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INSTITUTIONS, ECONOMICS, AND THE BELIEF IN A ZERO-SUM GAME

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INTRODUCTION

When anthropologist George Foster arrived in the village of Tzintzuntzan, Mexico, he came into contact with an environment markedly different from what he was used to. The Tzintzuntzeños, the peasant population that inhabited that land, had a worldview completely opposed to the culture of progress that permeates Western societies. There was no 'American dream' in Tzintzuntzan. On the contrary, those Mexican peasants lived as if progress was impossible and wealth could never be created. Foster called their view of the world "Image of Limited Good" (Foster 1965). He described them as people living as if "all of the desired things in life [...] *exist in finite quantity* and *are always in short supply*" (Foster 1965, p. 296, emphasis in original). Moreover, they believed that this limited quantity was not expandable in any way.

This worldview is also known as 'belief in a zero-sum game', in that those who hold it live as if life were a zero-sum game, in which individuals can improve their condition only at the expense of others. Needless to say, those who hold this vision are strongly influenced by it; the behaviors they adopt in their daily lives undoubtedly lead to consequences on an economic level, both for them and for the community in which they live.

In recent decades, the relationship among culture, institutions, and economic growth has been placed under the magnifying glass of research and has attracted the attention of numerous scholars. Despite this, the 'belief in a zero-sum game' has received very little consideration and has long been neglected. Foster's studies had a great impact in the field of anthropology, but were not adequately considered by economists, who for more than 50 years did not realize the relevance his research could have for the subject of economics. Fortunately, this seems to be changing (see Chinoy et al. 2022 and Carvalho et al. 2022).

The aim of this thesis was to show how the belief in a zero-sum game is an important element, which has extremely significant effects towards institutions and economic growth. Hopefully, it will serve as a starting point for future research.

The belief in a zero-sum game is closely linked to peculiar institutional frameworks that have been discovered in numerous populations around the world and were probably very common in the ancient past. Widespread poverty and the belief that the available "pie" is not expandable incentivize communities to create systems of norms designed to prevent the emergence of economic inequality. In a

zero-sum world, when the amount of resources is very limited, a fair division of them is indeed a good solution for everyone. Those who try to achieve more than others and rise above the average are then sanctioned appropriately. It does not matter if the attempts are made by trying to create wealth and innovate; in the eyes of a zero-sum believer, any attempt at innovation or investment is seen as an attempt to steal from others, since growth is not imagined as possible. As a result, innovation and investments are forbidden and the only possible outcome is perpetual stagnation.

In this thesis, the term "egalitarian norms" is used to define any set of norms designed to prevent and correct the emergence of economic inequality. To fall under this definition, such norms need not have been adopted on the basis of philosophical ideals of equality, brotherhood, and resource sharing, which are commonly associated with the word "egalitarianism". What matters is that they had the effect of preventing the rise of economic inequality. These norms could also have been motivated by envy, an emotion closely associated with the belief in a zero-sum game.

Envy is the subject of the first chapter of this thesis. Sociologist Helmut Schoeck coined the term "envy-barrier" (Schoeck 1969, p. 57) to refer to the obstacle to economic development that plagued communities that adopted the 'anti-inequality' norms. The chapter deals with how to address the envy-barrier problem and what measures to take in populations affected by it. A common view in economics identifies envy as a variable closely related to economic inequality; according to this view, the intensity of envy in a community depends on the degree of economic inequality - the greater the inequality, the greater the envy. Therefore, wealth redistribution has often been proposed as a solution.

The chapter explains how this view might actually be wrong and lays out arguments gathered from various scientific fields to show that the relationship between envy and economic inequality is more complex than a simple linear relationship. Wealth redistribution does not seem a good means to solve the envy-barrier problem and may even be counterproductive. What needs to be countered is the view of the world as a zero-sum game.

The thesis continues by bringing the mind back to the past. As harmful and fallacious as it is, the belief in a zero-sum game is our original worldview, which was developed by ancient hunter-gatherers to cope with an environment in which economic growth was not imaginable. Ancient hunter-gatherers had strong incentives to create egalitarian communities within which to share the risk of food-taking activities, so it

was extremely likely that social norms would be created to prevent the emergence of economic inequality. What caused the origin of inequality?

The second chapter aims to answer this question, which numerous scholars have tried to answer. None of them, however, has considered what is possibly a key element in the story, namely the belief in a zero-sum game. By including this element in the framework, the chapter offers a new theory on the origins of inequality and on the historical process that eventually led egalitarian communities to survive only in remote areas of the world.

The second part of the chapter offers a new version of the well-known diagram devised by Acemoglu and Robinson to illustrate the relationship between political institutions and economic growth. Including the belief in a zero-sum game in the scheme makes it more consistent and resolves ambiguities that the authors themselves sought to remove (Acemoglu and Robinson 2012; 2019). Finally, the chapter highlights the danger of the belief in a zero-sum game in today's world and explains why we need to take measures to counter it.

Indeed, although in recent centuries humanity has managed to replace the original zero-sum mentality with a growth-oriented mindset, this harmful belief has never completely disappeared. What factors determine its distribution in today's world? The information we have on this is very limited.

The third chapter aims to find new insights in this regard, focusing on two variables that might have a relationship with the zero-sum belief. The first of them is the affiliation with ethnic groups that had egalitarian social structures in the pre-industrial period. The empirical analysis aims to test whether an egalitarian past may have had a persistent effect in the culture of these ethnic groups, leading descendants to believe in a zero-sum game more than others. The second variable is economic growth, which should instead lead individuals to decrease their propensity to believe that the available 'pie' is not expandable. What was hypothesized is not confirmed by the analyses. However, the results are somewhat surprising. and, when combined with those obtained from other recent studies (Chinoy et al. 2022; Carvalho et al. 2022), constitute a difficult puzzle to solve.

Chapter 1

THE ENVY-BARRIER AND ECONOMIC INEQUALITY

Abstract

Envy is a universal painful emotion whose economic effects are highly significant, especially in poor populations living in remote areas of the world. Several anthropological studies have shown how it can cause the formation of sets of institutions designed to prevent individuals from accumulating capital and making investments. These norms constitute a significant obstacle to economic growth and create a harmful 'envy-barrier' to development.

Economic inequality is often considered a variable that increases the intensity of envy in a community. Consequently, wealth redistribution has been proposed as a means of leading communities affected by the envy-barrier out of the cage of anti-development norms. The chapter aims to show that this view is incorrect by collecting and explaining the reasons why reducing inequality does not seem to be a useful tool for breaking the envy-barrier. The authorities involved in the development of these rural communities should instead focus on increasing contacts with the outside world and on countering the presence of the belief in a zero-sum game.

Introduction

Not many things are as universal as envy. Considered as one of the seven deadly sins, since ancient times envy has often been described as the worst of them. Geoffrey Chaucer argued that "For truly, all other sins are sometime against only one special virtue; but truly, envy is against all virtues and against all goodnesses […] For hardly is there any sin that has not some delight in itself, save only envy, which ever has of itself but anguish and sorrow." (Chaucer 2015, p. 498). Envy has always been a taboo subject. Everyone knows that it exists, but no one wants to talk about it. Therefore, it has been noted that, despite its high significance in many fields, envy has attracted very limited scholarly attention (Schoeck 1969).

Psychologists agree that envy is "an unpleasant emotion resulting from self-relevant, upward social comparisons" (Crusius et al. 2020). Its core is the pain suffered by individuals when understanding that another subject, belonging to their reference group, is superior to them in a quality that they consider important. Envious people can have two opposite reactions to this painful sensation, both aimed at reducing or eliminating the gap with the envied subject: they can increase their efforts in order to improve

themselves and, therefore, gain the quality or the material possessions that the other person has; otherwise, they can think of harming the envied subject in order to eliminate the desired attribute.

The second reaction is driven by so-called "malicious envy", which has even been called "envy proper" (R. H. Smith and Kim 2007). This form of envy should be the main concern for economists since the acts it provokes always result in the destruction of resources. The envious agents, who decide to damage their neighbors to reduce their feelings of inferiority, do not bring any improvements to their own economic situations. In the meantime, envied agents who fear the neighbors' envy are driven to limit their investments, because the benefits of the potential wealth improvements are often lower than the costs of becoming the target of the people living locally, which frequently means seeing the fruits of their labor being destroyed by envious acts.

From an economic perspective, malicious envy is potentially one of the worst threats to the growth and development of small and poor communities living in remote areas of the world. As early as the first half of the 20th century, several anthropologists concentrated their studies on such populations and showed how this evil force is able to create a huge obstacle - a real "envy-barrier" (Schoeck 1969, p. 57) - to their evolution. Eric Wolf, an anthropologist who worked for years among South American peasants, coined the term "institutionalized envy", with reference to psychological mechanisms related to envy that have the effect of "restraining non traditional behavior" (Wolf 1955, p. 460). In the communities he came in contract with, envy gave birth to a set of informal institutions, which incentivized individuals not to outperform their neighbors; neighbors' envy terrified people and led them to respect the common rules of avoiding accumulation of wealth and distrusting innovation. The breach of these commonly known principles resulted in sanctions that included gossip, envious sabotages, and even violent attacks. This threat and the fear of the 'evil eye' (the fear that envious people can harm others just by enviously watching them) drove individuals to constrain their efforts and aspire to be the 'ordinary person'[1]. Several scholars revealed such an institutional environment in rural communities living in different areas of the world (e.g., Tax 1957; Foster 1967; 1972; Lindholm 2008). In some cases, even formal institutions arose, such as the '*Alférez*' (Nash 1961) and the 'cargo system' (Foster 1967), developed with the aim of levelling wealth in order to satisfy envy[2].

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[1] See Schoeck (1969), Chapters 4 and 5, for an in-depth description of the 'evil eye' belief and various examples of customs and norms designed to prevent individuals from elevating their condition above the average.

[2] The terms 'Alférez' and 'cargo system' refer to ritual assignments that are given by peasant communities to their wealthiest members. These individuals are forced to organize large parties that require the expenditure of exorbitant sums.

The origination of institutional frameworks of this kind is due to the widespread belief that life is a zero-sum game. The tightness of these peasant communities and the scarcity of the available resources led them to develop a "limited good mentality" (Lindholm 2008, p. 234) - also known as "Image of Limited Good" (Foster 1967) or "belief in a zero-sum game" (Różycka-Tran, Boski, and Wojciszke 2015) - according to which every improvement made by a member is perceived as happening at the expense of the other members. Therefore, accumulation of wealth and economic mobility are considered a threat to society because they necessarily upset the existing balance among individuals. Envy-avoiding rules are theoretically able to prevent this danger; however, they impose an irremovable limit to economic activities and a strong disincentive to development. This problem has attracted the interest of scholars, who have devoted themselves to figuring out how to free these populations from this cage of anti-development norms (e.g., Platteau 2000).

It has attracted the attention of economists as well. The most recent in-depth analysis by an economist on envy and its economic effects in rural populations comes from Boris Gershman's studies (Gershman 2013; 2014; 2015). Gershman designed a rather detailed theoretical model, built on models devised by other economists, whose purpose was to comprehensively show how the envy-barrier is formed. The author argued that the degree of economic inequality plays a relevant role in determining its formation and subsequent negative impact on growth and innovation. Therefore, he included wealth redistribution among the solutions to the problem. This approach is certainly influenced by a popular view of the relationship between envy and inequality, according to which economic inequality is a variable linearly related to the intensity of envy.

This chapter aims to establish whether this view is correct and whether wealth redistribution can be considered a useful tool for breaking the envy-barrier and freeing affected communities from the cage of anti-development norms. The direction of the research is set by the following question:

i)   Is wealth redistribution a useful instrument to break the 'envy-barrier' and lead the populations affected to economic growth?

In recent decades, many social sciences have tried to analyze envy and its impact on people. The main goal of this study is to collect all the different results obtained in each field and draw some useful conclusions to answer this question.

The chapter is organized as follows. Section 1 analyzes how recent economic literature has addressed the problem of the 'envy-barrier' and assumed that economic inequality is a significant cause of it. In section

2, the chapter outlines the numerous theoretical arguments as to why the role of economic inequality in determining the intensity of envy is commonly misunderstood. It presents some empirical findings that provide useful insights into the relationship among envy, inequality, and economic development. Section 3 discusses the shortcomings of the models designed by economists so far. Section 4 concludes by offering some advice to policymakers.

1 – Economists, envy, and inequality

Envy has captured the interest of few economists in recent decades, as the unpleasantness of this topic has probably discouraged scholarly efforts. The first economists who dealt with this issue were those belonging to the school of thought known as 'welfare economics' (Duesenberry 1949; Mishan 1960; Foley 1967; Feldman and Kirman 1974; Varian 1974; 1975). Their approach to the subject was merely abstract; their purpose was not to investigate the concrete characteristics of envy in the real world. They aimed primarily to develop theoretical models in which envy, contemplated only as economic envy, was used as a variable whose value was to be reduced as much as possible - if feasible, reduced to zero. According to their definition, individual 'x' envied individual 'y' if she preferred the bundle of goods possessed or consumed by individual 'y'. An envy-free society meant, therefore, a society in which no individual preferred a bundle of goods possessed or consumed by another individual[3].

These theoretical constructions were used to make policy proposals, pointed at reaching the level of 'fairness', which was given the meaning of efficiency without envy. A fair allocation was a Pareto-efficient allocation, in which no individual preferred the bundle of goods of another individual (Varian 1974, p. 2). To get an envy-free society, the solution usually proposed was a progressive income tax, which had to be sufficient to placate the envy of anyone with a lower income. Accordingly, "the stronger is this envy of others, the heavier must be the tax." (Mishan 1960, p. 247).

In their opinion, it was envy that set the agenda. 'The stronger the envy, the higher the tax' meant that policies should be dictated by lower income individuals' envy; if it was very strong, the only possible solution was to raise the tax to an amount that would allow for the realization of a purely egalitarian society, where nobody preferred the amount of resources possessed or consumed by any other individuals.

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[3] "A completely fair social state is one in which no citizen would prefer what another has to what he himself has" (Feldman and Kirman 1974, p. 995).

Clearly, their analyses did not focus on the envy-barrier and were limited to abstract models. However, their approach left an influential legacy for later economists, who conserved the impulse to design their models by considering the strength of envy to be related to the envious subjects' relative wealth, and thus to the degree of inequality between the members of the envious relationship (e.g., Chaudhuri 1985; Banerjee 1990; Mui 1995; Mitsopoulos 2009).

This approach most likely influenced Boris Gershman, who is the author of the most recent in-depth analysis on envy and its economic effects. He developed a mathematical model aimed at describing the envy-barrier and the behaviors of people in populations affected by it (Gershman 2013; 2014). Gershman distinguished, in his model, three different equilibria that such communities can reach: a 'fear of envy equilibrium', a 'destructive envy equilibrium', and a 'keeping up with the Joneses (KUJ) equilibrium'. These equilibria describe quite faithfully what happens as a result of the institutions born of envy in the numerous poor communities described by anthropologists.

In the 'fear of envy equilibrium', the subjects who could try to innovate constrain their behaviors because of the fear they feel. Making an improvement could result in attracting their neighbors' envious acts, which constitute a cost that makes the innovation appear much less beneficial. In this scenario, the norms shared by the community impede the creation of wealth, with the consequence of permanent stagnation.

Another negative equilibrium is the destructive envy equilibrium. In this case, the innovators decide to undertake their productive investments, but the envious neighbors violently attack them. There is, therefore, a concrete destruction of wealth and the outcome is the same as that achieved in the fear of envy equilibrium.

The KUJ equilibrium is, instead, the equilibrium that conduces to economic growth. Envy does not act as a destructive force, but as a motivator; all the community members do their best to improve their condition and make productive investments. Competition with the neighbors is just an engine for innovation, and individuals perceive the various gaps among them as reducible only through efforts and self-improvement.

In Gershman's model, many variables have an impact on the equilibrium that the community reaches: among these, the protection of property rights, the level of tolerance for inequality, and the strength of social comparisons. An important variable is, for him, even the degree of wealth inequality; the higher the inequality, the higher the probability of obtaining a negative equilibrium (the fear of envy or the destructive envy equilibria). He states that "under high fundamental inequality […] the society is likely

to get stuck in the fear of envy region with low productivity in the steady state." (Gershman 2014, p. 24). Redistribution of wealth from the rich to the poor is then an optimal way to break the envy-barrier, because it is supposed to have an effect "similar to the effect of better property rights protection" (Gershman 2014, p. 432).

In another article, the same author demonstrated that the evil eye belief originated in pre-industrial societies with high wealth inequality (Gershman 2015). He claimed that this happened because of the fear felt by richer people, who perceived their wealth as in danger; they, then, started adopting envy-avoiding behaviors to reduce the threat of envy. The underlying assumption was that inequality has an impact on envy and increase the risk of ending up in negative equilibria.

This approach is probably influenced by a popular view of envy and inequality as two linearly related variables. According to this view, the strength of envy between two subjects increases when the inequality between them is greater, and thus the richer subject 'a' is in relative terms, the more envious subject 'b' is. When considering an entire community and not a single relationship between two subjects, it follows that inequality in the distribution of wealth makes the envy felt by its members stronger and more dangerous.

This idea is very common. Wrenn, for instance, dedicated an article to denouncing a supposed link between destructive envy and neoliberalism/inequality (Wrenn 2015). She argued that the growing level of economic inequality in recent times will result in an increased presence of envy and will "lead to even greater disillusionment and turn emulative-driven, benign envy into malicious envy." (Wrenn 2015, p. 507). Grolleau, Mzoughi, and Sutan claimed that in "societies dominated by destructive envy […] egalitarian policies are likely to be more effective than policies oriented toward leaders" (Grolleau, Mzoughi, and Sutan 2009, p. 800). A recent psychological study aimed to compare the level of envy of the respondents of an interview, who came from four different countries - Russia, Poland, Germany, and the US (Kwiatkowska, Rogoza, and Volkodav 2020). The conclusion was that countries with higher levels of inequality presented higher levels of envy; Americans, who are a population living in an economy with a wide gap between rich and poor, were presented as more envious than Russians or Poles, who experienced a recent socialist past.

If policymakers who wished to solve the envy-barrier problem in a rural community read the statements of the scholars mentioned above, they would be led to think of redistributing wealth and reducing

inequality among members; by doing so, as inferred from Gershman's model, the intensity of envy should decrease and individuals should avoid envious behavior toward others and focus more on themselves.

The rest of the chapter aims to show how this advice to policymakers may be quite misleading. The first reason is that, as the next section shows, the relationship between envy and inequality is much more complex than how it is commonly thought.

2 – Envy and inequality: a complex relationship

2.1 – *Theoretical aspects*

If the strength of envy increased as inequality increased, an envious person would feel the strongest envy toward the richest person in the world. Yet, this is not what happens. The mentioned idea, which many people take as something undisputed, derives from a superficial vision of envy that does not analyze how this powerful force actually works.

2.1.1 – *The role of reference groups*

People do not envy all other people; they envy only the people who belong to their reference group. The term 'reference group' was first used by Hyman to describe the imaginary groups that contain all the individuals to whom a person compares herself (Hyman 1942). Humans have indeed the need to make comparisons with others, in order to evaluate their own qualities (Festinger 1954).

Individuals select the subjects that they consider significant on the basis of many different factors, including neighborhood and similarity. Similar and close persons are indeed the best benchmark to understand whether one has seized all the available opportunities, and the comparison with them represents a fundamental instrument for realizing if the path followed up to that moment is correct, or if one's behavior and efforts should be adjusted (Senik 2009).

People do not envy individuals who are outside their reference groups, because they simply do not care about them. These outsiders can naturally become the targets of negative feelings and gossip, but they are not threatened by true destructive envy. Smith and Kim made clear what the two main elements of an envious relationship are: similarity of the subject and self-relevance of the quality compared (R. H.

Smith and Kim 2007). Regarding wealth inequality, therefore, people usually envy other people who have a level of wealth not too different from theirs and share some backgrounds with them.

The increase of economic inequality can even lead to the removal of some subjects from the reference group. People simply stop considering these subjects as targets of comparison, because the comparison with them is not useful anymore; they start thinking about them as 'special' people, separate from their group. Counterintuitively, then, an increase of economic disparity could even significantly reduce the level of envy between two people (Schoeck 1969; Ben-Ze'ev 1992; Miceli and Castelfranchi 2007).

An example of this mechanism is what happens in societies divided in castes (Schoeck 1969; Foster 1972). Members of different castes do not envy each other, because they do not belong to the same reference groups. There is no rationale for an individual to compare herself with a member of another caste since the information that the comparison provides is useless for her self-evaluation. Therefore, despite the extreme inequality between the members of the highest caste and the lowest individuals in the wealth scale, these communities are normally affected by much lower envy than societies with no castes and minimum levels of inequality. Quite curiously, an analysis performed in the Indian region of Uttar Pradesh revealed that the components of the highest caste were significantly more envious and prone to damaging their neighbors than the members of the low castes (Fehr, Hoff, and Kshetramade 2008). This discovery contradicts the idea that the poorest individuals in relative terms are those whose envy has the highest possible intensity; stating that the size of economic inequality determines the level of envy implicitly means that the most envious people are the poor, and this is not true. Indeed, every individual builds a separate world and feels emotions based on her specific point of view.

2.1.2 – *The inevitability of envy and the case of kibbutzim*

There is another reason why the relationship between envy and material objects should be more carefully evaluated: envy is present even when people do not have different endowments, because it is simply inevitable. Classical psychoanalytic formulations confirm its unavoidability (Klein 1957; Erlich 2016).

Envy is indeed the result of evolution. It is an emotion, and emotions are "adaptive responses that arise from mechanisms shaped by selection" (Nesse and Ellsworth 2009, p. 129). Even emotions face natural selection, which keeps those useful and lets the others get extinguished; in the long run, only the former survive. According to an influential hypothesis, evolution led envious individuals to out-compete their non-envious rivals (Hill and Buss 2008). An extreme scarcity of resources affected the environment in

which mankind lived for thousands of years, and envy guaranteed an advantage, because the unpleasant discomfort made envious subjects invest more effort to win the competitive race.

The immovability of envy is demonstrated by the results obtained during the many attempts made by humans to create egalitarian societies, believed to be the environment in which envy should be minimized or even eliminated, given the absence of economic inequality. Envy was certainly not removed in socialist countries, which were built on the idea of equality. Scientific data are not available, but anecdotes and stories abound (e.g., Brenner 1990). William and Jane Taubman reported that, to many people in the Soviet Union, socialism "seems to amount to social envy, the insistence that 'my neighbour not live better that I do', even if the prospect of doing so prompts him to produce more for us both." (Taubman and Taubman 1989, p. 143). However, the case of socialist countries is not reliable for drawing conclusions, for although the socialist experiment was driven by the impulse to achieve an egalitarian society, in the end this goal was not achieved.

