In particular, we find three institutional frameworks that lead to the benchmark production levels for a community made up of two households, who produce and create protection against bad weather and marauders if it is convenient for both agents: the stateless society in which the agents behave following the altruistic logic (Subsection 2.4); the stateless society in which the agents behave following the selfish logic, but only if a side-contracting mechanism is at work and is convenient for both agents (Subsection 2.5); and the

community led by a bipartisan State, independent from the agents' behaviour (Subsection 3.1).
Conversely, there are two types of societies in our analysis that produce a lower level of output: the stateless community in which the agents are selfish when side contracting is not convenient for both agents (Subsection 2.5), and the community led by a partisan State, independent from the agents' behaviour (Subsection 3.2). Furthermore, in this last institutional framework an inequality problem in the distribution of labour arises.
Our results allow policy makers to rank the levels of production for each public choice, showing when the efficiency and equity of a society with and without State may be aligned with the preferences of the private agents. However, the efficiency of stateless society self-governed by altruistic agents is always not smaller than other societies'.

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