Institutions, Culture and the Tropical Development Gap

Bernard Poirine, Vincent Dropsy

Institutions, Culture and the Tropical Development Gap: The Agro-Climatic Origins of Social Norms about Thrift and Sharing

Preprint *in* Journal of Economic Issues · June 2018

2 authors:

Bernard Poirine
University of French Polynesia
38 PUBLICATIONS **585** CITATIONS

SEE PROFILE

Vincent Dropsy
University of French Polynesia
20 PUBLICATIONS **137** CITATIONS

SEE PROFILE

Some of the authors of this publication are also working on these related projects:

Thrift versus Sharing social norms and economic development View project

Economics of pearl culture View project

Institutions, Culture and the Tropical Development Gap:

The Agro-Climatic Origins of Social Norms about Thrift versus Sharing

Bernard Poirine, professor emeritus, University of French Polynesia
Vincent Dropsy, associate professor, University of French Polynesia

SHORT TITLE

The Agro-Climatic Origins of Thrift versus Sharing

ABSTRACT

The development gap between countries in tropical and temperate zones has been attributed to a variety of factors. Using data from the World Values Survey, we find that social norms about thrift, as opposed to sharing, vary with the length of the winter season. We also show that this cultural dimension "thrift versus sharing" and institutional quality both have an independent effect on contemporary economic outcomes. This suggests that the tropical development gap might be the consequence of deep-rooted effects of pre-industrial agro-climatic conditions on both the quality of institutions and social norms about thrift versus sharing that fostered development in the industrial era.

1. Introduction

The subject of differences in economic development between nations in tropical and temperate zones has been much debated. In a series of seminal papers, Sachs (2000, 2001, 2003) has shown the extent of this 'tropical development gap': the GNP per capita in countries with a temperate climate was on average 4.5 times higher than in the tropical climate zones, which accounted for 40.3% of the world population but only 17.4% of the world GNP (Sachs 2001:7). Moreover, Sachs notes that 'there is systematic gradation of average per capita income, with the high latitudes both North and South showing higher per capita income than the low, tropical latitudes' (Sachs 2001:4). Since then, it has been much debated whether this gap can be explained by natural handicaps such as the lower productivity of tropical agriculture, higher mortality and morbidity due to tropical mosquito borne diseases, greater distance from the coast or navigable rivers leading to the sea in many countries of tropical Africa, South Asia or South America, the date of the Neolithic transition and the North-South or East-West orientation for each continent (Landes 1988, Diamond 1997); or by historical factors dating back to European colonization that led to "extractive" institutions in the tropics and "inclusive" institutions in the temperate countries (Acemoglu Johnson and Robinson 2002, Acemoglu and Robinson 2012).

Recent research advocates an independent cultural cause: different agro-climatic conditions in the pre-industrial era might have fostered different cultural norms about patience, long-term orientation, and/or cooperation that might explain differences in present day economic performance (Galor and Özak 2016, Litina 2016, Buggle and Durante 2016, Dohmen et al. 2015).

This paper intends to explain the tropical development gap by a combination of institutional and cultural differences: we hypothesize that climates have shaped cultural values and social norms about patience, thrift, and sharing in the pre-industrial era, with long run consequences on formal rules and institutions. Moreover, both formal institutions and informal rules or constraints (as defined by North, 1990) have long run consequences on modern economic performance, because social norms about patience, thrift and sharing, inherited from pre-industrial times tend to shape institutions as well as individual economic behavior in the post-industrial era.

Applying an evolutionary approach to social norms and economic behavior (Veblen 1898, Cavalli-Sforza & Feldman (1981), Boyd & Richerson 1985, 2005, Hayek 1988, Williamson 2000, Mokyr 2017, Poirine et al. 2017), we suggest that societies in tropical and temperate climates developed largely opposite cultural traits about patience, thrift and sharing, because they selected the best social norms for group survival in each specific ecological environment. [1]

This process of cultural evolution took place over many generations. Tropical agricultural practices would imply day to day planning and continuous harvesting, hunting and gathering all year long, while the prevalence of long winters and annual harvesting in temperate and cold climates, fostered long-term planning of the crop cycle and the need to accumulate and store grain and food in order to survive during the winter and to save grains needed to sow for next year's crop. In other words, cultures were shaped by climate and agricultural practices, at least as far as economic values and norms such as patience, planning, thrift and sharing are concerned.

Our first proposition states that populations in tropical and equatorial zones have inherited from pre-industrial times 'immediate return' cultures that place day-to-day sharing above thrift and planning, while populations living in temperate or cold climates with long winters have inherited from their ancestors 'delayed return' cultures fostering thrift, patience and long-term orientation. [2] We test this hypothesis and demonstrate that cultures promoting 'thrift" more than 'sharing' are more frequently found in climate zones with a long winter.