The history of Israeli kibbutzim is more useful for explaining how even perfect economic equality cannot reduce or eliminate envy. Kibbutzim are egalitarian communities, first established in 1910, whose members live together on the principle of pure equality (Gressel 2016). The advocates of the linear relationship between envy and economic inequality would theoretically consider the kibbutzim as societies in which envy is zero or at least minimized; they are the closest concrete case to the envy-free societies imagined in mathematical models. However, the long history of these communities has proven exactly the opposite; envy does not disappear and, according to several authors, is even higher inside them than in the external world (Ben-Ze'ev 1992; Erlich 2016; Gressel 2016)[4].

The levelling of people's economic conditions does not erase envy, which simply moves towards other targets. Income inequality is indeed just one little side of the disparities that exist: people are different under innumerable aspects (e.g., beauty, age, cleverness). Removing inequalities of income or wealth does not erase the natural differences that are inherent in every pair of individuals, and malicious envy of personal qualities is very dangerous because it prompts direct attacks on the envied people, causing, for example, damage to their bodies (Schoeck 1969). Eliminating natural disparities is clearly impossible, so there will always be differences on which envy originates. Furthermore, recent findings support the hypothesis that the main source of envy is not economic wealth (or material possession), but social status (Bolló et al. 2020), which exists even in purely egalitarian societies. In kibbutzim, every little difference

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[4] It deserves to be mentioned that all three authors lived for some time in a kibbutz.

is magnified. People find all their neighbors very similar, so their reference group is truly only one; this impedes the previously mentioned mechanism of removal of some outstanding subjects from their reference group.

Gressel interviewed 17 current and former kibbutz members, belonging to six different communities (Gressel 2016). Although his interviews do not represent a source of scientific data, given the limited size of the sample, what he reports is very interesting. All 17 respondents acknowledged that the social engineering developed in the kibbutzim does not erase envy; in fact, the majority of them stated that the peculiar environment of kibbutzim makes envy even stronger than elsewhere. "Whatever social and moral advantages reduced inequality has, reduced envy is not one of them." (Ben-Ze'ev 1992, p. 579).

2.2 - *Empirical findings on inequality, envy, and related variables*

The complexity of the relationship between envy and inequality is also evident from empirical studies.

2.2.1 - *The empirical studies supporting the idea of a linear relationship*

Empirical analyses on envy are extremely hard to be performed because the difficulties in measuring it represent a major obstacle to the activity of researchers. To date, only two articles attempted to study the connection between envy and inequality by using concrete data, and both of them advanced, more or less explicitly, the hypothesis that a higher level of inequality causes a greater intensity of envy (Gershman 2015; Kwiatkowska, Rogoza, and Volkodav 2020). However, both are open to criticism.

Gershman's study on the origin of the evil eye belief adopted an interesting strategy to highlight a connection between envy and wealth inequality (Gershman 2015). The empirical analysis performed obtained a remarkable result, demonstrating that the presence of the evil eye belief in ancient communities - the widespread idea that envious people can harm envied subjects just by looking at them in a malicious way – was correlated with peculiar characteristics of those communities, among which the level of wealth inequality. According to the author, in weakly institutionalized societies wealth inequality incentivized the presence of destructive envy and the envy-avoiding behaviors connected to it, such as those induced by believing in the evil eye.

Gershman's empirical analysis is not to be contested. The possibility that this belief and the related envy-avoidance behaviors were born in unequal societies is reasonable, since people may have developed it because they feared for their superior wealth, which naturally would not be superior in egalitarian societies. However, the evil eye belief is something different from envy, and envy can naturally be present and destructive even in communities where the concept of evil eye is absent. Moreover, Gershman's findings naturally did not focus on what would happen were the level of inequality to be changed, in a second moment, after the origination of this fear. There is no reason to think that the reduction of inequality would lead people to be less scared of the evil eye threat or to feel less envy towards their neighbors; nor would a subsequent increase of economic inequality make things worse.

Kwiatkowska, Rogoza, and Volkodav's results (Kwiatkowska, Rogoza, and Volkodav 2020) are related instead to survey data, obtained in part by the same authors and in part from other studies (Lange and Crusius 2015; Lange, Crusius, and Hagemeyer 2016). The data come from some interviews conducted by adopting the BeMaS scale (Lange and Crusius 2015), whose aim is to measure the respondents' envy based on direct questions and self-reported values.

The authors of the paper compared the values resulting from interviews in four different samples of respondents (from US, Germany, Poland, and Russia). The American sample obtained significantly higher levels of envy with respect to the other three, and the Russian sample reported the lowest measure of envy. Believing that this difference was due to cultural differences, they claimed that these data confirm the hypothesis that individualistic societies with high levels of economic inequality would lead their members to be more envious. Collectivistic and more egalitarian communities such as the Russians and Poles, on the contrary, would suffer from a lower level of envy and live in a more harmonious environment.

These self-report questionnaires on envy present some significant limits, and their weakness was clear even to their creators. The mentioned scales utilize questions, which are direct and often explicitly mention the words 'envy' or 'envious'. Asking people how envious they are is certainly problematic, because envy is not something that people would be ready to admit[5]; nobody wants to be recognized as an envious person, even because of an evolutionary instinct (Hill and Buss 2008, p. 64). Respondents may have the impulse of underreporting their inclination to experience it (R. H. Smith et al. 1999);

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[5] "[…] there is no socially acceptable justification that permits us to confess to strong envy. Envy is untenable and unacceptable." (Foster 1972, pp. 165-166).

moreover, a scale based on self-reported values does not take into account that many subjects could experience envy without consciously realizing it (R. H. Smith et al. 1999).

There can be two impacts of cultural characteristics on the self-reported level of envy: the impact on how envious some populations truly are, and the impact on the ease with which people admit feelings of envy. As Tan, Tai, and Wang highlighted: "In individualistic cultures, which emphasize autonomy and independence […], envy is thought to motivate economic and social competition; therefore, the expression of envy may be more acceptable […]. In contrast, in collectivistic cultures, which emphasize the values of connectedness, harmony, and cooperation […], the expression of envy may be less desirable because it may disturb the social equilibrium" (Tan, Tai, and Wang 2016, p. 248). Therefore, cross-cultural comparisons based on self-reported values are not reliable. The lower level of envy reported in the Russian sample could be due to a true lower level of envy in Russian population, but it could even be caused by a different attitude that Russians have with respect to envy, an emotion probably perceived as a major threat to the social equilibrium.

To date, the available concrete data on envy present too severe limitations. However, some evaluations can be inferred by observing the relationship between inequality and other variables, which are related to envy but can be measured with more certainty.

2.2.2 – *Inequality and violent conflicts*

Political economists have longtime been worried about the impact of inequality on communities. One of the main concerns is that high levels of inequality could enhance the risk of outbreak of violent conflicts and civil wars. Envy is naturally strictly related to this issue, given that it is supposed to be one of the causes that drive poor people to revolt against the wealthier classes. The basic idea is that high inequality may determine a higher risk of violent conflicts because high inequality would correspond to high levels of envy. Furthermore, a large disparity of wealth creates an environment where poor people have more to gain from the fight against the élite.

However, the concrete results reveal that the relationship between inequality and violent conflict is complicated to describe. Inequitable distributions of resources do not always provoke violent rebellions, and these events actually rarely occur in the presence of large wealth disparities. There is no consensus

on the nature of the inequality-conflict link[6]. While some scholars believe that there is no significant link between these two variables (e.g., Collier 2000), others argue that there is, but their claims are extremely diverse and contradicting each other; they range from implicitly or explicitly asserting the linearity of the relationship (e.g., Alesina and Perotti 1996) to arguing for the existence of U-shaped curvilinear relationships, based on Hirschman's 'tolerance for inequality' theory (Hirschman and Rothschild 1973), or even inverted-U-shaped curvilinear relationships (e.g., Nagel 1974). These two last shapes imply that the risk of violent conflicts is very high (or, on the contrary, very low) in egalitarian societies and then decreases (increases) with the increase of inequality up to a certain threshold, after which the effect of higher inequalities is reversed and leads back, in the end, to the initial high (low) risk. The fact that different scholars have sustained the existence of these two completely opposite relationships gives a hint of the uncertainty that reigns on this topic. Paradoxically, different assertions were even based on the same source of data, such as in Nafziger and Auvinen's study (Nafziger and Auvinen 2002) and Fearon and Laitin's study (J. D. Fearon and Laitin 2003)[7].

In any case, many articles highlight the numerous reasons why a high level of inequality can potentially be less dangerous than an egalitarian environment (e.g., Mitchell 1968; Parvin 1973; Besançon 2005). High inequality makes the idea of fighting more appealing to the poor because of the greater profit they could possibly derive by defeating the rich, but in the meantime renders the élite more frightening in the eyes of potential revolutionaries and enhances the perception of social mobility, which is positively welcomed by the have-nots. Moreover, in a more egalitarian society, the similarity among people increases and "oppressed groups will have […] a closer idea of what privileges they have been missing" (Besançon 2005, p. 409).

An article by Alcorta, Smits, and Sedlund aimed to analyze the impact of different kinds of inequality on the risk of violent conflicts among groups of people (Alcorta, Smits, and Swedlund 2018). The results of their analysis showed that economic inequality is negatively correlated with the presence of violent conflicts, whereas the risk of their outbreak grows with the increase of educational inequalities. Economic differences seem not to provoke violent reactions and actually may even discourage them. This seems to contradict Gershman's model, according to which greater economic inequality leads to the occurrence of violent attacks by the relatively poorer individuals.

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[6] See Cramer (2005) and Østby (2013) for reviews of the literature.
[7] Both the empirical analyses were performed by using (and interpolating) the data on inequality assembled by Deininger and Squire (Deininger and Squire 1996).

2.2.3 - *Inequality and happiness*

Interesting findings were obtained by the peculiar branch of economics commonly called 'happiness economics', which studies the effect of economic variables on people's happiness.

The most used instrument to measure average happiness is the analysis of data coming from surveys, which show the level of so-called 'subjective well-being' reported by respondents. Van Praag and Ferrer-i-Carbonell demonstrated that subjective questions used to measure the respondents' satisfaction are a reliable source of information and can be used to perform consistent empirical analyses (van Praag and Ferrer-i-Carbonell 2004)[8]. Moreover, questions asking the respondents to measure their satisfaction or happiness are much more reliable than questions asking to measure one's own envy; these interviews still deal with an emotion that people are willing to admit, although their measurement is obviously subject to inaccuracy.

Happiness is certainly related to envy, in the sense that envious people are less happy than non-envious individuals, given the painful sensation that they feel. The pain perceived is the element that both theories of envy denote as the core of the envious emotion (Crusius et al. 2020).

Looking at the link between inequality and happiness, the literature offers a huge variety of results, which recalls the complicated puzzle drawn by the studies focused on the inequality-conflict link. Some articles claim that inequality decreases happiness, others that it increases it. Some authors declare that there is no significant relationship between happiness and inequality, others that the relationship exists but is not linear[9].

Initially, drawing a conclusion appeared to be a huge challenge. Yet, the numerous analyses and their different outcomes showed more and more precisely a peculiar pattern that is followed across the entire globe; economic inequality seems to afflict citizens of developed countries and instead increases people's happiness in developing countries. Although no consensus has been reached among scholars[10], a

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[8] Other scholars intervened to claim the usefulness and reliability of these data, without questioning that they are naturally not perfect (e.g., Diener 1984; Easterlin 2001).

[9] Clark and D'Ambrosio (2015), Ngamaba, Panagioti, and Armitage (2018), and Cheung and Lucas (2020) provide interesting reviews that summarize the results obtained so far. Their articles contain summary tables, which list the papers focused on the topic and briefly report their findings.

[10] Some authors do not reject the idea that inequality has an overall negative impact on happiness (e.g., Verme 2011). However, their opinion, once considered a mainstream and bulletproof vision, is now sustained just by a minority of scholars. The number of articles that deny the negative effect of inequality on happiness - and state either the insignificance of the relationship between these two variables (Kelley and Evans 2017; Ngamaba, Panagioti, and Armitage 2018; Evans et al. 2019) or the existence of a slightly positive effect - has considerably increased and largely outnumbered the studies supporting the opposite view.

significant amount of evidence suggests that, taking both rich and poor countries into account, the relationship between inequality and happiness is slightly positive (M. Berg and Veenhoven 2010; Rözer and Kraaykamp 2013; Ng and Diener 2019).

The analyses of the specific different parts of the world are, nevertheless, more interesting than the global analysis. Almost the entirety of the authors who initially claimed that inequality is negative for happiness used data coming from developed economies, such as the US and the European countries (Alesina, Di Tella, and MacCulloch 2004 used data from Europe; Oishi, Kesebir, and Diener 2011 used data from the US). More recent analyses, focusing on Europe and United States, replicated their findings (Schneider 2019 - Europe; Ifcher, Zarghamee, and Graham 2019 - US).

Things change when the scope of the examination widens, and the rest of the world is considered. Data from developing countries almost univocally show that inequality is positively correlated with happiness in those areas of the globe (M. Berg and Veenhoven 2010; Rözer and Kraaykamp 2013; Kelley and Evans 2017; Ngamaba, Panagioti, and Armitage 2018; Ng and Diener 2019).

Extremely interesting results were found by analyzing data coming from two peculiar countries, Poland and China, which underwent the transition from communism to open market economies – a process that increased their wealth considerably over a relatively short period of time. Senik highlighted how Polish citizens changed their feelings towards their neighbors' wealth before and after the collapse of Soviet Union (Senik 2008). During the last years of the communist regime, the income of their reference group members had a negative effect on them. After the fall of communism, the attitude of people towards it overturned, and an increase of their neighbors' income provided them with a sense of satisfaction. This occurred during all the early years of the transition, in which Poland's economy rapidly grew. A related study, conducted by the same author and Grosfeld and investigating only the period after 1990, explained how Polish citizens' approach towards income inequality followed a parallel route (Grosfeld and Senik 2010). In the first years of the transition process, income inequality had a positive effect. Starting from 1996, though, after several years of significant growth and development, the general attitude towards inequality changed, and this variable started having a negative correlation with people's satisfaction.

The authors who studied Chinese data discovered an extremely similar process. Knight, Song, and Gunatilaka, after examining data coming from a survey carried out in rural China in 2002, revealed that the coefficient of the Gini index was positive and statistically significant for happiness in those areas (Knight, Song, and Gunatilaka 2009). These results were confirmed by Cheung (Cheung 2016).

However, he proved that the positive inequality-happiness link existed only in rural areas; no significant relationship was found in urban, more developed areas. Something changed with the passing of time, since a following analysis by Wang, Pan, and Luo, performed by using data coming from a 2006 survey, revealed a different peculiar effect of inequality on happiness; the relationship between these two variables was curvilinear, with an inverted U shape (Wang, Pan, and Luo 2015). Up to a certain threshold, county-level inequality produced a positive effect on happiness; once this threshold was crossed, instead, the relationship began to be negative. Quite significantly, this threshold was much lower in urban China than in rural areas, showing once again that the tolerance for inequality in underdeveloped areas is evidently much higher. Finally, the most recent findings, acquired by Jiawen Huang in 2019 (Huang 2019), describe a very different environment, similar to those of the United States and western Europe; income inequality is presented as having a significant negative effect on Chinese people's happiness.

Economic inequality can have different psychological effects on citizens. The impact most frequently contemplated, which gave birth to the claim that inequality makes people sadder, is the discomfort suffered by individuals when feeling inferior to their neighbors, even if their absolute conditions do not change. At the same time, high inequalities are often despised because they are perceived as being the result of corruption and unfairness, elements that inflame poor people's hostility.

However, there is an opposite and positive psychological impact that inequality has, and this is hope. Fifty years ago, Albert Hirschman developed a theory that has proven increasingly true in recent years - the so-called 'tunnel effect' theory (Hirschman and Rothschild 1973). According to this prescient author, inequality can cause a sensation similar to what people feel when they are stuck in a tunnel and the first cars in the queue start moving; they do not mind the fact that the first drivers are moving while they are still stuck in the queue, because this event gives them hope that they too will be able to move soon. Seeing neighbors getting richer is a sign that things are changing and that they may get the same opportunities in the near future. Hence, inequality is perceived as an outcome of growth and development.

The negative and positive effects coexist. In some periods of time, the negative effects prevail, resulting in a negative general impact of inequality on people's happiness. In other moments, instead, the sentiment of hope is stronger and makes people happier. This is the reason why inequality is perceived as a good thing in developing countries, whereas the citizens of rich countries, who care less about growth and are not threatened by the specter of poverty, are more influenced by the discomfort suffered because of social comparisons. In countries undergoing a transition process, the final negative attitude towards inequality

is also given by disillusion and disappointment as a result of understanding that, in the end, not all 'cars' move as far as individuals desire (Grosfeld and Senik 2010).

The fact that inequality affects happiness through its influence on people's hope and distrust has been proven by some empirical studies. Bjørnskov et al. demonstrated the existence of a connection between the negative effect of inequality on subjective well-being and the intensity with which people perceive unfairness, when considering how income disparities arise (Bjørnskov et al. 2013); the effects of inequality on people depended on how individuals perceived their community to be fair in rewarding the efforts of everyone.

From another angle, Cheung provided evidence that the positive inequality-happiness link, discovered in rural China, was due to the interplay between inequality and hope (Cheung 2016). Higher income inequality prompted hope in people, and the author demonstrated that this increase of hope partially explained the positive associations between inequality and happiness.

The perception of greater opportunities for growth and the spread of a sense of inferiority are two sides of the same coin. The outcome of this contraposition is dictated by which force between hope and social distrust is stronger, and this result may depend on the stage of economic development that the community is experiencing (Cheung 2016; Cheung and Lucas 2020). In countries which are undergoing the early phases of development, the sentiments of hope may be prevalent, because people perceive that something is moving and hope that they will soon enjoy the same progress that their lucky neighbors have experienced first. Moreover, they know that there are countries richer than theirs, so they hope that their economies can grow and approach those of more developed countries. With the passing of time, more and more people emerge from poverty, and at the same time become disillusioned about the possibility of getting as rich as their neighbors. Feelings of inferiority begin to arise, leading to a balance of hope and social comparisons in communities experiencing intermediate stages of development. Finally, in advanced economies, the specter of poverty is forgotten, and relative values become people's main concern, causing the negative impact of inequality on happiness.

As we return to consider envy, the same argument probably applies. The intensity of envy may not depend much on inequality, but on how much people perceive hope and believe they could improve their condition in the next future. When hope is strong and widespread in society, people are mainly concerned about themselves and desire to get better, without worrying too much about their neighbors. Therefore, envy may be at its minimum level. Things are completely different when there is no hope, life is perceived

as a zero-sum game, and social distrust and unfairness dominate individuals' perceptions. Such an environment is the perfect place for destructive envy to burst. These findings suggest that maybe, in order to minimize envy, what deserves to be addressed is people's worldview and not their relative wealth.

3 – The shortcomings of economists' models

As described in the last section, the relationship between envy and inequality appears to be much more complex than a simple linear relationship. Some arguments suggest that a decrease in inequality might even lead to an increase in the intensity of envy. However, this simple fact is omitted by economists, who are used to considering the intensity of envy as linearly dependent to relative wealth. Admittedly, welfare economists concentrated only on abstract theoretical models, so they did not focus on real communities and the concrete nature of envy. However, their models are still imitated today; economists who have recently analyzed envy have followed the hypothesis that the intensity of envy of subject 'a' is directly related to inequality with subject 'b'.

Gershman's model (Gershman 2014), which is the evolution of earlier models (Chaudhuri 1985; Banerjee 1990; Mui 1995; Mitsopoulos 2009), is very detailed but lies on this misleading assumption. Indeed, in his model there is just one reference group that includes all the individuals, and the option of being removed from this reference group is not considered. Consequently, the model does not contemplate the possibility that increasing inequality could lead some poor to stop considering the rich as members of their reference group. A few scholars exhibited through concrete experiments how reference groups influence envious behaviors (Grossman and Komai 2013; Celse 2016a). The participants of their games reduced their destructive envious acts when the gap with the envied opponents was too large. This is the exact opposite of what commonly thought. Celse's experiment is very interesting because it shows that the relationship between malicious/benign envy and inequality may be opposite to that suggested by Wrenn (Wrenn 2015). Participants reported being less satisfied when faced with more gifted opponents, and their dissatisfaction increased as the gap widened. However, they tended not to reduce the opponent's endowment when the difference between their endowments was considerably large. This seems to show that destructive envy increases with decreasing inequality and not vice versa. Envy toward highly gifted people, on the other hand, may take the form of benign envy – in Celse's experiment, it did not lead to what in the game corresponded to violent attacks. These features of the relationship between envy and inequality make the models developed so far rather misleading; when a model is designed to analyze

concrete reality, and thus is not limited to abstract reasoning, the assumption that the intensity and dangerousness of envy increase linearly with inequality does not seem correct (Zizzo 2008; Celse 2016b) [11].

Gershman's model has other objectionable features. In the society described there are only two classes of individuals, each with one level of wealth: only rich and poor, with no individuals in the middle. Only poor individuals are supposed to feel envy or to be a threat to the rich, whereas the latter are described as people faced with just two choices - underinvesting or suffering from the destructive envy of the poor. The possibility that the rich defend themselves or attack the poor first is not considered, as it is not considered that higher economic inequality could grant more advantages to the rich in case of violent conflicts. This is naturally misleading, as the paragraph on the relationship between inequality and violent conflicts showed. Even in poor rural populations affected by the envy-barrier a superior endowment can theoretically grant richer people a higher chance to defend themselves from the envious opponents.

The most important deficiency of his model, however, seems to be that it does not contemplate the impact of the "belief in a zero-sum game" (Różycka-Tran, Boski, and Wojciszke 2015). The belief in a zero-sum game is the harmful belief which is shared by the members of the communities affected by the envy-barrier.

This belief is relevant in two ways:

1- If members of a community are convinced that resources are limited and very scarce, it makes no sense to assume that the likelihood of violent attacks depends on a certain threshold of inequality. Any difference in relative terms is intolerable and provoke negative reactions, since the resources held by the wealthiest individuals are seen as a subtraction at the expense of others, who feel endangered because of their pessimistic vision of the world.

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[11] Even without considering reference groups, theorizing mathematical models on envy does not necessarily lead to believing that increasing economic inequality increases envy. This was shown by the sociologists who focused on 'relative deprivation', an indicator extremely similar to that used by welfare economists to describe envy. Considering income, the relative deprivation of individual 'i' is meant to be "the sum of the (positive) gaps between i's income and the incomes of all members of society whose income exceeds that of person i, divided by the population size." (Bossert and D'Ambrosio 2020, p. 2). In the case of a society with one individual getting all the resources, the maximum level of inequality is reached. However, the level of relative deprivation is close to the possible minimum (Podder 1996). Every individual feels relatively deprived only with respect to this unique ultra-rich person, whereas every other relationship is among peers. The maximum level of relative deprivation is obtained, instead, in a society divided into two classes of individuals with equal income (the class of the haves and the class of the have-nots), with the percentage of have-nots slightly larger than half the population (Podder 1999). In this case, the amount of inequality would be naturally lower than in the previous example, but the poor would feel more relatively deprived, because they would feel inferior to a much larger number of people.

2 - Moreover, individuals with this worldview do not care about economic growth, because they believe it is impossible. Therefore, even a purely egalitarian distribution would not lead them to concentrate on themselves and improve their effort; on the contrary, it would probably make the reciprocal control much easier. In communities with this mindset, envy can never become benign and is bound to remain malicious.

This mindset is what should attract the most attention from those who want to break the envy-barrier, since it is probably its main cause.

4 - Policy implications and conclusion

Recent economic literature, among which Gershman in his in-depth study of envy and its economic effects, considers economic inequality as a variable positively correlated with it; he claimed that redistribution of wealth could lead individuals to adopt behaviors conducive to economic development. However, this idea might be erroneous. This vision fails to consider the role of reference groups (a crucial element in social comparisons) and of the belief in a zero-sum game. It also assumes that envy is eradicable or minimizable, if there are no economic differences among the members of a community; however, envy exists even in egalitarian societies, and it may be even stronger because of the emphasis such environments place on every little difference.

The idea that the creation of a more egalitarian environment can bring about a transition from the institutions that cause the envy-barrier to institutions conducive to growth is actually blatantly contrary to the history of these communities; for centuries they have lived with egalitarian norms designed to prevent inequality from arising and, as evidenced by sociologists' studies, have never experienced significant economic growth. On the contrary, these egalitarian norms have considerably hindered it. Wealth redistribution is still proposed as a solution to this problem, when in fact it would have exactly the same effect as that achieved by the norms caused by envy itself; it may prevent envious sabotages from occurring, but this changes nothing from the perspective of economic development. On the contrary, it may lead to more effective social control in limiting investments and innovation.

Recent economic literature does not seem to take enough account of the belief in a zero-sum game, which appears to be the real enemy of economic development in these poor rural communities and should be the main concern of authorities who want to solve the envy-barrier problem. As long as these populations share this mentality, economic development is hardly achievable, regardless of the distribution of wealth.

Populations who have broken the envy-barrier, such as the Tzintzuntzeños, have succeeded because they were able to change their mindset through contact with the outside world and evidence that economic growth is possible (Foster 1967). This awareness is what reduces the natural instinct to envy neighbors. The first thing that policymakers should do, then, is to open these communities to the external world in order to let them understand that economic development is possible and that resources can actually be abundant.

This fact can have a very good impact on poor populations, as studies on economic inequality and happiness have shown. Indeed, economic inequality appears to have a positive effect on the happiness of citizens living in underdeveloped economies, whereas it has a negative impact in rich countries. Inequality seems to be perceived as positive in the early stages of development because of the role of hope; when people realize that there are great possibilities for development, hope overrides the feelings of inferiority generated by social comparisons and leads individuals to focus on themselves and self-improve. Hope arises when the zero-sum view of the world is shown to be false and individuals realize that progress is possible. It may be ignited by the very experience of growth. When the idea of a zero-sum world loses strength, individuals start substituting the envy they feel towards the neighbors with the hope that they will soon appreciate an improvement of their lives; the social norms that drive underinvestment are then gradually eliminated and leave place to institutions that sustain growth.

Authorities concerned with the development of these rural populations should, therefore, concentrate on increasing these communities' contacts with the outside world and, in the meantime, granting an effective protection of property rights, so that people can feel safe in accumulating capital and making investments. Once the early stages of development have passed, the positive effects created by hope may fade, and people may turn their attention to those around them and be influenced by social comparisons. However, the progress made up to that point will have created an institutional environment that prevents the envy-barrier from forming again. Individuals will then be free to innovate, protected from the obstacles that the evil force of envy generates.

Chapter 2

THE BELIEF IN A ZERO-SUM GAME AND THE ORIGINS OF INEQUALITY

A THEORY OF THE EARLIEST INSTITUTIONAL CHANGE

Abstract

The origins of economic inequality in ancient communities have been widely investigated by numerous scholars, belonging to different disciplines. Most of their analyses focused on establishing which environmental or economic variables determined the institutional change that allowed the emergence of economic élites. However, archaeological and anthropological evidence shows that those factors are insufficient to explain the variety of social structures of that time.

The theories proposed so far did not take into consideration an element that may be important for understanding the overcoming of egalitarian social norms: the belief in a zero-sum game. By assuming that our ancestors shared this mentality, the chapter offers a new theoretical view, according to which the emergence of non-egalitarian institutions was not due to environmental factors, but to religious debates occurring within the communities. It then proposes a reflection on the relationship between superstructure and infrastructure.

Lastly, the chapter analyzes the impact on economic development, which the interaction between the belief in a zero-sum game and institutions may have, even in present times, and suggests some policy implications.

Introduction

The origins of economic inequality in ancient communities have been widely investigated by numerous scholars, belonging to different disciplines. Most of their analyses focused on establishing which environmental or economic variables determined the institutional change that allowed the emergence of economic élites. However, archaeological and anthropological evidence shows that those factors are insufficient to explain the variety of social structures of that time (Graeber and Wengrow 2021).

The theories proposed so far did not take into consideration an element that may be important for understanding the overcoming of egalitarian social norms: the belief in a zero-sum game. This belief was dominant in ancient world and played a crucial role in shaping people's incentives. Although scholarly

research has started investigating it only recently (e.g., Meegan 2010; Różycka-Tran, Boski, and Wojciszke 2015), its presence is significant even in today's world, especially considering its interaction with institutions.

The chapter analyzes the impact of the belief in a zero-sum game on institutional change and economic development. In doing so, it offers a new theoretical view of the origins of economic inequality and a new interpretation of the relationship between institutions and economic growth.

The theory was developed to answer three questions:

i) How did economic inequality arise?
ii) Why did egalitarian communities gradually disappear?
iii) Is the relationship between political institutions and economic growth affected by the presence of the belief in a zero-sum game?

The chapter is organized in the following way. Section 1 describes the current state of knowledge on the origins of inequality. Section 2 introduces the belief in a zero-sum game. Section 3 presents a new theory of the origins of inequality, which takes into consideration the presence of this belief in ancient communities. It then proposes a reflection on superstructure and infrastructure. Section 4 explains why egalitarian communities were destined to be outgrown by non-egalitarian societies[12], by highlighting how social norms affected innovation. Section 5 analyzes the interaction in today's world among the belief in a zero-sum game, institutions, and economic growth, and suggests some policy implications. The conclusion summarizes the main points of the theory.

1 - Current theories on the origins of inequality

Human beings lived as hunter-gatherers for thousands of years. During this extremely long time, and especially during the Ice Age, they had to face a harsh environment that forced them to struggle for survival every day. Incapable of overcoming the challenges of nature on their own, they became accustomed to living together in bands, in order to share the risks of that nasty daily life.

Hunter-gatherer communities are ordinarily portrayed as 'egalitarian' communities, living with an institutional setting designed to level the quantity of material resources possessed by every member. The

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[12] The term 'non-egalitarian' refers to societies with norms that allow the presence of economic disparities and the hereditary transmission of wealth.

rationale behind the egalitarian social norms was analyzed in depth in the past (Posner 1980; Fafchamps 1992). Individuals did not create these rules just out of a sense of fairness. In fact, the main purpose of the egalitarian system was to spread the risk of food-taking activities and prevent individuals from obtaining an amount of resources sufficient to concede them the option of self-insurance. This latter eventuality would, indeed, break the insurance system and divide the group. Therefore, individuals expected an equal distribution of supplies and threatened those who tried to accumulate more than the others with sanctions that ranged from gossiping and mocking to actual homicide. Violence rates were indeed very high (Boix 2015, p. 51).

This institutional setting was designed to last and, indeed, its history is very long. In some populations, living in remote parts of the world, it has survived until the present (Platteau 2000). Yet, in most of the global surface, people experienced a passage from egalitarian norms to an institutional environment that allowed the presence of economic inequality among people. What broke the egalitarian institutional setting?

This question has attracted a great deal of attention. Scholars tried to understand which economic, military, or ideological factors could potentially trigger the emergence of inequality. Most of them investigated economic or ecological variables. In the past, the prevailing theory was that inequality started with the invention of agriculture and the subsequent surplus production. Surplus allowed, indeed, the existence of community members not engaged in food-making, namely soldiers, nobles, and priests (Childe 1942). Many other causes were later imagined (Ames 2007)[13], such as storage (Testart 1982), sedentism, or scalar stress (Johnson and Earle 2000). Notorious theories asserted that states with stratified societies originated in the effort of building vast irrigation systems (theory of hydraulic societies - Wittfogel 1957) or because of environmental circumscription (circumscription theory - Carneiro 1970). The most recent analyses underline the role played by the predictability, density, appropriability, and defensibility of resources (E. A. Smith et al. 2010; Mattison et al. 2016; Mayshar, Moav, and Pascali 2022), or by the growth of population density (Platteau 2000; Dow and Reed 2013; Roscoe 2020). Lastly, a few scholars highlighted the fact that leaders can provide advantages to communities, in terms of surplus production (Powers and Lehmann 2014; Garfield, von Rueden, and Hagen 2019). They thus argued that the rise of inequality could be due to collective agreements, which recall the idea of the

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[13] Moreau (2020) provides the most recent and complete review.

'social contract' imagined by natural law philosophers: commoners may have tolerated inequality because they perceived indirect gains from the existence of a wealthier elite (Vehrencamp 1983).

However, the findings obtained to date have proven that none of these factors was decisive (Graeber and Wengrow 2021). Agriculture was neither necessary nor sufficient to establish inequality. It was undoubtedly an element that increased the probability for social stratification to arise, but several communities of farmers remained egalitarian after the agricultural transition, whereas many hunter-gatherer groups adopted a non-egalitarian social structure without becoming sedentary (Boix 2015, pp. 110 ff.; Moreau 2020). Archaeological evidence contradicted the idea that agriculture rapidly increased the productivity of labor, leading to the production of a surplus (Darmangeat 2020). Even the defensibility and predictability of resources and population density were elements that only increased the likelihood of the emergence of inequality (Hayden 2001; Fitzhugh 2020; Graeber and Wengrow 2021). Scalar stress did not represent an insurmountable obstacle for equality, as archaeological remains proved that big egalitarian cities existed in the past (Graeber and Wengrow 2021). Most importantly, archaeological evidence confuted the theory that human communities experience different stages of development in an evolutionary path from simplicity to complexity; many populations switched repeatedly from egalitarian to non-egalitarian institutional settings and vice versa (Graeber and Wengrow 2021). This fact contradicts the assumption that inequality emerged in peculiar ecological environments, since the inhabitants of the same lands clearly changed their social structure without a correspondent change in the ecological landscape.

Even military factors, despite their importance, were not decisive. Empirical evidence does not support the 'lethal weapons hypothesis', which claims that equality depended on the widespread accessibility of lethal weapons such as poisonous arrows, whereas inequality arose once military assets allowed some people to get an advantage with respect to the neighbors (Stibbard-Hawkes 2020).

Many scholars have a different perspective. They define themselves as 'substantivists', in opposition to the 'formalists' who concentrate on mathematical optimizing models and "believe that the laws of supply and demand usually determine what societies do" (Flannery and Marcus 2012, p. 502). Substantivists argue that economies must be instead "understood cross-culturally as embedded within the social structure and as functioning to maintain that structure" (Earle 2002, p. 15), so that each economy is unique. For this reason, they suspect that inequality had to be "orchestrated" (Flannery and Marcus 2012, p. 206) and did not appear automatically as a response to environmental or technological changes. They state that the change of institutions occurred as a result of debates within communities, through which a

sub-group of individuals managed to manipulate the social logic and reach a position of superiority (Flannery and Marcus 2012). However, it has been difficult for them to document this process and prove that material variables were not decisive.

The latest hypothesis in this regard is that the structure of societies did not depend on economic factors, but on individuals' "bold social experiments, resembling a carnival parade of political forms." (Graeber and Wengrow 2021, p. 3). The authors argue that 'schismogenesis' played a prominent role. Although they provide ample evidence that the role of economic factors in creating inequality may have been seriously overvalued in the past, their narrative tends to overromanticize hunter-gatherers' lives. They illustrate the process of society building as something comparable to a game, whereas our ancestors were people accustomed to violence, who were caught in a daily struggle for survival.[14]

The long debate on the origins of inequality has therefore produced numerous findings but has not drawn a clear picture of what broke the system of egalitarian norms. Scholarly research has so far omitted an important element that could be of help in understanding that process of institutional change: the belief in a zero-sum game.

2 - The 'belief in a zero-sum game'

The belief in a zero-sum game (BZSG) is the belief that only a finite amount of goods exists in the world and is not expandable; consequently, if one individual improves her conditions, some other individual must suffer an equivalent loss, as it occurs in a zero-sum game. Therefore, every other player represents a potential opponent.

This mentality drives people to distrust cooperation, which is perceived as something useless, unless it is targeted at stealing resources from others or at redistributing the available resources equitably. These forms of cooperation do not lead to the creation of new wealth. This idea provokes significant negative effects on economic development (Sirola and Pitesa 2017b; P. A. Fearon et al. 2021) and has the potential of becoming a self-fulfilling prophecy: if people believe that growth is impossible, they do not focus their efforts on expanding the 'pie'. The economy then tends towards stagnation.

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[14] Even Sahlins, Graeber's menthor, received some criticisms in this sense. Bogin confuted his idea that hunter-gatherers worked less time than people from the present because they were used to enjoying life and free time. In fact, they probably worked just a few hours per day because their food consumption did not provide them the calories necessary to work more (Bogin 2011).

The impressive results in terms of economic growth, which mankind has obtained in the last few centuries, should provide enough evidence that the world is not a zero-sum game and that human actions can increase the payoffs of the game[15]. However, the BZSG is still quite widespread, especially among people who are not economically educated and are therefore less familiar with the concept of economic growth (Rubin 2003). This is due to the fact that our mental architecture developed during thousands of years in which resources were effectively limited, and our mind adapted to provide us the instincts that could make us survive in such an environment (Boyer and Petersen 2018). The emotion of envy originated from this process and, as all the emotions, faced natural selection (Hill and Buss 2008). It overcame it because it proved to be useful to our ancestors; in a context with scarce resources, indeed, envious individuals had an advantage in terms of motivation, which led them to outperform their non-envious rivals and enjoy higher chances of survival.

The BZSG is now less present than in our distant past. However, its impact is still very strong in some areas of the world. Anthropologist George Foster coined the term 'Image of Limited Good' to describe the worldview of the Tzintzuntzeños, a Mexican population with whom he lived for many years. He described them as believing that all good things in life exist in scarce quantities and there is no way to increase the available supplies (Foster 1967). They therefore created an institutional environment that hindered every member of the community from accumulating more resources than the average, since accumulating was perceived as stealing. This set of informal institutions was discovered in many other populations in different countries, both in the past (e.g., Wolf 1955) and in recent times (e.g., Lindholm 2008). It is a system of "egalitarian norms" (Platteau 2000), which preserve equality but prevent individuals from accumulating wealth and making investments. Sociologist Helmut Schoeck used the term "envy-barrier" to refer to the obstacle for economic development that this system of rules generates (Schoeck 1969, p. 57).

Believing in a zero-sum world can have different impacts on people's behaviors and on the institutions that they decide to adopt. The size of the 'pie' that they imagine is indeed relevant. I will use the term 'expected individual wealth' (EIW) to refer to the amount of resources that every person would get, if the total sum of resources available in the globe were divided equally among all the individuals.

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[15] Naturally, many zero-sum relationships exist (think of positional goods, for instance. See Pagano and Vatiero (2017)). However, they represent only a subset of human interactions. The resources available in the globe are expandable, and therefore even the rights and duties connected to them.

a) If the EIW is perceived to be lower than the level of resources needed for a person to survive, people are ready to fight with every other individual, since they believe that the survival of one subject means the death of someone else. There is no space for institutions, apart from precarious rules adopted by some groups, formed with the only aim of attacking others. The consequence is a Hobbesian world.

b) If the EIW is perceived instead to be equal to the survival level, then people are incentivized to form communities within which they can share resources equally, so that everybody can survive. Egalitarian norms prevent the chance that some members accumulate more than the others – fact that would determine the death of somebody else.

c) Only if the EIW is perceived to be higher than the survival level, the members of a community can accept economic inequality. Even in this scenario, they are prone to fight to acquire the limited resources. However, in some cases they may accept that other subjects get more resources than them if the amount they receive is not lower than the survival level. This tolerance depends on the concrete choices at their disposal.

3 – The belief in a zero-sum game within the framework

When investigating the origins of inequality, scholars have always looked at hunter-gatherers' incentives through a modern lens. They imagined them as individuals trying to get as much utility as possible and thinking that economic growth was feasible. For this reason, researchers paid so much attention to ecological, technological, or economic factors, which are the elements on which growth is based. The underlying assumption has always been that, at some point in time, people accepted inequality because it became a better option than keeping fighting for equality.

There are many reasons, however, to think that this was not the case. As shown in the last session, human mind in the hunter-gatherer era evolved through developing a zero-sum instinct (Boyer and Petersen 2018), which led individuals to perceive daily life as a struggle for finite resources. Growth never occurred, generation after generation, and life seemed to be stuck in an infinite cycle, where nothing could change. People were completely devoted to nature, which was the real master of their fate and donated them the necessary means to survive. Religion was of great importance, because it represented the instrument to try to connect to the world. The quantity of resources available varied from time to time, but that was seen as dependent on nature and not on people's actions. Moreover, the Malthusian

trap operated: favorable environmental circumstances led to population growths and did not change the level of wealth per capita significantly. Every individual could enjoy, on average, only what was necessary to survive.

Innovations happened very rarely and casually. The idea that humans have always striven to master their environment (e.g., Boix 2015, p. 94) derives from a modern vision of life. In fact, hunter-gatherers perceived nature as something not to be touched or threatened. "Far from considering themselves as agents able to act externally on an objectified nature, primitive people feel immersed in it. They have no ambition to transform their environment […] Human beings, precisely because they are only human beings, are unable to provide for their own subsistence needs. They require the *active* assistance of supernatural agencies that are ultimately responsible for the provision of human necessities." (Platteau 2000, p. 194). The idea that technological progress could improve everyone's life was never even imagined.

During the hunter-gatherer era, human beings most probably perceived the EIW to be exactly equal to the survival level. The theory presented in this chapter lies on this strong but likely assumption.

If this theory is correct, egalitarian norms did not arise because people wanted to prevent "the breakdown of cooperation that comes from growth" (Boix 2015, p. 54). If we assume that they were rational and self-interested individuals, even those who were destined to become relatively poorer than their neighbors would have preferred an unequal growth to eternal poverty (growth would have improved their conditions, in absolute terms). Hence, the egalitarian cooperation system would not have lasted thousands of years. The reason it might have lasted is that people continued to believe that growth was impossible.

3.1 - *How could aggrandizers accumulate wealth?*

Although the egalitarian system granted a higher chance of survival for everyone, there surely were individuals who felt the need to raise their conditions over the others, in terms of both prestige and material possessions. Anthropologists call them "aggrandizers" (Hayden 2001, p. 247). Their problem was that, whereas prestige could be unevenly distributed, communities could never tolerate economic inequality: accumulating more than the others was equivalent to stealing from them and provoking their death. For this reason, the members of egalitarian communities were even ready to kill the aggrandizers who tried to break the egalitarian equilibrium.

This behavior did not depend on the real level of resources present in the environment, but on individuals' perspectives. Those who thought that the EIW was equal to the survival level conserved the instinct of fighting against inequality, even if resources were actually abundant. The BZSG is so deep-rooted in our mind that it certainly was not eradicated during the first centuries in which a small surplus could be produced. Egalitarian norms could survive for a long time; Tzintzuntzeños, for instance, kept enforcing their norms in 20th century, even though they had evidently experienced significant growth during their past.

- o *By using violence*

  Aggrandizers could potentially try to obtain a superior level of wealth with violence. This was hardly achievable, however, in the hunter-gatherer world. Firstly, it was extremely unlikely that an individual could collect more resources than others for a long time, no matter how skilled he was; luck and fortuitousness played a crucial role, and the unexpected could happen at any time (Posner 1980). Secondly, that guy had to face the attacks of all his neighbors. However strong he was, in an environment where deathly weapons were very easy to realize and use, he could not resist much time. More predictable or defensible resources would not change this situation.

  Some communities could temporarily accumulate more wealth than others, but either they distributed it equally among the members or they would collapse. There probably existed roving gangs who kept attacking other people and stealing their supplies, but each member of them expected an equal part of the loot. Some groups of individuals could acquire considerable experience and become more skilled in fighting, therefore gaining a significant advantage in battle. However, no community could tolerate the conquest by another group, with the latter becoming a sort of élite, because surrendering to the enemies represented certain death, from the viewpoint of a zero-sum game believer. There was no way to leave some individual physically free of moving while rendering him a slave - he would react as soon as possible and fight for his life[16]. Finally, violence could not guarantee the inheritance of property in any way.

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[16] Boix claimed that the decisive element was a technological change that impacted on economic and military factors (Boix 2015). He based his model on Mancur Olson's idea of 'roving and stationary bandits' (Olson 2000). After having divided individuals into "producers" and "looters", who are those who specialized in fighting, Boix argued that looters created unequal societies by stabilizing in some land and subjugating producers. However, if we consider that producers had a zero-sum game mentality and believed that the EIW was equal to the survival level, they could not accept the dominance of the 'looters': being subjugated (and tolerating an unequal distribution of the resources donated by nature) meant receiving an amount of supplies which was lower than what was necessary to survive.

- o *By hiding wealth*

    In a world with practically no privacy, this was impossible, apart from small items. Ethnographic studies showed that hunter-gatherers were indeed used to trying to hide objects (Woodburn 1998), but this practice did not allow them to accumulate anything particularly valuable.

- o *By migrating*

    This alternative could not solve anything, because in every other area the same egalitarian scenario existed. Alternatively, they could try to live as solitary hermits, but in such a harsh environment they would not survive for long; it was better to remain in egalitarian communities.

- o *By making other people have debts with them*

    No zero-sum game believer could agree on assuming a debt that would imply a future unequal distribution of resources. Indeed, the modern concept of debt did not exist. Sharing was mandatory, notwithstanding the events previously occurred (Woodburn 1998). The exchange of gifts could not determine economic inequality, since at most it established a difference in prestige (Mauss 2002).

Apparently, there were no ways, therefore, through which aggrandizers could get the greater wealth that they desired. Jean-Philippe Platteau listed some alternatives that aggrandizers have in modern egalitarian communities: migration, coalitions of entrepreneurs aimed at breaking the egalitarian equilibrium, and the conversion of people to modern religions (Platteau 2000, p. 216). However, these strategies were not available in ancient times: migration was useless, modern religions did not exist, and people could never tolerate the existence of an entrepreneurial élite.

3.2 - *The role of religion*

In a context where nobody would let anybody else accumulate a higher level of wealth than the average, the emergence of inequality could not derive from ecological or technological factors inherent to wealth production. There was no way for aggrandizers to improve their relative conditions unless the neighbors allowed it. How could this happen?