Our second proposition states that immediate return cultures are less adapted to entrepreneurship and industrial development than delayed return cultures in the modern global capitalist setting. This is a possible explanation of the 'tropical gap', i.e. the fact that tropical countries are less industrialized and less developed, on average, than non-tropical countries. We test this second hypothesis and find that countries where thrift is valued more than sharing, have a higher gross national income per capita, after controlling for institutional quality, which also has a positive, but separate effect on income per capita. This finding is robust to the introduction of geographical controls and the date of the Neolithic transition. It is in contradiction with the institutional school's position that cultures and social norms do not matter independently of institutions and that they may only have an indirect effect by supporting or hindering institutional change (Acemoglu and Robinson, 2012:57).

The paper is organized as follows: section two analyses the anthropological theories about immediate return versus delayed return cultures and their agro-climatic origins. Section three reviews the literature about the effects of thrift and sharing on entrepreneurship and development. Section four assesses the theoretical debate about the natural, institutional, or cultural causes of the tropical gap. Section five tests propositions one and two using panel and cross-country regressions. Section six discusses the results and their policy implications. Section seven sums up the main results and outlines avenues for further research.

2. The Agro-Climatic Origins of Values and Norms: Insights from the Anthropological, Psychological and Economic Literature

Culture, which is defined by Guiso et al. (2006:23) as "those customary beliefs and values that ethnic, religious, and social groups transmit fairly unchanged from generation to generation", tends to be stable over time. Indeed, according to the New Institutional Economics informal constraints (customs, norms and traditions) are assumed as given: 'given their evolutionary origins, they are "adopted" and thereafter display a great deal of inertia…they have a lasting grip on the way a society conducts itself' (Williamson 2000:597). Boyd & Richerson (1985, 2005), Hayek (1988) and Bowles and Gintis (2011) argue that formal and informal rules and norms are in fact the product of a cultural evolution through group selection: in a given ecological setting, the groups that adopt the most socially beneficial rules will be more economically efficient and will tend to prevail in the long run through demographic expansion, migration, conquest, or imitation of their institutions by less socially efficient groups. Some view this cultural evolution as 'a quasi-Lamarckian process, in which individuals acquire cultural characteristics through learning and imitation during their lifetimes and pass these to others (…) when there is a change in the environment, cultural traits tend to change through the retention of some and the elimination of other elements' (Mokyr 2017:24-25).

Similar theories have been proposed by anthropologists (Frake 1962, Steward 1955, Sahlins and Service, 1960, Layton 2005, Mace and Jordan, 2011). Cultural ecology is an anthropological theory arguing that culture is the product of a natural environment, because only the values and norms necessary for the survival of the group will be handed down to the next generation: human groups select the norms and values best fitted for group survival in a given ecological context. The groups with less efficient social norms will not survive or will be conquered by other groups equipped with social norms making them more efficient at survival and warfare: 'if the proximate mechanisms for social learning or other determinants of behavior (such as preferences) evolved in environmental conditions that are no longer current, then emergent behavior may no longer promote fitness' (Mace and Jordan, 2011:402).

From the point of view of social norms about economic behavior, it is useful to distinguish between two broad kinds of natural environments: Woodburn (1982) makes a distinction between 'immediate return' societies of nomadic foragers with no food storage, who share their bounty every day, and 'delayed return' sedentary groups, who practice herding, farming and seasonal food storage.

For the purpose of our economic theory of cultural evolution, we choose to extend the definition of immediate return societies to any pre-industrial culture where food is mostly shared daily, rather than stored privately or collectively to survive during the winter season (in which case we have a delayed return society).

Thus, social norms of sharing were best fitted to such immediate return cultures, because food accumulation was neither possible nor necessary in the tropical conditions (no winter, continuous harvesting and gathering all year round), and immediate sharing was required as a form of mutual insurance against hunger when today's gathering, hunting, or fishing did not produce enough to feed a family. Such social norms of immediate sharing are closely linked to short-term orientation since the daily mutual insurance system thus provided makes it less necessary to defer consumption and store food in order to avoid starving in the future (Martin and Shirk, 2008:164).

Some empirical evidence has been gathered in support of this hypothesis, showing that foraging tribes have a much higher discount rate (or a higher rate of time preference) than people in the United States (Godoy et al. (2004:198).

By contrast, in delayed return societies, farming involves a careful annual planning of many activities that 'must be done in the right way at the right time' (Martin and Shirk, 2008:170), to avoid hunger and starvation, implying a culture of thrift and long-term orientation. Similarly, Minkov and Blagoev (2009:19) also argue that thrift and patience are related to climatic and pre-industrial agricultural conditions: 'It appears that the concept of preserving and saving is not easily adopted in societies that have not been under long and persistent pressure to do so. What seems to generate such pressure is a long history of intensive agriculture, especially in a climate with long and cold winters.'

Economic historian McCloskey explains why a culture of thrift and long run orientation was an absolute necessity for group survival in medieval Europe: 'because of the peculiarly unproductive character of their agriculture, the preindustrial European world needed urgently to abstain from consumption (…) one quarter to one third of the grain crop had to go back into the field as seed in the fall or the spring, its fruit to be harvested the next September' (McCloskey 2010: 129).