To avoid their neighbors' attacks, aggrandizers had to convince them of being separate entities that did not compete in the same zero-sum game. The only instrument that could realize this was religion. As previously seen, religion permeated ancient humans' lives, since they lived in close contact with nature and an important part of their daily life was devoted to begging for nature's blessing[17].

Aggrandizers could claim of having a special connection with the divine, therefore with the gods or the ancestors, or of being gods themselves. By doing this, they separated themselves from the other people; the rules of the game that nature decided for humans do not apply indeed to gods. Hence, the resources that gods or special people owned were not part of the limited resources that nature had established for humans. Commoners probably actually perceived the donation of items to the special élite as a means to ingratiate themselves with nature, in order to have a more prosperous future[18].

Anthropologists and institutional economists have always included religion and changes in cosmologies among the factors of legitimation that a newly formed élite could exploit to render its position of superiority more stable. They describe religion as an instrument to legitimize a new social structure once it is formed[19], by including it among the "strategies" available to justify inequality (Diamond 1997, p. 277; Hayden 2001, pp. 258 ff.; Earle 2002, p. 17)[20].

However, religion may have been not only a source of legitimacy, but the real driver of change and the ultimate cause for inequality. By separating themselves from the rest of the community, chiefs could escape from the cage of egalitarian norms and accumulate wealth. In this way, they became a sort of godlike chiefs who were simultaneously spiritual and temporal leaders. Scholars usually describe the dominance based on religious motifs only as a kind of dominance among many and distinguish it from

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[17] The importance of religion in the ancient world is widely documented (e.g., Flannery and Marcus 2012; Hayden 2018; Graeber and Wengrow 2021). A few decades ago, anthropologist Robert Lowie had the intuition that the cause of inequality must have been religion (Lowie 1948). The arguments here presented support his idea.

[18] In the primitive world, the separation of the élite members from the rest of the group, resulting from the recognition of their divine nature, was necessary for them to keep part of the donations. The mere activities of interpreting divine signals, writing, and accounting, which were typical of common priests or sorcerers, certainly granted them prestige, but were not sufficient to overcome the egalitarian norms and obtain more wealth than the average. Even priests were, indeed, subject to the zero-sum game rules. Hunter-gatherers did not evaluate the concrete contribution that each individual offered to the group, since they believed that nature was the real agent who procured them the resources (Woodburn 1998).

[19] This is quite frequent among both anthropologists and institutional economists: e.g., Flannery and Marcus concluded their book by underlining that the élite members "justified their superiority by claiming special relationship with the very beings who had given humans their laws of behavior in the first place" (Flannery and Marcus 2012, p. 563). Acemoglu and Robinson cited religion among the 'edges' that would-be state builders could exploit (Acemoglu and Robinson 2019, p. 80).

[20] The strategies they emphasized are numerous and varied: e.g., contractual debts, feasting, trade and profit. Hayden presented religion as "One of the most common, if not universal, strategies that aggrandizers use to consolidate and justify their power" (Hayden 2001, p. 261). Moreover, he highlighted the role that secret societies, which were religious sects, played in legitimizing inequality in trans-egalitarian communities (Hayden 2018).

forms of dominance based on military, organizational, or technological elements (e.g., Acemoglu and Robinson 2019, pp. 80 ff.). Yet, even when illustrating these alternative forms, it appears to me that the religious element was never absent, even though they consider it as a source of legitimacy ex-post[21].

The arguments here explained support the 'substantivist' vision, which claims that the structure of primitive societies depended on debates within the communities and not on economic or ecological factors. However, the present analysis comes to this conclusion by taking into consideration even economic and ecological variables: the fact that material factors could not determine the emergence of inequality was due to the concrete inability of aggrandizers to overcome egalitarian norms with violence, since people perceived the EIW to be equal to the survival level and would never surrender to their enemies. Significant disparities in military strength, which were anyway unlikely at that time, could not alter their incentives to fight.

Certainly, violence later played a prominent role in human history. With the passing of time, people changed their perspectives on the quantity of resources available in the world; the significant increase of production and the stable presence of a surplus made them understand that the resources provided by nature were not so scarce, so that they started perceiving the EIW as higher than the mere survival level. Therefore, an unequal distribution of resources naturally became preferrable to death, leading many people to accept a condition of inferiority when faced with opponents that were stronger and could potentially kill them. Violence and military skills then gained much more importance in causing and fostering inequality. However, this change of perceptions required very likely much time and did not occur uniformly in every region of the world. Undoubtedly, many communities kept believing that the EIW was equal to the survival level; this possibly explains why some populations were more prone than others to fight to the death for their freedom and maintained egalitarian norms for a longer time.

Considering religion as the ultimate cause of inequality allows to explain the variety of social structures in ancient communities. Non-egalitarian societies existed even among simple foragers, and the return to egalitarian norms, which some populations experienced, may have occurred when commoners stopped believing in the divine connection of the élite members and started considering them again as normal people - thereby attacking them.

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[21] For example, Acemoglu and Robinson describe King Kamehameha of Hawaii as having a technological 'edge', provided by his advanced weapons (Acemoglu and Robinson 2019, p. 80). Yet, in the meantime, they explain how Hawaiian chiefs were regarded as "direct descendants of the gods" (Acemoglu and Robinson 2019, p. 91). See also Wright (2000; 2009), Flannery and Marcus (2012), Moreau (2020), and Graeber and Wengrow (2021).

Agriculture, storage, and the other mentioned elements certainly increased the likelihood of economic inequality because they determined an abundance of resources that enhanced the aggrandizers' potential payoffs, enticing them. Yet, all these elements were only incentivizing factors.

3.3 - *Superstructure and infrastructure*

Scholarly research, so far, has not been able to provide a convincing picture of how and why institutions change or are created in the first place. It is hard to deny that contingencies and randomness may play a decisive role in driving the trajectories of institutional evolution.

The debate on the foundations of institutional orders has a very long history. Political thinkers imagined different causes for the emergence of rules, which vary from social contracts, willingly concluded by individuals to prevent disorder, to norms imposed by a powerful élite, who had the incentives to preserve peace. Marx's materialistic theory described the so-called 'infrastructure' (i.e., the productive forces and the related production relations) as the independent variable from which rules, religious ideas, and social values (the 'superstructure') derive. According to him, the available mode of production constitutes the real foundation of society, and institutional change follows from the change of economic foundations (Marx 1977).

This vision is in stark contrast with what explained in this session. In ancient times, changes in the material conditions could not lead to changes in norms, if we consider that the BZSG was widespread. Debates over the divine nature of the élite may have been the true independent variable, and their outcome was most likely independent from environmental or economic factors, which could not affect the ease with which aggrandizers could convince their neighbors that they had a special connection with gods and ancestors.

Therefore, with respect to the earliest significant institutional change, Marx's materialistic theory may have been wrong[22]. Throughout the course of history, institutions, religious beliefs, and production relations have influenced each other, and it is difficult to establish which factor took the leading role in the process. Yet, taking into consideration the BZSG allows to solve what has long looked like a

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[22] Actually, Marx's analysis did not focus on precapitalist societies. However, he implicitly suggested that those societies broke down because of increases in population (Platteau 2000, pp. 8,9), which were anyway related to material elements.

chicken/egg problem: at the beginning of social evolution, the superstructure may have determined the infrastructure, and not the contrary.

4 – Innovation, institutions, and economic development

Archaeological evidence has shown that the idea of the 'stages of development' was wrong (Graeber and Wengrow 2021). Communities in the past repeatedly switched from egalitarian to non-egalitarian settings. The religious debates on the divine nature of the élite, which had the potential of originating social inequality, could even produce the opposite effect, that is the return to an egalitarian institutional framework[23]. This probably happened many times in the past, in several locations. However, at some point in time, egalitarian communities disappeared and survived only in some remote areas of the world, while economic inequality became the normality. Why did this happen?

Graeber and Wengrow offered some suggestions, by highlighting some important factors such as schismogenesis, warfare, religion, and charity (Graeber and Wengrow 2021, pp. 504 ff.). They did not consider however the zero-sum game mentality.

The answer to the question may be that non-egalitarian societies became wealthier and technologically more advanced than egalitarian groups. When people believe in a zero-sum world, there are indeed fewer obstacles to innovation in non-egalitarian than in egalitarian communities.

Some mathematical models, which focus on the consequences of envy on innovation, give an idea of the impact of egalitarian norms on economic development; envious attacks and sanctions against inequality have indeed the same effects. The basic model (Mui 1995) describes the relationship between two agents when envy is present. It assumes that an agent is incentivized to innovate only if the benefits of the innovation are higher than the costs, which include the retaliation of the envious neighbor. The model is designed for the contemporary world and takes into account many variables, among which the intensity of envy, the effectiveness of retaliation, and the probability for the retaliator of being discovered and sanctioned (the level of protection of property rights). It shows that innovation occurs when the enforcement of property rights is good, when envy is low, or when the innovation benefits the envious subject more than the retaliation.

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[23] There was no other way to re-establish an egalitarian institutional setting than destroying the sacred image of the élite members, by affirming that their claimed connection to the divine was false, so that they were subject again to the same zero-sum game rules of the other people.

The ancient world was much simpler. In an egalitarian community, who believed in a zero-sum game, all the neighbors were envious toward the innovator, so that he would be attacked by all the other members simultaneously. Property rights were not protected, and the community naturally never punished itself for the envious retaliation. Hence, the innovator had to defend his properties by fighting on his own against all the others, therefore the attacks always led to the destruction or theft of the newly generated wealth. Moreover, those people's envy was at the maximum level, and even the slightest disparity would cause an aggression.

The consequences are easily imaginable. Innovation was only possible if it benefited everyone in an equal manner, which means that the new products or techniques had to be easily copiable or sharable. Furthermore, individuals who tried to innovate were perceived as challenging nature, which was something immoral, attracting only contempt. Therefore, there was no incentive to put any effort in trying to master the environment. Innovations occurred always casually, usually when playing games, and inventors did not exploit the new inventions to improve their material conditions (Graeber and Wengrow 2021, p. 500). Egalitarian norms created a barrier to economic development by discouraging investments and technological progress (Boix 2015, p. 8; Acemoglu and Robinson 2019, pp. 96 ff.).

Communities of zero-sum game believers, who instead accepted the presence of inequality, faced a different situation. The élite members, who had escaped from the cage of norms, had the opportunity to accumulate wealth, since commoners would not attack them. As a result, they were allowed to make investments to improve their conditions and could use commoners as workforce. Even though they shared the view that growth was impossible, they naturally found attractive the accumulation of resources, which they perceived to be realized at the expense of the others. They therefore could enjoy even the innovations that required the accumulation of capital[24].

At first, egalitarian norms and non-egalitarian norms did not impact very differently on economic development. In ancient times, the main innovations were indeed, most of the time, casually discovered innovations that could benefit everybody – such as fire, arrows, the wheel. In the long run, however, the innovations requiring capital accumulation became increasingly important, and non-egalitarian

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[24] Even though the élite members could count on taxation and dominance over the commoners to satisfy their needs, innovation represented nonetheless an instrument to improve their lifestyle and comfort; new techniques and products were gladly welcomed, as long as they did not represent a threat to the established order – the élite indeed feared 'creative destruction' (see Acemoglu and Robinson 2012).

economies could develop at a much faster pace, outgrowing egalitarian societies.[25] Economic growth may have been an unintended consequence of the self-interested accumulation of capital of the élite.

The higher rate of economic growth made non-egalitarian societies richer and technologically more advanced than egalitarian communities, providing them a significant advantage in battle. This advantage did not render them invincible, and history has witnessed many significant victories of egalitarian groups against unequal populations – e.g, the destruction of the Roman Empire at the hands of the egalitarian Germanic tribes. However, with the passing of time, the benefits provided by innovation, technology, and wealth became more and more significant in war, enlarging the gap between egalitarian and non-egalitarian societies in a decisive way. Therefore, these latter slowly conquered all the lands that they considered exploitable.

There exists some archaeological evidence, which apparently contradicts what said so far. The remains of the cities of Teotihuacan and Monte Albán reveal that their citizens managed to create big egalitarian communities, which exploited the most modern technology of the time. Authoritative scholars claimed that their institutional settings had positive economic consequences and favored innovation (Acemoglu and Robinson 2019, pp. 149 ff.; Graeber and Wengrow 2021, pp. 341 ff.). This could imply that the theory presented in this chapter is not correct. Yet, there are two possible explanations:

1. A first hypothesis is that these communities freed themselves, in some way, from the BZSG. Their members stopped believing that growth was impossible and that their neighbors were only opponents in the struggle for resources. By doing this, they began to innovate and enjoyed positive economic results.

2. Another possible explanation (which seems more convincing, given the strength of the BZSG) is that the products and techniques that those communities used had not been invented by their members, but belonged to a non-egalitarian past when the limits to investments were not binding for the élite. For example, Wengrow and Graeber reported that the technology exploited to build the "impressive apartments" of Teotihuacan was almost certainly dating back to an earlier period, in which it was utilized to build nobles' palaces (Graeber and Wengrow 2021, p. 341). With the return to egalitarianism, the techniques or products discovered that far did not disappear and were

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[25] Indeed, all non-egalitarian societies of that time had "extractive" institutions (Acemoglu and Robinson 2012, p. 76), which cannot sustain intensive economic growth, but enable a slow rate of growth that is better than the tendency to stagnation caused by the cage of egalitarian norms (Acemoglu and Robinson 2012, p. 91; 2019, p. 113).

certainly kept in use. However, those populations lost the incentives to invest, which were necessary to innovate further.

5 - The belief in a zero-sum game today: discussion and policy implications

One of the main findings of institutional economics is the demonstration that sustained economic growth requires inclusive economic institutions, which "feature secure private property, an unbiased system of law, and a provision of public services that provides a level playing field in which people can exchange and contract" (Acemoglu and Robinson 2012, p. 74). Only inclusive political institutions lead to the stable presence of inclusive economic institutions[26]. Political institutions are "inclusive" when they "distribute power broadly in society" and are "sufficiently centralized" (Acemoglu and Robinson 2012, p. 79); they are distinguished from extractive political institutions, which exist where "the distribution of power is narrow and unconstrained" (Acemoglu and Robinson 2012, p. 79). With inclusive political institutions, all citizens have, at least formally, a similar individual power to determine economic policies; therefore, the representative bodies that they elect should establish economic institutions that prevent rent-seeking activities, favor free entry and competition, and incentivize innovative efforts, with the aim of making the economy grow at the fastest pace.

However, that is not true all the time. Citizens with an equal 'political' power could even create the cage of egalitarian norms, as it occurred in ancient communities. Acemoglu and Robinson noticed that this eventuality was not encompassed in their previous model and expanded their conceptual framework. They argued that inclusive political institutions are not sufficient to obtain inclusive economic institutions, because, as much as the constraints on the government and on the political élite are important, "equally essential is the capacity of the state", described as the power of the state to intervene in people's life (Acemoglu and Robinson 2019, p. 145). They claimed, therefore, that both 'society' and 'state' must be powerful, for economic growth to occur.

This idea does not seem entirely convincing, because the difference between 'state' and 'society' does not appear very clear. In their analysis, they juxtaposed social norms to formal rules, as if they came from two different groups, whereas the subjects that create the rules are the same, i.e., citizens. Certainly, the

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[26] North, Wallis, and Weingast focus on 'open access orders' instead of on inclusive institutions. 'Inclusive institutions' and 'open access orders' are separate concepts, but they both refer to institutional settings based on the ideas of political equality, free entry and competition, and an unbiased system of law (North, Wallis, and Weingast 2009, p. 114; Acemoglu and Robinson 2012, p. 74). With regard to the issue addressed by this section, the two concepts can be used interchangeably.

process of creating rules can take various forms and involves very different individuals, with disparate characteristics and roles. However, it is the community in its whole that accepts the rules and their enforcement. Hence, there is not a real distinction between 'state' and 'society', because they are both terms that refer to the community. An isolated community would never relax the cage of norms by giving more power to the 'state', since that would just mean to give more power to the community itself, which is the entity who created the cage of norms and enforced it.

The real problem with inclusive political institutions may be related to the BZSG. Acemoglu and Robinson have always assumed that people would desire growth and therefore act to expand the economy. This is not an assumption that should be made so easily.

During the course of history, the 'Image of Limited Good' has certainly lost its grip on humans (the possible reasons why this happened are discussed in Chapter 3). However, the softening of this mentality was gradual and certainly took a long time; only in the last few centuries people started taking as obvious that mankind's future can be richer than the past. The sustained economic growth experienced starting from the Industrial Revolution was due to the emergence of inclusive political institutions, but also to the weakening of the BZSG[27].

A population with the BZSG and with broadly distributed power is destined to freeze its economy; if citizens do not believe that growth is possible, their target may just become to get all the wealth they can from the existent 'pie' (Rubin 2018). In a democratic country, in which the poor are the great majority, the level of redistribution of wealth may tend to the maximum level, i.e., the level that allows realizing perfect equality. This would represent an enormous limit to growth[28]. Redistribution targeted at reaching economic equality, summed to a widespread presence of the BZSG, would recreate an institutional environment equal to those of the ancient egalitarian communities, where the zero-sum game becomes real, because growth is non-existent. In that case, the only possible innovations would return to be those obtained by chance, which can easily be copied or shared.

In the presence of the BZSG, inclusive political institutions may lead to an outcome that is worse, in economic growth terms, than the slow growth rate provided by extractive political institutions[29]. With

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[27] The rejection of the BZSG was one of the main elements that distinguished the West from the East and determined their divergent economic trajectories (Mokyr 2017, p.307; Henrich 2020).

[28] Extreme redistribution would remove most of the incentives to make investments and innovate. Empirical evidence has shown that redistribution of wealth, which normally has a positive impact on economic growth, is instead significantly negative if it is "extensive" (A. Berg et al. 2018).

[29] Or by a "Despotic Leviathan', as defined in Acemoglu and Robinson (2019).

extractive political institutions, indeed, the élite would protect itself and conserve the possibility of accumulating wealth and making investments, as in the ancient non-egalitarian societies.

Undoubtedly, in the present this scenario is very unlikely for several reasons. Firstly, even in western democracies the élite conserves a 'de facto' power (Acemoglu and Robinson 2006) that renders the decision of a complete redistribution of wealth almost impossible. The rich can exert considerable influence on the poor and can move easily from country to country, bringing their wealth with them. Secondly, military assets are now very different from the 'democratized' lethal weapons of hunter-gatherers, so that the élite can exploit a strong disparity in military terms. Thirdly, modern zero-sum game believers do not think that the EIW is equal to the survival level, therefore they are much more prone to tolerate inequality.

However, the mix between democracy and BZSG may cause the formation of a soft form of 'envy-barrier', which could seriously undermine growth. Elected governments may focus their activities on imposing the highest level possible of redistribution of wealth, on limiting investment opportunities, and weakening the protection of private property rights.

The following scheme summarizes the interaction that political institutions may have with the BZSG:

1. *Inclusive political institutions + widespread BZSG*: minimum level of growth. Elected policymakers impose heavy obstacles to investments and innovation. The economy tends towards stagnation.
2. *Extractive political institutions + widespread BZSG*: low level of growth. The élite members can make investments. However, they extract all the resources from normal citizens, preventing them from any opportunity to improve their conditions.
3. *Extractive political institutions + negligible presence of the BZSG*: medium-low level of growth. The élite can make investments and tries to make the economy grow in order to have more resources to extract. However, it constrains growth because it fears creative destruction.
4. *Inclusive political institutions + negligible presence of the BZSG*: sustained growth.

Unfortunately, the BZSG was not completely eradicated in the past, and the risk that it may return popular exists. Psychologists started investigating it only in the last few years (Meegan 2010; Różycka-Tran, Boski, and Wojciszke 2015), so the factors that may increase its presence within a population are not fully known. Some studies have shown that economic crises influence people to adopt it (Sirola and

Pitesa 2017b; Carvalho et al. 2022), therefore even economic stagnation may logically have a similar impact.

Western world economies have sadly been slowing down for many years and continue to appear quite vulnerable. Furthermore, there are many movements that explicitly criticize the idea of growth and advocate degrowth, for reasons such as the protection of the environment and ecological sustainability[30]. Over the past 50 years, public opinion has decisively shifted its focus from economic growth to wealth redistribution and social justice, so that the idea of growth has lost much of the appeal it had[31]. Not infrequently, it is described as a fairy tale by influential figures. These circumstances may strengthen the presence of the BZSG, by driving people to believe that growth will not be possible in the future.

If western democracies allowed the BZSG to spread, they would be driven towards stagnation. This would leave them, paradoxically, in a worse situation than extractive dictatorships or oligarchies. History may repeat itself, by leading authoritarian countries to become more powerful than countries with inclusive institutions.

The research on the BZSG is still in its infancy and may provide new important findings in the next few years. At the moment, however, it is hard to imagine how to address the problem of the BZSG with economic policies or regulations: acting on people's beliefs is not easy for policymakers, who probably cannot do much to solve this issue.

Education may instead play a decisive role. The BZSG is evidently more present among untrained individuals (Rubin 2003), who have not received an education that has explained to them what economic growth is and how it is possible. Mandatory schools should explain the fallacy of the zero-sum game bias in order to help people overcome this instinct, which hinders cooperation aimed at creating wealth. The benefits would be significant, both for the students, who would be more prepared to have positive-sum interactions in their professional and social life, and for the community at large.

Furthermore, there are some methods used by teachers that almost certainly lead young learners to develop a zero-sum game mentality. These methods should be avoided. Consider, for instance, the habit

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[30] These movements influenced even scientific articles, which proclaimed the necessity of redebating growth and changing the paradigm for economic policies (e.g., Trawick and Hornborg 2015).

[31] Clearly, the present reflection does not aim to denigrate the idea of social justice or the claims related to it, but is targeted at defending the idea of economic growth and emphasizing how important it is to humanity. In the absence of growth, the world really becomes a zero-sum game, in which people can improve their own condition only at the expense of others. Moreover, countries whose economies do not grow will find it increasingly difficult to defend themselves against potential attacks from nations with extractive political institutions.

of grading on a curve; students who get used to it are naturally influenced to believe that the gain of one subject means the loss of another. Subsequently, they are induced to believe that their fellows are only opponents. The importance given on competition can be detrimental if it trains people to evaluate their performances only by comparing themselves to others; they will not improve their cooperation skills and will get used to have envious feelings, which cause almost only damages, both to them and to the people around them.

Conclusion

The theory presented in this chapter was developed from a study of the relevant literature and is therefore based on secondary sources. It attempts to offer insight into a process that may have involved all ancient societies, united by a view of the world as a zero-sum game with scarce and non-expandable resources. Given the complexity of the topic and the limited informational basis to which I had access, the assertions in this chapter should be evaluated with caution. However, I believe that the arguments provided are valid and deserve consideration.

The theory can be summarized in three points:

i) Economic inequality may have originated because of religious debates that took place within ancient communities. Aggrandizers may have succeeded in convincing their neighbors that they had a special connection to the divine, thus becoming separate entities from their fellows and escaping from the cage of egalitarian norms. Ecological or economic variables probably did not play a decisive role.

ii) Egalitarian communities may have gradually disappeared because their institutional setting imposed a major obstacle to innovation, due to the impossibility for their members to accumulate wealth and make investments. Non-egalitarian societies could outgrow them and gradually conquered all the lands that they found desirable.

iii) The relationship between institutions and economic growth could be affected by the presence of the BZSG. Inclusive political institutions may not lead to sustained economic growth, when this belief is widespread within the population, since the elected bodies may focus solely on redistributing the existing 'pie' and not worry about its expansion. In the presence of the BZSG, authoritarian countries might manage to grow faster than democratic countries.

The public needs to be aware of the harmfulness of the BZSG, especially in democratic countries. Further research is needed to understand how to constrain its presence. Education may probably be the best instrument we have at our disposal.

Chapter 3

EGALITARIAN NORMS, ECONOMIC GROWTH, AND THE BELIEF IN A

ZERO-SUM GAME

Abstract

The interactions between institutions and culture and the economic effects of their joint evolution have attracted a great deal of scholarly attention. However, only little research focuses on the 'belief in a zero-sum game', a cultural element that may have a significant impact on economic prosperity.

This chapter aims to investigate whether a peculiar institutional framework of the past - the set of egalitarian norms adopted by many populations around the world - can be linked to the persistence of this belief among people. It also investigates whether the current prevalence of this belief is associated with contemporary economic variables, including economic growth; the goal is to understand whether this cultural element is persistent or whether its intensity may be influenced by closer events.

The empirical analysis is based on data from the Ethnographic Atlas and the World Values Survey. What emerges is that the current intensity of 'belief in a zero-sum game' among people is not associated with past egalitarian institutional frameworks, but with recent economic performance of countries. However, this relationship is different from that hypothesized.

Introduction

The interactions between institutions and culture and the economic effects of their joint evolution have attracted a great deal of scholarly attention[32]. The most important results were obtained by studying the impact of trust and social capital on economic development and the role played by institutions in influencing trust formation among people (see, for instance, Tabellini 2010).

However, other cultural elements may also have a significant impact on economic prosperity. Among these, the 'belief in a zero-sum game' (BZSG) certainly deserves greater consideration (Różycka-Tran, Boski, and Wojciszke 2015). The BZSG is the belief that human life is a zero-sum game, in which if one

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[32] See Alesina and Giuliano (2015) for a comprehensive review.

individual improves her condition, some other individual must suffer an equivalent loss. This worldview drives people to distrust cooperation and causes significant negative effects on economic development (Sirola and Pitesa 2017a; P. A. Fearon et al. 2021).

Despite its harmful nature, this mindset is the result of human evolution; our mental architecture developed during thousands of years when resources were extremely limited, and our minds adapted to provide us with the instincts that could make us survive in such an environment (Boyer and Petersen 2018). We can consider the BZSG as our 'original' mentality, which was shared by all our ancient ancestors.

A decisive historical turning point was the abandonment of this worldview in favor of an attitude focused on progress and innovation. According to several leading scholars, this change of mindset was one of the most important factors that enabled mankind to experience the extraordinary economic growth of recent centuries and one of the decisive causes of the great divergence between Western countries and the rest of the world (North 2005; Mokyr 2017; Henrich 2020). Subsequently, the economic success of the West led even non-Westerners to realize that growth and progress are possible and pursuable, so that this new growth-oriented mindset spread to the rest of the world. However, it did not spread to all populations at the same rate; some populations had cultural and institutional features that plausibly undermined this change in worldview.

The sets of egalitarian norms[33] designed to prevent the emergence of economic inequality, which were adopted by many ethnic groups around the world, may have been a major obstacle to the abandonment of the BZSG. The assumption underlying this study is that this worldview may have been a fundamental element of the culture of these communities and therefore a belief they passed on to their children. Therefore, the members of egalitarian ethnic groups may have transmitted the BZSG to their descendants

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[33] In this thesis, the term 'egalitarian norms' is referred to the sets of norms designed to prevent the emergence of economic inequalities and having the effect of impeding the formation of wealth distinctions. These sets of norms could be very different from each other; some consisted only of social norms, others also of 'formal' institutions. What they had in common and is relevant to this analysis is the result they managed to achieve, namely the absence of economic stratification in the community. To fall within my definition, it was not necessary that the philosophical ideals of equality, brotherhood, and resource sharing, commonly associated with the word "egalitarianism," underlay the adoption of such norms. What matter is their outcome; namely, the prevention of the emergence of economic inequality.

A more appropriate term would be 'norms directed at preventing the emergence of economic inequality'. I use the term 'egalitarian norms' for brevity.

The underlying assumption of this study is that, at least in the past, the 'belief in a zero-sum game' was one of the main reasons why such norms against inequality were adopted (see Chapters 1 and 2).

more than the members of non-egalitarian populations. Consequently, the BZSG might be a persistent cultural element within those ethnicities[34].

The chapter aims to understand whether the ethnic groups that adopted those norms in the past have higher levels of BZSG in the present. Moreover, it aims to measure the relationship between economic growth and the current diffusion of this belief. Theoretically, economic growth should lead people to perceive the improvement of the economy and thus to understand that development is possible.

The direction of the research is set by two questions:

i) Some people belong to ethnicities that had egalitarian social norms in the past. Do they believe in a zero-sum game more than others?

ii) Is there a relationship between contemporary economic growth and the intensity of the BZSG nowadays?

The chapter is organized as follows. Section 1 describes the BZSG and explains the objectives of the research. Section 2 describes the data. Section 3 and 4 illustrate the empirical analyses. Section 5 discusses the findings obtained and suggests some policy implications. The conclusion summarizes the results.

1 – The belief in a zero-sum game and its possible determinants

The BZSG is the view of the world as a place where only a finite amount of goods exists and is not expandable; therefore, the size of the available 'pie' always remains the same. Economic growth is instinctively perceived as impossible or insignificant.

People who believe in a zero-sum game tend to consider the other 'players' as opponents that they must defeat in the competition for scarce resources. For this reason, they distrust their neighbors and try to prevent them from improving their own conditions: every improvement of an individual's neighbor is perceived as something negative by that individual, because it means that the other subject is getting more goods out of the fixed 'pie' available – thus taking resources away from the rest of the community[35].

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[34] Over the past fifteen years, many economists have been concerned with studying the persistence of peculiar cultural, economic, and institutional elements over time (see Bisin and Federico 2021 for a comprehensive review). The study builds on this literature.

[35] The emotion of envy derives from this vision (see Chapter 1).

The BZSG provokes significant negative effects on economic development (Sirola and Pitesa 2017a; P. A. Fearon et al. 2021) and is a weakness for democratic countries with inclusive political institutions[36]. People who believe in a zero-sum game do not focus their efforts on expanding the 'pie', but only on getting as much as they can from the existent pool of resources. Hence, they do not cooperate to create wealth or try to innovate; they consider the option of cooperating only when it is targeted at stealing resources from others or when it is aimed at redistributing the available resources equally. Both these forms of cooperation, however, have no positive impact on economic growth.

Cooperation aimed at sharing resources was very common in the past, especially among ancient hunter-gatherers. They had no reason to believe that economic development, as we understand it today, was possible; in ancient times, growth never occurred for thousands of years, and life was always the same, generation after generation. To spread the risk of food-taking activities and to redistribute the limited resources available equitably, many communities created sets of egalitarian norms, designed to prevent the insurgence of inequalities. Unfortunately, the same egalitarian rules prevented every member of those communities from making investments and innovating, since any individual improvement was perceived as theft by the others. The result was thus permanent stagnation.

This significant limitation on development led communities with these institutional settings to be gradually overwhelmed by non-egalitarian populations. However, in various areas of the world some populations with such social norms have survived for a very long time – some even to the present day. For instance, an institutional environment designed to prevent inequality from arising was found by anthropologist George Foster among the Tzintzuntzeños, a Mexican population with whom he lived for many years (Foster 1967). In that population, innovation was impossible because the community exerted very rigid control over every individual, sanctioning any attempt of 'rising above the mean' with penalties ranging from gossiping and mocking to outright homicide. Scholars discovered similar sets of norms in numerous populations around the world, both in the past (e.g., Wolf 1955) and in recent times (Platteau 2000; Lindholm 2008). In these communities, the BZSG became a self-fulfilling prophecy: people believed that growth was impossible, so they created the mentioned institutional environment, with the result of making growth truly impossible. This process plausibly rendered the zero-sum belief even more pervasive, making it very difficult to eradicate.

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[36] For a more detailed analysis of the following concepts, see Chapter 2.

1.1 – *The gradual abandonment of the zero-sum worldview*

The BZSG was our 'original' mentality (Boyer and Petersen 2018); our ancient ancestors could not even imagine what growth could be. How humankind has managed to abandon the BZSG in favor of a growth-oriented worldview is still a source of debate. However, recent literature has undeniably made enormous strides in the direction of understanding how this might have happened.

Until the Industrial Revolution, humanity was stuck in the so-called Malthusian trap, which continually brought GDP per capita down to a level close to the survival threshold. Innovation and increases in production could take place, but they were offset by population growth, and this mechanism made the average wealth of each individual stable (Ashraf and Galor 2011). People had indeed an incentive to procreate as much as possible, since mortality was high and offspring represented a source of wealth and support. This scenario naturally represented the perfect place for the BZSG to become pervasive. Life was, in effect, akin to a zero-sum game whose rules did not seem destined to change.

Recent studies have highlighted the shift due to the intervention of the Catholic Church to disrupt the intensive kin-based institutions that were prevalent in Europe (Schulz et al. 2019; Henrich 2020; Schulz 2022). The rupture of the traditional extended family model had several major consequences, which most likely laid the foundation for subsequent economic growth and the escape from the Malthusian trap (Henrich 2020). This event is certainly what brought about a turning point in the process of abandoning the BZSG, for several reasons:

1. Firstly, because of its effects on economic growth. Among the potential factors that may have led people to abandon the BZSG, the most effective was probably the experience of growth itself, which made individuals perceive the improvement and realize that the 'pie' is expandable. Over the past two centuries, growth has certainly had a very strong impact on people's mindsets; however, it did not have it in the past, as long as the Malthusian trap was operative.

   The pre-industrial period probably experienced moments of growth and innovation, which improved, at least temporarily, the lives of various populations (Dutta et al. 2018; Mokyr 2021). The average level of food and means necessary for survival possessed by each individual remained significantly stable over time, but there were certainly signs that humanity was capable of generating wealth (think, for example, of the technologies developed by the ancient Romans). However, ordinary people remained incentivized to think that life was a zero-sum game, since, despite the progress of humankind as a whole, the amount of resources available to them always remained quite limited, and they could not expect considerable improvement in their condition

over their lifetime. For this reason, were it not for the upheavals in kin-based institutions caused by the Catholic Church, economic growth alone could never have led to the abandonment of the BZSG.

2. Secondly, because it set the stage for the subsequent emergence of "cultural entrepreneurs" (Mokyr 2017, pp. 59 ff.), who began to theorize about growth and spread the idea of 'progress'. They naturally played a role in the process of transition from the BZSG to a growth-oriented mindset.

3. Thirdly, because the Church's "Marriage and Family Program" over time led the inhabitants of European territories to undergo major psychological changes and had the (unintended) effect of lowering the testosterone level in men. Testosterone is a hormone that stimulates aggression and influences males to perceive their neighbors as opponents to be defeated in the competition for resources and sexual partners. The lowering of testosterone certainly hindered men's predisposition to perceive life as a zero-sum game (see Henrich 2020).

Within this framework, surely there were also factors that had an opposite impact and resulted as obstacles to the transition, thus slowing down the process of abandoning the BZSG in many populations. This was likely the case for the sets of egalitarian norms mentioned above, which may have constituted the environment in which this belief could persist the longest: firstly, because egalitarian norms hindered economic development; secondly, because the BZSG was very pervasive among the people who adopted these norms, since it likely constituted an important element of their ethnic group's culture and one of the bases on which they adopted those sets of institutions (Foster 1967; 1972; Lindholm 2008). In these populations, the abandonment of the zero-sum belief may have occurred much later than in non-egalitarian communities and only as a result of contact with them.[37]

1.2 - *Which factors are driving the current spread of the belief in a zero-sum game?*

The current distribution of the BZSG around the world is likely due to multiple factors, including both historical and contemporary elements. The present study aims to investigate the relationship that two variables might have with people's tendency to believe in a zero-sum game:

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[37] An example is what happened to the Tzintzuntzeños, who gradually abandoned this mentality once they developed stronger relationships with the external world (Foster 1967). Evidence that other populations had reached outstanding levels of technological progress made them realize that their vision of the world was erroneous.

1- The first variable is the affiliation with ethnic groups that in the pre-industrial period had egalitarian institutional frameworks aimed at preventing the emergence of economic inequality. The BZSG may have remained more widespread among the descendants of those communities, as this belief may have been transmitted from ancestors to descendants as a fundamental tenet of their worldview.

2- The second variable is economic growth. When economies grow, individuals should reduce their level of BZSG. Conversely, periods of recession may lead individuals to re-adopt a pessimistic attitude toward growth. Some evidence has been gathered in this regard (Sirola and Pitesa 2017a; Carvalho et al. 2022).

Hypotheses. The following predictions will be investigated:

Hypothesis 1: Individuals descended from egalitarian ethnic groups believe in a zero-sum game more than others.

Hypothesis 2: Economic growth has a negative relationship with the BZSG. Individuals residing in countries whose economies grow faster should display lower levels of BZSG than others.

2 – Data

To measure the belief in a zero-sum game of the people in the world, the analysis relies on data collected by the European Value Study and the World Values Survey, two well-known large-scale, cross-national survey research programs on values and beliefs (EVS 2022; Haerpfer et al. 2022)[38]. In several waves of the two surveys[39], among the numerous questions, the respondents were asked to place their views on a scale of 1 to 10, with 1 meaning that they agreed completely with the statement on the left and 10 that they agreed completely with the statement on the right. They could choose any number in between. The statement on the left was "People can only get rich at the expense of others", whereas the statement on the right was "Wealth can grow so there's enough for everyone". These responses are taken as a measure

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[38] I used the 'Integrated Values Survey dataset 1981-2022', which can be constructed by merging the 'European Value Study Trend File 1981-2017' and the 'World Values Survey trend 1981-2022 dataset'. Instructions to merge the two datasets are reported in https://www.worldvaluessurvey.org/WVSEVStrend.jsp. The integrated data file includes 450 surveys from 115 countries.

[39] Wave 1 of the European Value Study and waves 2, 3, 5, and 6 of the World Values Survey. The answers to this question are reported as variable E041 in the dataset. The responses used in the analyses were all collected in the time interval 1990-2014.

of respondents' propensity to believe in a zero-sum game; the statement on the left is clearly connected to zero-sum thinking[40]. I reversed the scale so that higher values correspond to higher levels of BZSG. The distribution of the answers is shown in Figure 1 of the Appendix. There is a fair amount of dispersion in the responses, and each point on the 10-point scale was chosen by a significant percentage of individuals.

Data on the ethnic characteristics of the individuals are taken from two linked datasets: the *Ethnographic Atlas* (Murdock 1967) and the *Ancestral Characteristics of Modern Populations Database – Extended Version* (Giuliano and Nunn 2018).

The *Ethnographic Atlas* is a database that contains a great deal of information regarding the lifestyle and social institutions of 1265 pre-industrial ethnic groups from all over the world. It is the most widely used ethnographic dataset, even by economists[41]. Murdock entered the oldest available data for each ethnic group into it. The analyses in this chapter are conducted using the version recently expanded by Giuliano and Nunn, who added 46 ethnic groups to the *Atlas*, mainly from the European continent (Giuliano and Nunn 2018). The variable of interest is the presence of egalitarian norms in the ethnic groups considered. The information was recorded in the variable v66 of the *Atlas*, which reports data on the economic stratification of communities. Murdock divided the communities into five categories of economic stratification (Murdock 1967):

i.   "Complex stratification".
ii. "Dual stratification into a hereditary aristocracy and a lower class of commoners" - the aristocracy enjoyed a traditional status of nobility.
iii. "Élite stratification, in which an élite class derives its superior status from […] control over scarce resources".
iv. "Wealth distinctions".

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[40] The use of this scale of 1 to 10 could naturally lead to some measurement problems. First, respondents are known to be prone to anchoring bias. Their habit of using the metric system leads them to use values such as 5 and 10 more frequently than values close to them. Therefore, I repeated all analyses using a scale from 1 to 5, created from the previous scale by grouping the responses (I substituted values 1 and 2 with 1, 3 and 4 with 2, 5 and 6 with 3, 7 and 8 with 4, and 9 and 10 with 5).

Moreover, the value assigned by respondents could be higher or lower based on how these people are inclined to choose moderate values (i.e., are less likely to choose extreme values on a scale) and not based on how much they actually believe in a zero-sum game. Therefore, I repeated all analyses using a different scale, created by grouping all responses into three values: 1 if the response was 1, 2 or 3; 2 if the response was 4, 5, 6 or 7; 3 if the response was 8, 9 or 10.

The results, which are reported in the Appendix, are always very similar.

[41] The meaningfulness of its data was recently evaluated (Bahrami-Rad, Becker, and Henrich 2021).

v. "Absence of significant class distinctions […] ignoring variations in individual repute achieved through skills, valor, piety, or wisdom".

In this chapter, communities that fall into the latter category are considered communities with egalitarian norms. The assumption is that the lasting absence of economic stratification is not an attainable outcome without the presence of a system of egalitarian norms that prevent the emergence of inequality; over time, people will naturally produce different levels of wealth if there are no social mechanisms that continually level the amounts of individual resources.

The *Ancestral Characteristics Database* was created by Giuliano and Nunn by combining data from the *Atlas* with data on the languages and dialects spoken by the world's present-day populations. They matched each language spoken today with the ethnic group included in the *Atlas* from which that language originated. In this way, knowing the extent to which each language is spoken today in every country in the world, they were able to calculate how many people in each country are descended from every ethnic group considered by the *Atlas*. The *Ancestral Characteristics Database* takes countries as units of observation. For each variable in the *Atlas*, it indicates the percentage of the country's current population connected to an ethnic group with the characteristics considered by the variable. Therefore, for instance, it reports the percentage of each country's current population with ancestors who practiced intensive agriculture. The value of each variable is in the form of a fraction and ranges from 0 to 1. In this study, the variable of interest is the one that reports information on the fraction of each country's current population with ancestors who lived in egalitarian communities (variable v66_grp2 in the *Database*).

Data regarding current economic indicators are taken from the World Bank's *World Development Indicators*[42]: data on economic growth (in the form of annual growth rate of real GDP per capita), on GDP per capita based on purchasing power parity, and on unemployment rates. The "Polity Score", taken from the *Polity 5* Dataset[43], measures how democratic or autocratic countries are. The degree of economic inequality of each country, represented by the Gini index of inequality in equivalized disposable income (post-tax, post-transfer), comes from the *Standardized World Income Inequality Database* (SWIID), version 9_1 (Solt 2020).

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[42] Data are available at https://databank.worldbank.org/source/world-development-indicators#
[43] Data are available at https://www.systemicpeace.org/polityproject.html

Lastly, the analysis uses data on the fraction of each country's population with European ancestry, gathered by Nunn and Puga (Nunn and Puga 2012).

3 – Egalitarian ancestors and the belief in a zero-sum game

This session reports the results obtained from statistical analyses conducted to investigate the relationship between the current diffusion of the BZSG and descent from egalitarian communities. The first two analyses use data from the *Ancestral Characteristics Database*. The third analysis directly uses information from the *Ethnographic Atlas*.

3.1 - *Estimation results using the Ancestral Characteristics Database*

3.1.1 - *Analysis 1 – Countries as units of observation*

To determine whether there is a significant relationship between egalitarian norms in the past and BZSG in the present, the simplest analysis can be done using data from the *Ancestral Characteristics Database* and countries as units of observation. A similar analysis was carried out by Giuliano and Nunn in 2013 to study the link between democracy in the past and democracy in the present (Giuliano and Nunn 2013).

To calculate the level of the BZSG of each country, I simply averaged the responses given to the WVS by its inhabitants. I estimated the following country-level equation:

$$BZSG_c = \alpha_r + \beta percegal_c + \mathbf{X_c^H}\Gamma + \mathbf{X_c^C}\Pi + \varepsilon_c, \tag{1}$$

where c denotes countries, BZSG is the mean of the BZSG among respondents, and *percegal$_c$* measures the percentage of each country's current population with ancestors who lived in egalitarian communities. $\mathbf{X_c^H}$ and $\mathbf{X_c^C}$ are vectors of historical and contemporary control variables, measured at the country level. α_r denotes region fixed effects[44]. All models include the average year to which the ethnographic information in a country pertains (see Giuliano and Nunn 2013; 2018)[45].

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[44] In line with Bentzen, Hariri, and Robinson (2019), all models include a set of regional dummies: sub-Saharan Africa, Asia, Europe, North America, Oceania, and the Middle East and North Africa.
[45] The *Atlas* reports more recent information for ethnic groups that lacked written records or had later contact with the outside world.

The historical control variables are obtained using information from the Database, following the procedure described by Giuliano and Nunn (Giuliano and Nunn 2018). All variables included in the models are in the form of fractions of the current population of a country with ancestors having certain characteristics. I control for several attributes of ethnic groups that may be correlated with economic stratification and the BZSG. Past political complexity is measured as the fraction of each country's population with ancestors who lived in centralized ethnic communities with at least two levels of jurisdictional hierarchies[46] ('Centralized communities', calculated from variable v30 in the Database). The complexity of settlement patterns is measured as the percentage of each country's population with ancestors who lived in sedentary settlements[47] ('Complex settlement patterns', from v33). As for the other variables, they represent the fraction of each country's current population with ancestors who: appointed their chiefs through formal or informal consensus ('Local democracy', from v72); practiced intensive agriculture ('Intensive agriculture', from v28); had no form of slavery ('Absence of slavery', from v70); had no heritable property rights to land ('Absence of inheritance of real property', from v75)[48]; lived in extended families ('Extended families', from v8); believed in high gods ('High gods', from v34).

I then calculated two indexes measuring the dependence on hunting and herding for survival ('Dependence on hunting', from v2, and 'Dependence on herding', from v4) following Alesina, Giuliano and Nunn's method (Alesina, Giuliano, and Nunn 2013). These indexes also range from 0 to 1. Furthermore, I controlled for the percentage of each country's population with European ancestry, since Europeans certainly played an important role in the process of change from a zero-sum to a pro-growth mindset ('European descent').

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[46] The distinction between fragmented and centralized ethnic groups is taken from Gennaioli and Rainer (2007).

[47] Variables v30 (political complexity) and v33 (settlement patterns) of the *Atlas* are widely used in literature to proxy for past political and economic development (see, for instance, Alesina, Giuliano, and Nunn 2013; Michalopoulos and Papaioannou 2013; Bentzen, Hariri, and Robinson 2019).

[48] The absence of economic stratification and the absence of inheritable property rights to land are non-overlapping variables: egalitarian communities existed even in contexts where property rights were protected (e.g., the Tzintzuntzeños). What mattered was that social norms prevented inequalities from arising by not allowing individuals to rise their wealth above the average.

TABLE 1A

Dependent variable:	Belief in a Zero-Sum Game (Country Mean)													
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Egalitarian ancestors	0.728***	0.732***	0.914***	0.698**	0.746***	0.754***	0.684**	0.730***	0.660**	0.724***	0.729***	0.686**	0.856**	0.779**
	(0.272)	(0.267)	(0.327)	(0.301)	(0.275)	(0.263)	(0.284)	(0.275)	(0.274)	(0.272)	(0.276)	(0.274)	(0.357)	(0.328)
Centralized communities		0.0212											-0.0382	-0.441
		(0.461)											(0.552)	(0.815)
Complex settlement patterns			0.308										0.256	0.207
			(0.214)										(0.257)	(0.322)
Local democracy				-0.0798									-0.132	-0.0815
				(0.192)									(0.221)	(0.255)
Intensive agriculture					0.183								-0.0896	0.316
					(0.259)								(0.463)	(0.764)
Dependence on hunting						-2.887**							-2.852	-6.503
						(1.251)							(2.551)	(4.089)
Absence of slavery							-0.104							-0.166
							(0.413)							(0.557)
Absence of inheritance of real property								0.272						0.903
								(0.254)						(0.592)
Extended families									0.206					0.245
									(0.162)					(0.182)
Presence of high gods										0.237				0.425
										(0.235)				(0.430)
Dependence on herding											-0.0180			-0.302
											(0.444)			(0.867)
European descent												-0.00177		-0.00496
												(0.00662)		(0.00745)
Date of observation ethnicities	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	96	96	96	93	96	96	95	91	96	96	96	92	93	87
Adjusted R-squared	0.092	0.081	0.092	0.107	0.084	0.093	0.097	0.090	0.093	0.089	0.081	0.100	0.080	0.067

Notes: OLS estimates. The unity of analysis is a country. All models include a constant term and the average year to which the ethnographic information in a country pertains. The seven regions included are sub-Saharan Africa, Asia, Europe, North America, Oceania, and the Middle East and North Africa. Coefficients are reported with robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

The contemporary control variables include the natural logarithm of each country's real GDP per capita based on purchasing power parity, unemployment rates, Polity Scores, and Gini indexes. All these variables were measured in 2000[49].

TABLE 1B

Dependent variable:	Belief in a Zero-Sum Game (Country Mean)							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Egalitarian ancestors	0.599*	0.578*	0.731**	0.744***	0.687**	0.747**	0.747**	0.756**
	(0.324)	(0.322)	(0.306)	(0.231)	(0.273)	(0.296)	(0.296)	(0.321)
Ln GDP per capita p.p.p.	-0.166					0.0199	0.0199	-0.0822
	(0.178)					(0.110)	(0.110)	(0.0961)
Unemployment rate		0.0143				0.0133	0.0133	0.0136
		(0.0113)				(0.0124)	(0.0124)	(0.0125)
Polity score			-0.00281			0.0336*	0.0336*	0.0504***
			(0.0298)			(0.0192)	(0.0192)	(0.0182)
Gini index				-1.839*		-2.832**	-2.832**	-3.440***
				(1.095)		(1.164)	(1.164)	(1.098)
Centralized communities								-0.115
								(0.516)
Local democracy								-0.0844
								(0.177)
Complex settlement patterns								0.0437
								(0.218)
Intensive agriculture								-0.125
								(0.238)
Date of observation ethnicities	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	94	94	89	89	84	83	83	82
Adjusted R-squared	0.102	0.084	0.080	0.304	0.278	0.351	0.351	0.368

Notes: OLS estimates. The unity of analysis is a country. All models include a constant term and the average year to which the ethnographic information in a country pertains. The seven regions included are sub-Saharan Africa, Asia, Europe, North America, Oceania, and the Middle East and North Africa. Coefficients are reported with robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

The estimates show that countries with populations who have more egalitarian ancestors apparently have higher average levels of BZSG than the rest of the countries. The coefficient is positive and significant in all the models. Column (14) in Table 1A includes all the ethnographic variables, and the coefficient of the regressor of interest is the only significant coefficient. Table 1B shows that the results are robust to the inclusion of economic indicators. GDP per capita and unemployment apparently do not have any significant relationship with the average level of the BZSG in the countries. In contrast, the Polity score

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[49] Choosing a specific year in analyses of this kind is a common practice (see, for instance, Alesina, Giuliano, and Nunn 2013, p. 493).

and the Gini index have a significant coefficient: more democratic countries and countries with a lower degree of economic inequality appear to have higher levels of BZSG.

3.1.2 - *Individuals as units of observation*

The previous analysis obtained significant results, but it was rather superficial. I therefore conducted a second analysis by taking individuals as units of observation. I used a three-level mixed-effects model, with individual observations nested in country-year clusters, which in turn were nested in countries. In this way, I was able to control even for respondents' individual characteristics, which certainly influence their level of BZSG. In addition, I could use more precise economic indicators related to the year in which each respondent was interviewed[50].

In this analysis, the dependent variable is the response given by the individual to the WVS. I estimated the following equation:

$$BZSG_{i,y,c} = \alpha_{y,c} + \beta percegal_c + \mathbf{X_c^H}\mathbf{\Gamma} + \mathbf{X_{y,c}^C}\mathbf{\Pi} + \mathbf{X_i}\mathbf{\phi} + \varepsilon_{i,y,c}, \quad\quad (2)$$

$$\alpha_{y,c} = \gamma_c + \tau_{y,c} \quad\quad (2.1)$$

$$\gamma_c = \gamma_0 + \nu_c \qu\quad (2.2)$$

where i denotes an individual, y a year, and c a country. $percegal_c$ is the percentage of a country's current population with egalitarian ancestors. Each individual is assigned the value of the country in which he or she resides. $\mathbf{X_c^H}$ are the same historical controls of equation 1, measured at the country level. Even in this case, all models include the average year to which the ethnographic information in a country pertains (starting from column 3 in Table 2a). $\mathbf{X_{y,c}^C}$ are contemporary control variables, measured at the country level in the year in which the individual was interviewed. The random intercepts $\tau_{y,c}$ and ν_c are the only coefficients that vary randomly. Standard errors are clustered at the country-level.

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[50] When observations are clustered within groups, the assumption of independence is violated. There are alternative ways to address the problem of within-cluster dependence; multilevel mixed-effects models (with both fixed and random coefficients) are most appropriate when the aim of the research is to test the effect of group-level variables on a level-1 dependent variable (Snijders and Bosker 2012; Rabe-Hesketh and Skrondal 2021). All multilevel mixed-effects models in this study are fit using maximum likelihood (ML).

This analysis includes $\mathbf{X}_i$, a vector of individual-level controls: sex (variable X001 of the Integrated Values Survey Dataset), age (X003), age squared, the level of education (X025) and income (X047_WVS) of the respondents, their marital status (a dummy obtained from variable X007), whether they were unemployed at the time of the interview (a dummy from X028), whether they felt they belonged to the lowest social class (a dummy from X045), whether they were religious (F034), and their political views (E033). In almost all the models, these individual variables have significant coefficients; for brevity, they are not reported. Women tend to have lower levels of BZSG. Age and BZSG have an inverted-U shaped relationship. As can be easily guessed, better educated and richer people have lower levels of BZSG. Single people, the unemployed and those who feel they belong to the lowest social class show higher BZSG intensity. Lastly, religious people believe significantly less in a zero-sum game (faith probably has a positive impact on their vision of the world), as well as people who declare to be right-wingers.

As shown in table 2A, the relationship is robust to the inclusion of the individual-level controls. The coefficient is always positive and significant.

The use of the multilevel model gives the opportunity to control for the impact of economic growth on the BZSG. The relevant growth here is the growth of real per capita GDP, which is the economic change that individuals should perceive the most. The analyses in this chapter use data on the Compound Annual Growth Rate of Real GDP per capita relative to the three years preceding the year in which the respondents were interviewed.

Even after adding more precise economic indicators and a variable measuring economic growth in the previous years, the relationship between egalitarian ancestors and BZSG remains positive and significant. The relationship between the BZSG and economic growth (and economic inequality) will later be analyzed in Section 4.

The results obtained by using the information from the *Ancestral Characteristics Database* indicate that, apparently, individuals living in countries where a higher percentage of people are descended from egalitarian ethnicities report higher levels of BZSG than others. This suggests that hypothesis 1 may be correct.

TABLE 2A

Dependent variable: Belief in a Zero-Sum Game (Individual)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
Egalitarian ancestors	1.007***	0.761***	0.756**	0.711***	1.057***	0.862***	0.780***	0.948***	0.873**	0.755**	0.630**	0.786**	0.760**	0.868**	0.929***
	(0.281)	(0.295)	(0.296)	(0.272)	(0.296)	(0.307)	(0.292)	(0.361)	(0.414)	(0.303)	(0.299)	(0.308)	(0.297)	(0.398)	(0.326)
Centralized communities				-0.183											
				(0.320)											
Complex settlement patterns					0.441**										0.238
					(0.179)										(0.203)
Local democracy						0.297									
						(0.203)									
Intensive agriculture							0.0590								
							(0.205)								
Dependence on hunting								-4.575*							-2.676
								(2.499)							(2.713)
Absence of slavery									0.177						
									(0.253)						
Absence of inheritance of real property										-0.427**					-0.210
										(0.207)					(0.199)
Extended families											0.346*				0.297
											(0.191)				(0.190)
Presence of high gods												0.176			
												(0.230)			
Dependence on herding													-0.310		
													(0.505)		
European descent														0.283	
														(0.200)	
Date of observation ethnicities	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Individual-level controls	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	279,079	128,007	128,007	128,007	128,007	128,007	128,007	128,007	128,007	126,892	128,007	128,007	128,007	126,353	126,892
Number of countries	97	81	81	81	81	81	81	81	81	80	81	81	81	79	80
Number of country-year clusters	207	137	137	137	137	137	137	137	137	135	137	137	137	135	135

Notes: Three-level mixed-effects regression. The unity of analysis is an individual. Cases are nested in country-year groups, which are in turn nested in countries. All models include a constant term. Columns (2)-(15) include individual-level controls. Columns (3)-(15) include the average year to which the ethnographic information in a country pertains. Standard errors are clustered at the country-level. *** p<0.01, ** p<0.05, * p<0.1.

TABLE 2B

Dependent variable:	Belief in a Zero-Sum Game (Individual)							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Egalitarian ancestors	0.797**	0.597**	0.728**	0.876***	1.254**	0.806**	1.004*	1.005**
	(0.378)	(0.272)	(0.317)	(0.305)	(0.534	(0.322)	(0.576)	(0.428)
Ln GDP per capita p.p.p.	0.0615					0.0794	-0.0205	0.00716
	(0.103)					(0.0902)	(0.104)	(0.0834)
C.A. growth rate - preceding 3 years		0.0183**				0.0174	0.0315***	0.0302***
		(0.00755)				(0.0111)	(0.0118)	(0.0112)
Unemployment rate			0.00731			0.0103	0.0133	
			(0.0107)			(0.0101)	(0.0104)	
Polity score				0.00872		0.00755	0.0124	
				(0.0109)		(0.0157)	(0.0186)	
Gini index					-2.977***		-3.419***	-3.388***
					(0.908)		(0.878)	(1.104)
Centralized communities								-0.654*
								(0.376)
Local democracy								0.178
								(0.178)
Date of observation ethnicities	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Individual-level controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	123,058	121,546	124,389	122,002	119,576	115,541	111,717	113,206
Number of countries	77	77	79	74	73	70	66	69
Number of country-year clusters	131	128	133	130	126	121	115	118

Notes: Three-level mixed-effects regression. The unity of analysis is an individual. Cases are nested in country-year clusters, which are in turn nested in countries. All models include a constant term, individual-level controls, and the average year to which the ethnographic information in a country pertains. Standard errors are clustered at the country-level. *** p<0.01, ** p<0.05, * p<0.1.

3.2 - *Estimation results using the Ethnographic Atlas*

Analyses using the Database created by Giuliano and Nunn show a distinct relationship between the presence of egalitarian communities in the past and the level of BZSG in the present. However, the link between past and present was indirect. WVS respondents were assigned the value related to the country in which they resided; the ethnicity to which they actually belonged was not taken into account. A more precise analysis of the link between past egalitarian ethnicities and present BZSG would require directly considering the ethnicity to which each respondent belonged.

The WVS contains some data on ethnic groups, but they are rather limited. In some surveys in a small number of countries, the interviewers asked the respondents to report their ethnicity (Question X051 in the Integrated File) [51]. I was therefore able to associate a portion of the WVS respondents with ethnic

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[51] Unfortunately, some responses are confusing or inaccurate. Therefore, I used only those responses with a sufficient level of accuracy and reliability (see section A3 in the Appendix). Enke used the same technique to associate WVS respondents with ethnic groups in the *Ethnographic Atlas* (Enke 2019).

groups in the Atlas. This sub-sample consists of 27,043 observations of individuals belonging to 74 different ethnic groups and residing in 31 countries[52].

The link between people and their ethnic group can also be established through the spoken language (Giuliano and Nunn used languages to create their Database)[53]. One question asked to WVS respondents concerned the language spoken by them at home (Question G016 in the Integrated File). This question was asked to many more people than the question regarding ethnicity. I therefore associated many more respondents with an *Atlas* ethnic group, greatly expanding the sample size: 99,181 additional individuals belonging to 164 different ethnic groups and residing in 73 countries.

The final sub-sample thus consisted of 126,224 individuals, belonging to 192 different ethnic groups and residing in 73 countries. This sub-sample was slightly smaller than half of the original sample[54].

I could then re-perform the previous analyses using the *Ethnographic Atlas* data directly. I still used a three-level mixed effects model, in which individuals are units of observation and are nested in country-year clusters nested in countries. I estimated the following equation:

$$BZSG_{i,y,c} = \alpha_{y,c} + \beta egalethn_i + \mathbf{X_i^H}\boldsymbol{\Gamma} + \mathbf{X_{y,c}^C}\boldsymbol{\Pi} + \mathbf{X_i}\boldsymbol{\phi} + \varepsilon_{i,y,c}, \tag{3}$$

$$\alpha_{y,c} = \gamma_c + \tau_{y,c} \tag{3.1}$$

$$\gamma_c = \gamma_0 + \nu_c \tag{3.2}$$

where *i* denotes an individual, *y* a year, and *c* a country. $egalethn_i$ is a dummy variable that takes value 1 if the ethnicity to which the individual is matched was egalitarian (variable v66 of the *Ethnographic Atlas*). $\mathbf{X_i^H}$ are the historical controls previously included in equation (1) and (2), but in this equation they are related to the ethnic group to which the respondent belonged. So, for example, past political complexity was controlled for by entering a dummy variable that acquired value 1 if the individual belonged to an ethnic group that is coded in the *Atlas* as having at least 2 levels of political hierarchies (variable v33 in the *Atlas*). Past settlement complexity was controlled for by adding a binary variable

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[52] The list of ethnicities and countries is reported in the Appendix.
[53] Using language as a means of linking person and past ethnicity is a delicate procedure and does not always lead to reliable results. In many cases I refrained from associating respondents because the linkage did not appear reliable and robust, therefore I kept in the sample only those individuals with respect to whom the association seemed sufficiently accurate (see section A3 in the Appendix).
[54] However, the inclusion of individual-level controls greatly reduced the size of this sub-sample as well.

that took value 1 if the ethnic group lived in sedentary settlements. Each information was therefore related to the ethnic group of the respondent. All models included the date in which the ethnic group was observed. $\mathbf{X}_{c,y}^{c}$ are contemporary control variables, measured at the country level in the year in which the individual was interviewed. $\mathbf{X}_i$ is the same vector of individual-level controls of equation (2).

TABLE 3A

Dependent variable:	Belief in a Zero-Sum Game (Individual)			
	(1)	(2)	(3)	(4)
Egalitarian ethnicity _(EA)_	-0.108	0.0285	-0.0467	-0.00233
	(0.118)	(0.106)	(0.178)	(0.109)
Centralized community			-0.108	
			(0.162)	
Local democracy			-0.163**	
			(0.0821)	
Intensity of agriculture			-0.0763	
			(0.122)	
Ln GDP per capita p.p.p.				0.0201
				(0.109)
C.A. growth rate - preceding 3 years				0.0137
				(0.00996)
Unemployment rate				0.0127
				(0.0125)
Date of observation ethnicities	No	Yes	Yes	Yes
Individual-level controls	No	Yes	Yes	Yes
Observations	121,385	65,092	48,389	59,177
Number of countries	73	61	55	55
Number of country-year clusters	123	101	92	90

Notes: Three-level mixed-effects regression. The unity of analysis is an individual. Cases are nested in country-year clusters, which are in turn nested in countries. All models include a constant term. Column (2)-(4) include individual-level controls and the date in which the ethnic group was observed. Standard errors are clustered at the country-level. *** p<0.01, ** p<0.05, * p<0.1

As Table 3A shows, when the analysis is repeated on this sub-sample and ethnographic information is assigned on the basis of each respondent's ethnicity, there is no significant relationship between the current level of BZSG and descent from an egalitarian ethnic group. I tested whether the relationship between the BZSG and the variable obtained from the Ancestral Database was also present in this sub-

sample, to see whether the latest results could be due to a decisive difference between the two samples (I estimated equation (2) on this sub-sample).

TABLE 3B

Dependent variable:	Belief in a Zero-Sum Game (Individual)					
	(1)	(2)	(3)	(4)	(5)	(6)
Egalitarian ethnicity *(Ethnographic Atlas)*	-0.0467			-0.113		
	(0.178)			(0.155)		
Egalitarian ancestors *(Ancestral C. Database)*		0.660**	0.626*		0.628**	0.775**
		(0.257)	(0.343)		(0.282)	(0.375)
Centralized community *(EA)*	-0.108		-0.0787	-0.174		-0.101
	(0.162)		(0.0857)	(0.154)		(0.0769)
Local democracy *(EA)*	-0.163**		-0.160*	-0.200*		-0.199*
	(0.0821)		(0.0825)	(0.108)		(0.108)
Intensive agriculture *(EA)*	-0.0763		-0.0702			
	(0.122)		(0.120)			
Centralized communities *(Ancestral C.)*		-0.996*			-0.906*	
		(0.525)			(0.470)	
Local democracy *(Ancestral C.)*		0.364			0.177	
		(0.264)			(0.195)	
Intensive agriculture *(Ancestral C.)*		0.0811				
		(0.330)				
Ln GDP per capita p.p.p.				0.168**	0.176*	0.207**
				(0.0846)	(0.0908)	(0.0883)
C.A. growth rate - preceding 3 years				0.0242***	0.0222***	0.0240***
				(0.00707)	(0.00602)	(0.00610)
Date of observation ethnicities	Yes	Yes	Yes	Yes	Yes	Yes
Individual-level controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	48,389	48,389	48,389	42,517	42,517	42,517
Number of countries	55	55	55	50	50	50
Number of country-year clusters	92	92	92	81	81	81

Notes: Three-level mixed-effects regression. The unity of analysis is an individual. Cases are nested in country-year clusters, which are in turn nested in countries.
All models include a constant term and individual-level controls. Columns (1), (3), (4), and (6) include the date of observation of the ethnicity associated to the individual.
Column (2), (5) include the average year to which the ethnographic information in a country pertains. Standard errors are clustered at the country-level. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

As shown in Table 3B, the previous relationship holds. Even in this case, it appears that individuals living in countries where a larger percentage of the population is descended from egalitarian ethnic groups tend to have higher levels of BZSG also in this sub-sample. This demonstrates that the different results obtained by using the variable from the *Ancestral Characteristics Database* and the variable from the *Ethnographic Atlas* were not due to peculiar characteristics of the sub-sample, which is similar to the original sample except in terms of size. Yet, the analysis using the data from the *Ethnographic Atlas*

shows that there is no direct relationship between the propensity to believe in a zero-sum game and belonging to an ethnic group formerly having a set of egalitarian norms.

Another element must be considered. The three-level model used here does not account for all the information available for this reduced sub-sample. The WVS respondents are indeed united by residing in a particular country in a particular year, but also by belonging to a specific ethnic group described in the *Atlas*. For this reason, the most appropriate model in this case is not a simple three-level model, but a multilevel model that also considers ethnic groups as clusters. I repeated the analysis on this sub-sample, therefore, using a mixed-effects model with the individual observations nested in country-year clusters, in turn nested in countries, which are then crossed with ethnicities[55]. I estimated the following equations:

$$BZSG_{i,y,c} = \alpha_{y,c} + \beta egalethn_i + \mathbf{X}_i^{\mathbf{H}}\mathbf{\Gamma} + \mathbf{X}_{y,c}^{\mathbf{C}}\mathbf{\Pi} + \mathbf{X}_i\boldsymbol{\phi} + \omega_{e(i,y,c)} + \varepsilon_{i,y,c}, \qquad (4)$$

$$\alpha_{y,c} = \gamma_c + \tau_{y,c} \qquad (4.1)$$

$$\gamma_c = \gamma_0 + \nu_c \qquad (4.2)$$

$$BZSG_{i,y,c} = \alpha_{y,c} + \beta percegal_c + \mathbf{X}_c^{\mathbf{H}}\mathbf{\Gamma} + \mathbf{X}_{y,c}^{\mathbf{C}}\mathbf{\Pi} + \mathbf{X}_i\boldsymbol{\phi} + \omega_{e(i,y,c)} + \varepsilon_{i,y,c}, \qquad (5)$$

$$\alpha_{y,c} = \gamma_c + \tau_{y,c} \qquad (5.1)$$

$$\gamma_c = \gamma_0 + \nu_c \qquad (5.2)$$

where *i* denotes an individual, *y* a year, *c* a country, and *e* an ethnic group. $egalethn_i$ is a dummy variable that takes value 1 if the ethnicity to which the individual is matched was egalitarian (variable v66 of the *Ethnographic Atlas*), whereas $percegal_c$ is the percentage of a country's current population with egalitarian ancestors (each individual is assigned the value of the country in which he or she resides). $\mathbf{X}_i^{\mathbf{H}}$ are the historical controls already included in equation (3) and are related to the ethnic group to which the respondent belonged. $\mathbf{X}_c^{\mathbf{H}}$ are the historical controls already included in equation (2) and are related to the country where the respondent resides. All models include the date in which the ethnic group was

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[55] Instructions on how to perform an analysis with such a model can be found in Rabe-Hesketh and Skrondal (2021).

observed or the average year to which the ethnographic information in a country pertains. $\mathbf{X}_{y,c}^{C}$ are contemporary control variables, measured at the country level in the year in which the individual was interviewed. The random intercepts $\tau_{y,c}$, ν_c, and $\omega_{e(i,y,c)}$ are the only coefficients that vary randomly. $\omega_{e(i,y,c)}$ indicates the effect of belonging to ethnic group e. $\mathbf{X}_i$ is the same vector of individual-level controls of the previous equations.

TABLE 3C

Dependent variable:	Belief in a Zero-Sum Game (Individual)					
	(1)	(2)	(3)	(4)	(5)	(6)
Egalitarian ethnicity *(Ethnographic Atlas)*	0.112	-0.0832	-0.200			
	(0.183)	(0.209)	(0.217)			
Egalitarian ancestors *(Ancestral C. Database)*				0.587	0.584	0.730
				(0.533)	(0.539)	(0.542)
Centralized community *(EA)*		-0.348*	-0.408**			
		(0.188)	(0.194)			
Local democracy *(EA)*		0.0379	0.00419			
		(0.143)	(0.157)			
Intensive agriculture *(EA)*		-0.0673	-0.0927			
		(0.166)	(0.171)			
Centralized communities *(Ancestral C.)*					-1.018	-0.845
					(0.725)	(0.641)
Local democracy *(Ancestral C.)*					0.462*	0.349
					(0.261)	(0.250)
Intensive agriculture *(Ancestral C.)*					0.0631	
					(0.366)	
Ln GDP per capita p.p.p.			0.140			0.126
			(0.0924)			(0.0971)
C.A. growth rate - preceding 3 years			0.0231**			0.0212*
			(0.0116)			(0.0113)
Unemployment rate			0.00272			
			(0.0133)			
Date of observation ethnicities	Yes	Yes	Yes	Yes	Yes	Yes
Individual-level controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	48,389	48,389	42,517	48,389	48,389	42,517
Number of ethnic groups	118	118	114	118	118	114
Number of countries	55	55	50	55	55	50
Number of country-year clusters	92	92	81	92	92	81

Notes: Multilevel mixed-effects regression. The unity of analysis is an individual. Cases are nested in country-year clusters, which are nested in countries, which are crossed with ethnic groups. All models include a constant term and individual-level controls. Columns (1)-(3) include the date of observation of the ethnicity associated to the individual. Column (4)-(6) include the average year to which the ethnographic information in a country pertains. Standard errors in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

This addition makes the coefficient of the regressor of interest non-significant[56]. Hypothesis 1 was therefore definitely wrong. Past egalitarian communities did not create any persistent effect on the culture of their descendants in terms of greater prevalence of the BZSG. In contrast, there are indications that individuals descended from ethnic groups once belonging to politically developed communities have lower levels of BZSG: the coefficient of the dummy variable measuring past political centralization ('Centralized community *(EA)*') is negative and significant.

4 – Economic growth and the belief in a zero-sum game

This section reports the results obtained from the study of the relationship between the spread of the BZSG and economic growth. Before conducting the analyses, I believed that growth could have a positive effect on the reduction of the BZSG. Hypothesis 2 was that economic growth would make individuals perceive an improvement and realize that wealth can grow and economic development is possible. However, as already reported in Table 2B, the analysis showed that in fact the relationship between growth and BZSG is exactly the opposite. To study it more precisely, I used two different mixed-effects models and estimated the following equations:

$$BZSG_{i,y,c} = \alpha_{y,c} + \beta growth_{y,c} + \mathbf{X}_i^H \mathbf{\Gamma} + \mathbf{X}_{y,c}^C \mathbf{\Pi} + \mathbf{X}_i \mathbf{\phi} + \varepsilon_{i,y,c}, \tag{6}$$

$$\alpha_{y,c} = \gamma_c + \tau_{y,c} \tag{6.1}$$

$$\gamma_c = \gamma_0 + \nu_c \tag{6.2}$$

$$BZSG_{i,y,c} = \alpha_{y,c} + \beta growth_{y,c} + \mathbf{X}_i^H \mathbf{\Gamma} + \mathbf{X}_{y,c}^C \mathbf{\Pi} + \mathbf{X}_i \mathbf{\phi} + \omega_{e(i,y,c)} + \varepsilon_{i,y,c}, \tag{7}$$

$$\alpha_{y,c} = \gamma_c + \tau_{y,c} \tag{7.1}$$

$$\gamma_c = \gamma_0 + \nu_c \tag{7.2}$$

where *i* denotes an individual, *y* a year, *c* a country, and *e* an ethnic group. Equation 6 is estimated through a three-level model, with cases nested in country-year clusters, nested in countries (Table 4A). Equation

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[56] As for equation (5), the results are similar using the previous three-level model and adding ethnicity fixed effects; the coefficient of the regressor of interest loses significance.

(7) takes into account the effect of belonging to the same ethnic groups: individual observations are nested in country-year clusters, which are nested in countries, which are crossed with ethnicities (Table 4B). $growth_{y,c}$ indicates economic growth; each individual is assigned the value of the country in which he or she resides. Growth is still measured as the compound annual growth rate of real GDP per capita relative to the three years preceding the year in which the individual was interviewed. $\mathbf{X}_i^H$ are the historical controls included in the previous equations, related to the ethnic group to which the respondent belonged. The models include the date in which the ethnic group was observed. $\mathbf{X}_{c,y}^C$ are contemporary control variables, measured at the country level, with reference to the year in which the individual was interviewed. $\mathbf{X}_i$ is the same vector of individual-level controls of equation (2). The random intercepts $\tau_{y,c}$, ν_c, and $\omega_{e(i,y,c)}$ are the only coefficients that vary randomly. $\omega_{e(i,y,c)}$ indicates the effect of belonging to ethnic group e.

As reported in Table 4A, economic growth has a very small coefficient, but it is significant and positive. Periods of stronger economic growth are linked to higher values of BZSG. In parallel, individuals living in countries with a higher degree of economic inequality show a lower propensity to believe in a zero-sum game. In this case, however, the coefficient is of considerable magnitude.

To estimate equation (7), the analysis was conducted on the sub-sample described in section 3.3. In the models shown in columns (7) and (8) of Table 4B, I could not use the same version of the database containing data on economic inequality that I used in the previous analyses, which was SWIID version 9_1. That version contains multiply imputed data (100 estimates for each observation given) and adding the ethnicity level to the multilevel model unfortunately created computational problems and prevented convergence. Therefore, I used the latest released version of the SWIID containing non-multiply imputed data, i.e., version 4_1 (Solt 2009). This version is clearly less up-to-date and reliable and contains a more limited amount of information; the analysis is indeed performed on fewer observations. For this reason, the calculations of column (7) and (8) should be taken with caution.

As for economic growth, the results do not change; it is always associated to higher levels of BZSG. Hypothesis 2 was then completely wrong. As it concerns economic inequality, the coefficient between Gini index and BZSG remains negative and significant in the model in column (7) (the p-value of the coefficient is 0.053) and remains negative but loses significance in the model in column (8) (p-value: 0.151). Even in these analyses, belonging to ethnic groups that formerly lived in complex state entities (variable 'Centralized community' in Table 4B) is associated with lower current levels of BZSG.

TABLE 4A

Dependent variable:	Belief in a Zero-Sum Game (Individual)								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
C.A. growth rate - preceding 3 years	0.0220**	0.0187**	0.0174**	0.0193**	0.0166	0.0336***	0.0181**	0.0179**	0.0315***
	(0.00856)	(0.00769)	(0.00793)	(0.00785)	(0.0116)	(0.0117)	(0.00755)	(0.00814)	(0.0118)
Ln GDP per capita p.p.			0.0154						-0.0205
			(0.0949)						(0.104)
Unemployment rate				0.00783					0.0133
				(0.0105)					(0.0104)
Polity score					0.0135				0.0124
					(0.0124)				(0.0186)
Gini index						-3.119***			-3.419***
						(0.839)			(0.878)
Egalitarian ancestors *(Ancestral C.)*							0.605**		1.004*
							(0.271)		(0.576)
Individual-level controls	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	251,798	121,546	119,525	120,702	115,541	114,050	121,546	119,525	111,717
Number of countries	91	77	75	76	70	70	77	75	66
Number of country-year clusters	181	128	126	127	121	119	128	126	115

Notes: Three-level mixed-effects regression. The unity of analysis is an individual. Cases are nested in country-year clusters, which are in turn nested in countries. All models include a constant term. Column (2)-(9) include individual-level controls. Column (7) and (9) include the average year to which the ethnographic information in a country pertains. Standard errors are clustered at the country-level. *** p<0.01, ** p<0.05, * p<0.1.

TABLE 4B

Dependent variable:	Belief in a Zero-Sum Game (Individual)							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
C.A. growth rate - preceding 3 years	0.0230**	0.0232**	0.0232**	0.0234**	0.0231**	0.0407**	0.0220*	0.0390**
	(0.0116)	(0.0115)	(0.0116)	(0.0116)	(0.0116)	(0.0166)	(0.0124)	(0.0176)
Local democracy (EA)		0.00860	-0.00441	0.00495	-0.00268	0.0236	-0.149	-0.140
		(0.149)	(0.157)	(0.153)	(0.157)	(0.155)	(0.229)	(0.230)
Centralized community (EA)		-0.409**	-0.421**	-0.411**	-0.424**	-0.427**	-0.0906	-0.115
		(0.189)	(0.192)	(0.192)	(0.192)	(0.191)	(0.297)	(0.297)
Complex settlement patterns (EA)		-0.0133	-0.0355	-0.0147	-0.0371	-0.0599	0.0781	0.0508
		(0.145)	(0.148)	(0.146)	(0.148)	(0.147)	(0.219)	(0.221)
Egalitarian ethnicity (EA)		-0.185	-0.182	-0.188	-0.184	-0.193	0.0495	0.0357
		(0.212)	(0.215)	(0.214)	(0.215)	(0.214)	(0.337)	(0.336)
Ln GDP per capita p.p.			0.136		0.137	0.0323		0.00785
			(0.0921)		(0.0922)	(0.0970)		(0.132)
Unemployment rate				0.000190	0.00275	0.00404		
				(0.0132)	(0.0133)	(0.0132)		
Polity score						0.0306*		0.0221
						(0.0172)		(0.0217)
Gini index							-2.805*	-2.272
							(1.448)	(1.583)
Individual-level controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	43,359	43,359	42,517	42,571	42,517	41,591	31,246	30,320
Number of ethnic groups	115	115	114	115	114	114	79	79
Number of countries	52	52	50	51	50	49	42	41
Number of country-year clusters	83	83	81	82	81	80	62	61

Notes: Multilevel mixed-effects regression. The unity of analysis is an individual. Cases are nested in country-year clusters, which are nested in countries, which are crossed with ethnic groups. All models include a constant term and individual-level controls. Column (2)-(9) include the date in which the ethnic group was observed. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

As a final test, I wanted to see if the relationships were different when considering only less wealthy countries. Hirschman's theory of the 'tunnel effect' states that economic inequality may have different impacts on individuals: in developing countries, high levels of inequality are perceived by people as a sign that the economy is moving, and the more affluent conditions of their neighbors offer poorer citizens hope that their conditions may also improve in the future (Hirschman and Rothschild 1973; see Chapter 1 of this thesis). In advanced countries, on the other hand, citizens are more distressed by social comparisons, and a higher degree of inequality is associated with a lower level of happiness (see Cheung and Lucas 2020).

This distinction between developed and developing countries could also be found in the relationship between the BZSG and economic growth. Therefore, I estimated equations (6) and (7) on a reduced sample, from which I excluded advanced countries[57]. However, the results are the same as before and the relationships do not change. Economic growth is still associated with a higher level of BZSG. The data are reported in the Appendix.

5 – Discussion and policy implications

The analyses included in Section 3 clearly show that Hypothesis 1 was wrong. There is no association between having ancestors who lived in egalitarian ethnic groups and the intensity of the BZSG. This, of course, does not prove that the BZSG was not pervasive in ethnic communities that adopted a system of norms designed to prevent the emergence of economic inequality; nor does it prove that there was no difference in terms of its pervasiveness between egalitarian and stratified ethnic communities. It is still likely, at least from a theoretical point of view, that, in the past, egalitarian norm systems were a major obstacle to the transition to a pro-growth mindset. However, their impact has clearly not produced effects that have endured to the present.

In contrast, the relationship between past political complexity and the BZSG appears to be negative and significant. It is reasonable to think that the development of state entities may have created environments more conducive to the transition to a pro-growth mindset and that this effect may persist to the present. In the past, the presence of states was certainly correlated with economic development and the creation of wealth; therefore, this finding would support the hypothesis that economic development played a role

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[57] I included in the sample only observations related to individuals living in countries with GDP per capita p.p.p. below 14500 international dollars. The reason behind the choice of this threshold is given in the Appendix.

in the abandonment of the zero-sum belief. This finding certainly deserves attention and should be investigated by further research.

The results of this study are also important in assessing the reliability of some analyses. The analyses reported in Tables 1A, 1B, 2A, and 2B, performed using data from the *Ancestral Characteristics Database*, clearly indicated the presence of a significant relationship between descent from egalitarian ethnic groups and current intensity of the BZSG. However, this relationship did not emerge in more accurate analyses in which I directly associated WVS respondents with past ethnicities. This study shows that the use of the *Ancestral Characteristics Database* can be useful to have preliminary results, but more accurate studies are always needed.

The relationship between the BZSG and economic growth is instead surprising. Section 4 clearly shows that Hypothesis 2 was wrong. Not only does economic growth not reduce the BZSG, but is actually associated with an increase in it, albeit a very small one. Therefore, it does not appear to be true that individuals tend to have a more pro-growth mindset when they experience it, just as it does not seem to be true that periods of recession increase individuals' zero-sum construal. This is valid both for rich and developing countries. At the same time, it is interesting to note that there are good indications of a negative relationship between economic inequality and the BZSG[58]. Individuals tend to believe that wealth can be created, and there can be enough for everyone, in countries where inequality is more pronounced[59].

These findings are in contrast with the results obtained by Sirola and Pitesa (2017)[60] and those recently obtained by Chinoy et al. (2022) and Carvalho et al. (2022)[61]. Chinoy et al. (2022) found a negative relationship between the intensity of the BZSG and upward mobility: the respondents to their survey reported lower levels of BZSG if they, their parents, or their grandparents had enjoyed greater upward mobility during their lifetimes. Carvalho et al. (2022), on the other hand, discovered a negative relationship between the respondents' propensity to believe in a zero-sum game and the overall economic

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[58] The coefficient is negative in all the regressions and is highly significant in most of the analyses. The non-significant coefficient in column (8) of Table 4B could probably be related to the less precise information in SWIID version 4_1.

[59] Since envy is closely related to the BZSG, this analysis supports what was stated in Chapter 1. Economic equality does not reduce the intensity of envy in individuals; in fact, it may even produce the opposite effect (see Chapter 1).

[60] My study does not confirm their findings and actually overturns them, even though the data they used always came from the WVS. This is probably because the sample they analyzed and the set of control variables included in their model were much smaller.

[61] The analyses reported in this chapter were performed before the publication of Chinoy et al. (2022) and Carvalho et al. (2022) and before I became aware of their studies. In any case, although they had similar objectives, the strategy they used was different from mine and led to surprisingly very different results.

growth of the country in which they lived during the first 20 or 30 years of their lives. The puzzle thus seems rather complicated. Combining all the results, it appears that economic growth is a positive factor in the early years of people's lives and reduces their propensity to see the world as a zero-sum game; however, it is associated with a slight increase in that propensity in the short run, regardless of age.

Events occurred during childhood and youth are known to have a strong impact on the personality and worldview of individuals. Therefore, it is possible that a variable such as growth may have a different impact depending on the period of life in which it is experienced. Childhood and youth are periods when a moving and advancing economy plausibly generate hope for the future; but hopes can be replaced by disillusionment and cynicism as time passes.

Moreover, events occurred in the recent past may have a different impact than events occurred in the distant past. Therefore, it may also be that growth has a negative impact in the short run and a positive impact in the long run. The possibilities are many, and further research is undoubtedly needed.

Research could be directed toward testing whether the following explanations are plausible:

1- The full agreement with the statement "People can only get rich at the expense of others" might be related to an underlying desire for wealth redistribution. Indeed, such a statement could represent a theoretical justification behind the exhortation to redistribute newly created wealth within a country's economy. Chinoy et al. (2022) documented a significant relationship between the BZSG and support for wealth redistribution. People might perceive an enlargement of the 'pie' and thus be stimulated to demand its sharing.

2- Another possible explanation is that competition may play a role in the formation of the BZSG. Economic growth and reduced inequality may be related to increased social mobility and competition among individuals. Chinoy et al (2022) documented a negative relationship between upward mobility and BZSG. However, this of course applies to those who have enjoyed upward mobility and not to those who instead have suffered from such mobility and have worsened their social position. With growth, people could perceive an increase in competition, which for many is not pleasant. Therefore, they may be led to convince themselves that the daily struggle to improve their conditions is a zero-sum game and that therefore their failures are due to the cruel rules of the game. Perhaps, increases in social mobility might trigger some ingrained instinct in our minds.

Further research is definitely needed. However, the results of the present study might be worrisome, because they could describe a weakness of growing economies in which economic inequality is reduced.

They are surprising because they appear to contradict what seems a plausible event of the past: humanity has moved from a sum-zero mentality to the realization that growth is possible even through the experience of growth itself. Yet, the BZSG has never disappeared completely, and probably human beings suffer so much from competition that they create visions that are blatantly contradicted by surrounding events. We feel a strong need to quell the negative feelings and fear that emerge from the uncertainty of change; a cynical and disillusioned mindset allows us to avoid the discouragement due to the feeling that we have not made the most of our opportunities. From one perspective, these results support the theory that societies in which opportunities for social mobility and personal growth abound are those most exposed to envy and social comparisons (see Schoeck 1969).

If the preceding reasoning is valid, policymakers have much to think about. As the analyses in Section 4 show, the positive effects found by Carvalho et al. (2022), which economic growth may have on the intensity of the BZSG among individuals, are limited to the growth experienced during childhood and youth. Thereafter, living in a moving economy does not lead to a decrease in the BZSG and in fact is associated with a slight increase in it. Hence, it is unreasonable to think that this belief will independently disappear as a result of political and economic development. We must take action to ensure that this negative and misleading view of the world is countered.

Education is the best tool we have in this regard. Mandatory schools should explain the fallacy of the zero-sum game bias in order to help people overcome this instinct. Biases are rooted in human nature, but they can be contrasted, especially by making people aware of their presence[62]. The BZSG is not different; it is evidently more present among untrained individuals (Rubin 2003), who are not familiar with the basics of economics and the concept of economic growth. Therefore, widespread knowledge of the existence of the zero-sum fallacy can certainly decrease the influence it has on people; this would produce enormous positive effects on people's social relationships and lives.

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[62] Behavioral economists are often inclined to find solutions to biases by imagining 'corrective' interventions by governments. In my view, the first thing to do to counter biases is to make people aware of their existence. The presence of these distortions of judgements should be taught in schools so that people be accustomed from a young age to counteract them.

Conclusion

The main results of this study are summarized in the following lines:

i) The egalitarian institutional arrangements adopted in the past by many communities have not produced any persistent effects on the descendants in terms of viewing life as a zero-sum game. In contrast, there are indications that individuals descended from ethnic groups once belonging to politically developed state entities have lower levels of BZSG. This relationship deserves further investigation.

ii) The *Ancestral Characteristics of Ancient Populations Database* is useful for obtaining preliminary results, buy analyses made through its data should be taken with caution, as they can be misleading even when they appear robust. To carry out accurate studies, it is necessary to associate the individuals under observation with each ethnicity individually.

iii) Economic growth that occurred in the years preceding the interviews was not associated with a reduction in the intensity of the BZSG in respondents; rather, it was associated with a slight increase in it. In contrast, economic inequality seems to have a negative relationship with the BZSG. This means that this belief may be more prevalent in countries with economies with low levels of inequality and high growth rates. One possible explanation is that growth and economic equality are linked to higher social mobility and consequent greater competition among individuals. People may be induced to adopt this cynical mindset because it could alleviate the discomfort produced by the uncertainty of a rapidly changing environment.

The BZSG will not disappear on its own. Action is needed to counter it and education is probably the best tool we have; mandatory schools should teach students about the existence of this misleading bias.

APPENDIX FOR CHAPTER 3

EGALITARIAN NORMS, ECONOMIC GROWTH, AND THE BELIEF IN A ZERO-SUM GAME

A1. Introduction

The Appendix accompanies the Chapter "Egalitarian norms, economic growth, and the belief in a zero-sum game". Figure 1 shows the distribution of the respondents' answers to the question about wealth and growth (the dependent variable in all analyses). Section A2 provides data on the use of alternative scales measuring the belief in a zero-sum game (BZSG). Section A3 provides information on the self-reported ethnicities and languages used to match respondents to ethnic groups in the *Ethnographic Atlas* (Murdock 1967). Section A4 shows the analyses performed on the subsample of respondents living in countries with GDP per capita p.p.p. below 14500 international dollars.

Figure 1: Distribution of the responses – Question E041 (Reversed order)

1= Full agreement with "Wealth can grow so there's enough for everyone"   **10**= Full agreement with "People can only get rich at the expense of others"
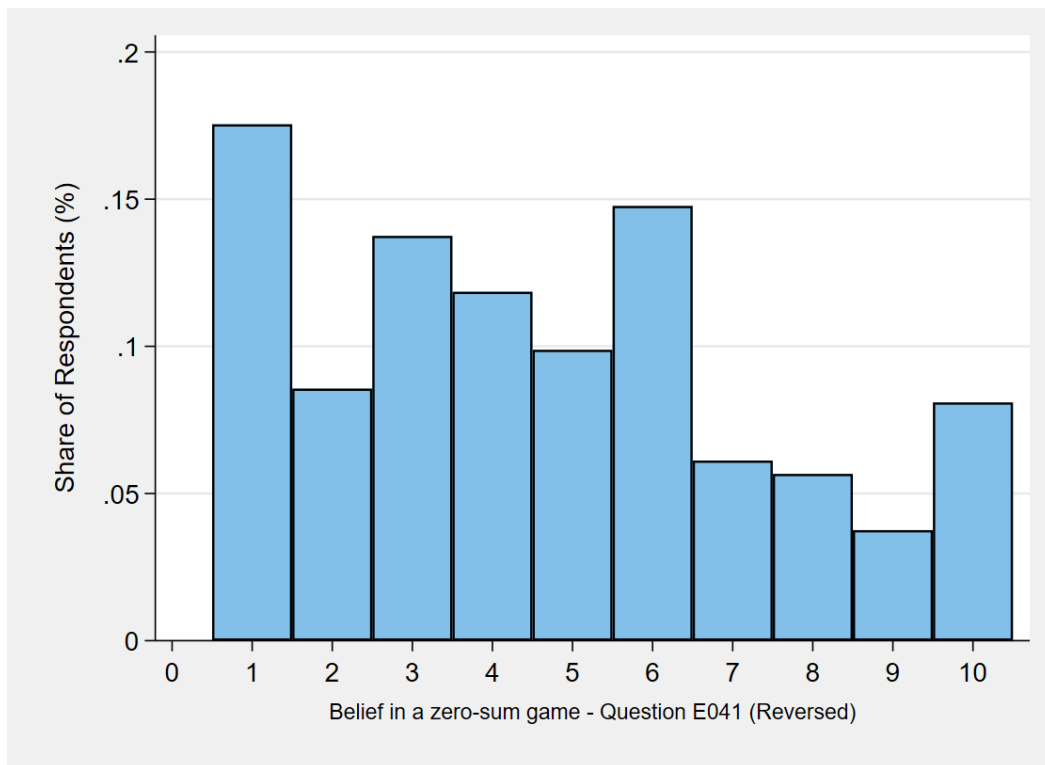
A2. Alternative scales

The dependent variable of each model in the chapter is the BZSG. To measure its intensity, I used data from the Word Values Survey and the European Value Study (Haerpfer et al. 2022; EVS 2022). In several waves of these surveys, the respondents were asked to place their views on a scale of 1 to 10, with 1 meaning that they agreed completely with the statement on the left and 10 that they agreed completely with the statement on the right. They could choose any number in between. The statement on the left was "People can only get rich at the expense of others", whereas the statement on the right was "Wealth can grow so there's enough for everyone" (Question E041). I took this scale of 1 to 10 as a measure of the respondents' propensity to believe in a zero-sum game. I reversed it so that higher values correspond to higher levels of BZSG.

The use of this scale of 1 to 10 could naturally lead to some measurement problems. First, respondents are known to be prone to anchoring bias. Their habit of using the metric system leads them to use values such as 5 and 10 more frequently than values close to them. Moreover, the value assigned by respondents could be higher or lower based on how these people are inclined to choose more moderate values (i.e., are less likely to choose extreme values on a scale) and not based on how much they actually believe in a zero-sum game. For these reasons, I repeated all analyses using first a scale from 1 to 5, created from the previous scale by grouping the responses; I substituted values 1 and 2 with 1, 3 and 4 with 2, 5 and 6 with 3, 7 and 8 with 4, and 9 and 10 with 5 (Scale "1 to 5", in orange in the tables). Then, I used a scale created by grouping all responses into three values: 0 if the response was 1, 2 or 3; 1 if the response was 4, 5, 6 or 7; 2 if the response was 8, 9 or 10 (Scale "0 to 2", in green in the tables). As shown in the following tables, which report some regressions of the analyses, the results are always very similar.

TABLE 1 APPENDIX

Dependent variable:	Belief in a Zero-Sum Game (Individual)											
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Scale:	1 to 10	1 to 5	1 to 3	1 to 10	1 to 5	1 to 3	1 to 10	1 to 5	1 to 3	1 to 10	1 to 5	1 to 3
Egalitarian ancestors (Ancestral C.)	0.724**	0.333**	0.215***	1.026***	0.475***	0.296***	0.806**	0.367**	0.242***	0.660**	0.302***	0.213***
	(0.285)	(0.137)	(0.0677)	(0.255)	(0.117)	(0.0630)	(0.322)	(0.156)	(0.0773)	(0.257)	(0.117)	(0.0636)
Centralized communities (Ancestral C.)				-0.0685	-0.0279	-0.00534				-0.996*	-0.504**	-0.226
				(0.428)	(0.194)	(0.112)				(0.525)	(0.218)	(0.141)
Local democracy (Ancestral C.)				0.322	0.156	0.0845				0.364	0.179	0.104
				(0.258)	(0.117)	(0.0609)				(0.264)	(0.123)	(0.0666)
Intensive agriculture (Ancestral C.)				-0.223	-0.111	-0.0542				0.0811	0.0381	0.0164
				(0.308)	(0.140)	(0.0754)				(0.330)	(0.147)	(0.0850)
Complex settlement patterns (Ancestral C.)				0.427**	0.200**	0.107**						
				(0.201)	(0.0925)	(0.0498)						
Ln GDP per capita p.p.p.							0.0794	0.0358	0.0255			
							(0.0902)	(0.0410)	(0.0216)			
C.A. growth rate - preceding 3 years							0.0174	0.00715	0.00461*			
							(0.0111)	(0.00525)	(0.00256)			
Unemployment rate							0.0103	0.00518	0.00227			
							(0.0101)	(0.00476)	(0.00260)			
Polity score							0.00755	0.00306	0.00160			
							(0.0157)	(0.00724)	(0.00388)			
Date of observation ethnicities	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Individual-level controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	128,007	128,007	128,007	128,007	128,007	128,007	115,541	115,541	115,541	48,389	48,389	48,389
Number of countries	80	80	80	80	80	80	70	70	70	55	55	55
Number of country-year clusters	137	137	137	137	137	137	121	121	121	92	92	92

Notes: Three-level mixed-effects regression. The unity of analysis is an individual. Cases are nested into country-year clusters, which are in turn nested into countries. All models include a constant term, individual-level controls, and the average year to which the ethnographic information in a country pertains. Standard errors are clustered at the country-level. *** p<0.01, ** p<0.05, * p<0.1.

TABLE 2 APPENDIX

Dependent variable:	Belief in a Zero-Sum Game (Individual)								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Scale:	1 to 10	1 to 5	1 to 3	1 to 10	1 to 5	1 to 3	1 to 10	1 to 5	1 to 3
Egalitarian ethnicity (EA)	-0.0467	-0.0363	-0.0222	-0.0832	-0.0556	-0.0130	-0.199	-0.112	-0.0412
	(0.178)	(0.0812)	(0.0485)	(0.209)	(0.0994)	(0.0541)	(0.216)	(0.103)	(0.0555)
Centralized community (EA)	-0.108	-0.0652	-0.0180	-0.348*	-0.169*	-0.0849*	-0.413**	-0.202**	-0.101**
	(0.162)	(0.0741)	(0.0394)	(0.188)	(0.0895)	(0.0487)	(0.193)	(0.0921)	(0.0497)
Local democracy (EA)	-0.163**	-0.0680*	-0.0493***	0.0379	0.0364	-0.000153	0.0244	0.0310	-0.00864
	(0.0821)	(0.0390)	(0.0190)	(0.143)	(0.0677)	(0.0367)	(0.156)	(0.0741)	(0.0398)
Intensive agriculture (EA)	-0.0763	-0.0456	-0.0278	-0.0673	-0.0517	-0.0132	-0.0674	-0.0539	-0.0138
	(0.122)	(0.0529)	(0.0297)	(0.166)	(0.0783)	(0.0425)	(0.169)	(0.0802)	(0.0431)
Ln GDP per capita p.p.p.							0.0376	0.0241	0.0158
							(0.0976)	(0.0458)	(0.0245)
C.A. growth rate - preceding 3 years							0.0403**	0.0173**	0.00992**
							(0.0166)	(0.00785)	(0.00408)
Unemployment rate							0.00381	0.00277	0.000700
							(0.0132)	(0.00618)	(0.00336)
Polity score							0.0295*	0.0121	0.00775*
							(0.0172)	(0.00804)	(0.00435)
Date of observation ethnicities	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Individual-level controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	48,389	48,389	48,389	48,389	48,389	48,389	41,591	41,591	41,591
Number of ethnic groups	no	no	no	118	118	118	114	114	114
Number of countries	55	55	55	55	55	55	49	49	49
Number of country-year clusters	92	92	92	92	92	92	80	80	80

TABLE 3 APPENDIX

Dependent variable: Belief in a Zero-Sum Game (Individual)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Scale:	1 to 10	1 to 5	1 to 3	1 to 10	1 to 5	1 to 3	1 to 10	1 to 5	1 to 3
C.A. growth rate - preceding 3 years	0.0187**	0.00818**	0.00490***	0.0231**	0.0101*	0.00559**	0.0403**	0.0173**	0.00992**
	(0.00769)	(0.00347)	(0.00181)	(0.0115)	(0.00538)	(0.00284)	(0.0166)	(0.00785)	(0.00408)
Egalitarian ethnicity (EA)				-0.199	-0.111	-0.0427	-0.199	-0.112	-0.0412
				(0.214)	(0.102)	(0.0551)	(0.216)	(0.103)	(0.0555)
Centralized community (EA)				-0.397**	-0.192**	-0.0969**	-0.413**	-0.202**	-0.101**
				(0.191)	(0.0912)	(0.0492)	(0.193)	(0.0921)	(0.0497)
Local democracy (EA)				0.0163	0.0268	-0.00761	0.0244	0.0310	-0.00864
				(0.150)	(0.0713)	(0.0382)	(0.156)	(0.0741)	(0.0398)
Intensive agriculture (EA)				-0.0705	-0.0537	-0.0135	-0.0674	-0.0539	-0.0138
				(0.168)	(0.0800)	(0.0430)	(0.169)	(0.0802)	(0.0431)
Ln GDP per capita p.p.p.							0.0376	0.0241	0.0158
							(0.0976)	(0.0458)	(0.0245)
Unemployment rate							0.00381	0.00277	0.000700
							(0.0132)	(0.00618)	(0.00336)
Polity score							0.0295*	0.0121	0.00775*
							(0.0172)	(0.00804)	(0.00435)
Date of observation ethnicities	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Individual-level controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	121,546	121,546	121,546	43,359	43,359	43,359	41,591	41,591	41,591
Number of ethnic groups	no	no	no	115	115	115	114	114	114
Number of countries	77	77	77	52	52	52	49	49	49
Number of country-year clusters	77	77	77	83	83	83	80	80	80

Notes: Multilevel mixed-effects regression. The unity of analysis is an individual. In column (1)-(3), cases are nested into country-year clusters, which are in turn nested into countries. In column (4)-(9), cases are nested into country-year clusters, which are in turn nested into countries, which are crossed with ethnic groups. All models include a constant term, individual-level controls, and the date in which the ethnic group was observed. Standard errors in parentheses: in column (1)-(3), they are clustered at the country-level. *** p<0.01, ** p<0.05, * p<0.1.

A3. Ethnic groups and languages

In some surveys in a small number of countries, the interviewers asked the respondents to report their ethnicity (Question X051 in the Integrated File). I was therefore able to associate a portion of the WVS respondents with an ethnic group in the *Ethnographic Atlas* (Murdock 1967; version expanded by Giuliano and Nunn (2018)). Unfortunately, some responses are confusing or inaccurate. Therefore, in line with Enke (2019), I used only those responses that I judged to have a sufficient level of accuracy and reliability. The following table shows the 74 ethnic groups within each country that I could use to associate WVS respondents with ethnic groups in the *Atlas*:

TABLE 4 APPENDIX

Country	Ethnic groups
Algeria	Kabyle, Shawiya
Azerbaijan	Czechs, Kazan Tatar, Moldovans, Russians
Armenia	Armenians, Greeks, Kurd, Russians
Belarus	Byelorussians, Russians, Ukrainians
Bosnia and Herzegovina	Serbs
Bulgaria	Bulgarians, Turks
Ethiopia	Amhara, Gibe, Gurage, Somali, Tigre
Ghana	Dagari, Ewe, Hausa Kanawa, Ijaw, Konkomba, Kukuruku, Moba
Germany	Germans (Prussia), Turks
Hungary	Hungarian
Indonesia	Javanese, Malays, Sumbawanese
Iran	Armenians, Kurd, Turkmen
Iraq	Kurd, Turks
Kazakhstan	Armenians, Bulgarians, Byelorussians, Chechen, Erzia Mordva, Germans (Prussia), Kazak, Kazan Tatar, Koreans, Kurd, Moldovans, Russians, Turks, Udmurt, Ukrainians
Kyrgyzstan	Germans (Prussia), Kalmyk, Kazan Tatar, Koreans, Kurd, Russians, Turks, Ukrainians
Latvia	Armenians, Byelorussians, Latvians, Lithuanians, Moldovans, Russians, Ukrainians
Lebanon	Syrians
Malaysia	Badjau Tawi-Tawi, Dusun, Iban, Malays
Moldova	Bulgarians, Gagauz, Moldovans, Russians, Ukrainians
Morocco	Beraber
New Zealand	Māori

Nigeria	Abron, Adangme, Bachama, Bari, Basa, Boki, Bororo Fulani, Chamba, Dagari, Edo, Efik, Ekoi, Gbari, Hausa Kanawa, Kukuruku, Ibibio, Ibo, Ijaw, Manprusi, Moba, Nupe, Oyo Yoruba, Tiv, Yako, Yungur
North Macedonia	Serbs, Turks
Peru	Aymara, Inca
Philippines	Manobo, Sagada, Sugbuhanon, Tagalog
Romania	Germans (Prussia), Hungarian
Russia	Armenians, Byelorussians, Kazan Tatar, Kazak, Moldovans, Russians, Ukrainians
Serbia	Hungarians, Serbs
Singapore	Malays
Thailand	Malays, Siamese
Ukraine	Armenians, Bulgarians, Byelorussians, Chuvash, Greeks, Hungarians, Kazan Tatar, Koreans, Moldovans, Russians, Ukrainians
Uzbekistan	Kazak, Kazan Tatar, Russians, Turkmen

One question asked in many more surveys and countries concerned the language spoken at home (Question G016). The connection between people and their ethnic group can also be detected through the language they speak - Giuliano and Nunn used languages to create their Database (2018). I exploited this information to associate additional respondents with ethnic groups in the Atlas. In many cases, however, I refrained from doing it because the linkage did not appear reliable or the information was not collected accurately enough. Therefore, I kept in the sample only those individuals with respect to whom the association seemed sufficiently accurate.

The following table shows the 164 ethnic groups that I associated:

TABLE 5 APPENDIX

Country	Ethnic groups
Albania	Bulgarians, Gheg, Greeks
Algeria	Algerians, Mzab
Andorra	French (Canada), Spaniards
Argentina	Argentinians
Armenia	Armenians, Kurd
Australia	Annamese, Armenians, Bengali, Boers, Bulgarians, Cambodians, Cantonese, Czechs, Germans (Prussia), Gheg, Greeks, Hungarian, Iranians, Japanese, Kerala, Koreans, Punjabi, Russians, Serbs, Siamese, Sinhalese, Tagalog, Tannese, Tunisians, Turks, Ukrainians, Uttar Pradesh

Azerbaijan	Chechen, Iranians, Qashgai, Russians
Belarus	Byelorussians, Czechs, Russians
Bosnia and Herzegovina	Serbs
Bulgaria	Armenians, Bhil, Bulgarians, Russians, Turks
Burkina Faso	Bambara, Dagari, Dogon, Liptako, Mossi, Tazarawa
Canada	French (Canada)
Chile	Germans (Prussia)
Colombia	Germans (Prussia)
Cyprus	Armenians, Greeks, Turks
Czech Republic	Czechs
Estonia	Estonians, Russians
Ethiopia	Amhara, Dorse, Gurage, Sidamo, Tigrinya, Tsamai
Finland	Annamese, Danes, Finns, Russians
France	Dutch, French (Canada), Germans (Prussia), Russians
Georgia	Armenians, Czechs, Dutch, Estonians, Georgians, Greeks, Iranians, Kurd, Osset, Qashgai, Russians
Germany	Czechs, Germans (Prussia), Gheg, Greeks, Hungarians, Russians, Turks, Ukrainians
Ghana	Abron, Ashanti, Assini, Basari, Bisa, Bogo, Dagari, Dagomba, Ewe, Ga, Isala, Kabre, Kasena, Konkomba, Kusasi, Mamprusi, Mossi, Tazarawa
Haiti	Haitians
Hong Kong	Cantonese
Hungary	Hungarians
India	Aryans, Baiga, Bengali, Bhil, Bihari, Gujarati, Hillbhuyi, Kashmiri, Kerala, Lakher, Maria Gond, Oraon, Pahari, Punjabi, Santal, Sindhi, Tamil, Telugu, Uttar Pradesh
Indonesia	Javanese, Kubu, Malays
Iran	Bakhtiari, Iranians, Kurd, Marri, Turkmen, Turks
Japan	Japanese
Kazakhstan	Kazak, Russians, Uzbeg
Kyrgyzstan	Kazak, Koreans, Kurd, Qashgai, Russians, Shantung, Uzbeg
Lebanon	Armenians
Latvia	Latvians, Russians
Libya	Ahaggaren, Beraber
Lithuania	Lithuanians, Russians
Malaysia	Dusun, Iban, Javanese, Malays, Tamil
Mali	Bambara, Dogon, Futajalonians, Malinke, Songhai, Soninke
Mexico	Japanese
Moldova	Moldovans, Russians

Montenegro	Gheg, Serbs
Morocco	Beraber
North Macedonia	Bhil, Bulgarians, Gheg, Serbs
Netherlands	Beraber, Dutch, Germans (Prussia), Moroccans, Turks
New Zealand	Japanese, Maori
Nigeria	Boki, Edo, Ibo, Idoma, Igbira, Ijaw, Isoko, Yoruba, Zazzagawa
Pakistan	Kashmiri, Marri, Pathan, Punjabi, Sindhi, Uttar Pradesh
Peru	Aymara, Inca
Philippines	Bilaan, Bisayan, Ifugao, Manobo, Sagada, Subanun, Sugbuhanon, Tagalog, Yami
Poland	Byelorussians, Czechs, Germans (Prussia), Russians
Romania	Bhil, Czechs, Germans (Prussia), Hungarians, Qashgai, Serbs
Russia	Cherkess, Kazan Tatar, Qashgai, Russians, Tajik (Mountain), Udmurt, Ukrainians
Rwanda	Ruanda, Rundi
Serbia	Gheg, Hungarians, Serbs
Singapore	Malays, Tamil
Slovakia	Bhil, Czechs, Germans (Prussia), Hungarians, Ukrainians
Slovenia	Bulgarians, Hungarians, Serbs
South Africa	Boers, Lovedu, Pedi, Sotho, Swazi, Thonga, Tswana, Venda, Xhosa, Zulu
Spain	Basque Spaniards, Portuguese, Spaniards
Sweden	Danes, Finns, Serbs, Spaniards, Turks
Switzerland	Germans (Prussia)
Taiwan	Minchinese
Thailand	Edo, Malays, Siamese
Turkey	Georgians, Kurd, Serbs, Turks
Ukraine	Hutsul, Russians, Ukrainians
United Kingdom	Germans (Prussia), Gujarati, Uttar Pradesh
United States	Japanese
Uruguay	Germans (Prussia)
Uzbekistan	Kazak, Russians, Tajik (Mountain), Uzbeg
Vietnam	Annamese
Zambia	Bemba, Chewa, Chokwe, Fipa, Ila, Iwa, Kaonde, Kunda, Lamba, Lozi, Luimbe, Luvale, Ndebele, Ndembu, Pl. Tonga, Shona, Tumbuka
Zimbabwe	Chewa, Ndebele, Pl. Tonga, Shona, Sotho, Zulu

A3. Analyses with countries with GDP per capita p.p.p. below 14500 international dollars

These analyses were performed to test whether the relationship between economic growth and the BZSG might be different in less wealthy countries. I chose the threshold of 14500 international dollars to determine which countries to include in the sub-sample. The reason why I chose this value is that the sub-sample created in this way contains a number of countries large enough to use standard errors clustered at the country-level in the regressions reported in Table 6 Appendix (standard errors clustered at the country-level cannot be used with crossed-effects regressions such as those in Table 7 Appendix); I followed the advice, given by Rabe-Hesketh and Skrondal (2021), to keep the number of groups, minus the number of group-level covariates, greater than or equal to 42. The highest GDP per capita p.p.p. values in this subsample belong to Algeria in 2014 and South Korea in 1996.

TABLE 6 APPENDIX

Dependent variable:	Belief in a Zero-Sum Game (Individual)						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
C.A. growth rate - preceding 3 years	0.0206***	0.0210***	0.0197**	0.0235**	0.0382***	0.0292**	0.0445***
	(0.00702)	(0.00797)	(0.00822)	(0.0106)	(0.0123)	(0.0115)	(0.0135)
Ln GDP per capita p.p.p.		-0.232				-0.261*	-0.210
		(0.180)				(0.157)	(0.131)
Unemployment rate			0.0205*			0.0234**	0.0224**
			(0.0118)			(0.0107)	(0.00976)
Polity score				0.00759		0.0173	
				(0.0170)		(0.0212)	
Gini index (SWIID 9_1)					-2.436**		-2.200**
					(1.125)		(1.020)
Individual-level controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	64,477	64,477	64,477	61,303	61,032	61,303	61032
Number of countries	50	50	50	46	46	46	46
Number of country-year clusters	68	68	68	64	64	64	64

Notes: Three-level mixed-effects regression. The unity of analysis is an individual. Cases are nested in country-year clusters, which are in turn nested in countries. All models include a constant term and individual-level controls. Standard errors are clustered at the country-level.
*** p<0.01, ** p<0.05, * p<0.1.

TABLE 7 APPENDIX

Dependent variable:	Belief in a Zero-Sum Game (Individual)						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
C.A. growth rate - preceding 3 years	0.0263**	0.0266**	0.0259**	0.0434**	0.0195	0.0261**	0.0418**
	(0.0131)	(0.0132)	(0.0131)	(0.0187)	(0.0146)	(0.0132)	(0.0187)
Local democracy *(EA)*	0.0819	0.0739	0.0851	0.0884	-0.149	0.0814	0.109
	(0.167)	(0.170)	(0.167)	(0.164)	(0.264)	(0.170)	(0.168)
Centralized community *(EA)*	-0.412**	-0.415**	-0.419**	-0.419**	-0.121	-0.420**	-0.409**
	(0.192)	(0.192)	(0.192)	(0.190)	(0.309)	(0.192)	(0.191)
Complex settlement patterns *(EA)*	-0.115	-0.118	-0.121	-0.146	-0.132	-0.122	-0.142
	(0.154)	(0.155)	(0.155)	(0.154)	(0.245)	(0.155)	(0.154)
Egalitarian ethnicity *(EA)*	-0.210	-0.213	-0.215	-0.219	0.0398	-0.216	-0.211
	(0.213)	(0.214)	(0.213)	(0.212)	(0.347)	(0.213)	(0.212)
Ln GDP per capita p.p.p.		0.0469				0.0204	-0.108
		(0.175)				(0.186)	(0.179)
Unemployment rate			0.00744			0.00684	
			(0.0151)			(0.0161)	
Polity score				0.0380*			0.0435**
				(0.0200)			(0.0218)
Gini index (SWIID 4_1)					-3.156		
					(2.077)		
Individual-level controls	No	Yes	Yes	Yes	Yes	Yes	Yes
Observations	28,927	28,927	28,927	28,001	19,843	28,927	28,001
Number of ethnic groups	104	104	104	104	69	104	104
Number of countries	35	35	35	34	28	35	34
Number of country-year clusters	48	48	48	47	33	48	47

Notes: Multilevel mixed-effects regression. The unity of analysis is an individual. Cases are nested in country-year clusters, which are nested in countries, which are crossed with ethnic groups. All models include a constant term, individual-level controls, and the date in which the ethnic group was observed. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

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