Galor and Özark (2016) propose the opposite theory and argue that higher, not lower, pre-industrial agricultural yields, fostered thrift and long-term orientation: 'pre-industrial agro-climatic characteristics that were conducive to higher return to agricultural investment, triggered selection and learning processes that had a persistent positive effect on the prevalence of long-term orientation in the contemporary era' (Galor and Özark 2016:1).

Litina (2016) finds that a lower level of land productivity in the pre-industrial past is associated with more intense cooperation and higher levels of contemporary social capital and development, a finding that seems to contradict the positive association between pre-industrial crop yields, long-term orientation and modern economic performance found by Galor and Ozäk (2016).

Buggle and Durante (2016) show the agro-climatic origins of social norms of cooperation and trust in European regions: regions with higher climate variability during harvest season fostered cooperation and trust, as a mutual insurance against hunger or famine. Olsson and Paik (2016) find that cultural norms about individualism and collectivism may date back to the Neolithic revolution: countries that adopted agriculture earlier in Eurasia have now more collectivist values than countries in Western Europe, where agriculture spread later.

Such recent findings show that social norms from the very distant past may affect today's beliefs and socioeconomic outcomes. However, some of those findings seem contradictory: it is uncertain whether lower agricultural yield or productivity (or higher climate variability) in the pre-industrial era is associated with better economic performance today, as suggested by McCloskey, Litina and Buggle and Durante, or whether, on the contrary, better economic performance today is linked to higher agricultural yields in the pre-industrial era, as suggested by Galor and Özak.

3. The effects of thrift versus sharing on entrepreneurship and economic performance

Thrift and patience are social norms that seem to foster entrepreneurship and investment in the long run, as first argued by Weber (1930). He thought that thriftiness and hard work were typical protestant values and that Protestantism was more compatible with capitalism and entrepreneurship than other religions such as Catholicism. In the Calvinist doctrine the pursuit of a secular vocation was encouraged and economic success was a sign of being elected among the chosen ones. But at the same time using hard earned money to buy luxuries was a sin. As a result, the only tolerated way of using earned income was to reinvest it, rather than spend it: money accumulated because of thrift and hard work was as a sign of divine selection. Dohmen et al. (2015:66) confirm the Weber hypothesis: they find that their measure of patience correlates well with the country share of protestants in 1900. Using two stage least squares regressions of log of GDP per capita with the share of protestant in 1900 as an instrumental variable for patience, they find that patience is

6

significant at the 1% level even when using a large set of control variables as well as Hofstede long-term orientation.

Doepke and Zilibotti (2008) model the possibility of path dependence: a country where patience is already a highly frequent value because of the structure of pre-industrial occupations at the onset of modern economic growth will experience higher growth in the industrial phase.

Doepke and Zilibotti (2013:3) stress that entrepreneurs 'face more risk and make investments that force them to defer consumption'. As a consequence, 'in a highly entrepreneurial society, a large proportion of the population is patient and risk tolerant', since 'Entrepreneurial dynasties develop patience because of the complementarity between this preference trait and their occupation' (p.18).

Asian countries with a Confucian culture (China, Singapore, Hong Kong, Taiwan) tend to exhibit a higher saving rate and social norms fostering long-term orientation (Hoftstede and Bond 1988, Hofstede and Minkov 2010). The positive association between patience, thrift or long-term orientation and a higher saving rate has been found by Dohmen et al. (2015), Guiso et al. (2006), and Shoam and Malul (2013). Maridal (2013) finds that "In countries where parents emphasize thrift and saving, the economy will grow faster". Gaygisiz (2013) shows a correlation between long-term orientation and the human development index, mediated by the Worldwide Governance Indicator (a measure of institutional quality). It has been found that Hofstede's long-term orientation (measured as composite index of several 1998-1999 World Values Survey items, among which 'thrift' from the WVS has a positive weight) predicted later economic growth across 70 countries (Minkov and Blagoev 2009).

Recent evidence shows the positive influence of long-term orientation on educational attainment: immigrant students in the USA have better test scores and are more likely to graduate from high school in four years than natives when their parents come from countries scoring high on long term orientation, thus emphasizing the importance of delayed gratification (Figlio et al. 2016).

Dohmen et al. (2015), using a recent survey on time preferences on 80,000 individuals in 76 countries, find a cross-country reduced-form relationship between a measure of patience (the ability to delay immediate gratification for future gains) and contemporary income per capita, long-run growth rates, saving rates, educational attainment, human capital, education expenditure, research and development expenditure, innovative capacity, and institutional quality. They find similar results within regions of each country and for individuals in each country: patience is correlated with regional and individual income and educational attainment.

On the contrary, sharing obligations (or forced solidarity) seem to burden entrepreneurs in tropical developing countries (Hoff and Sen (2006), Di Falco and Bulte (2011), Grimm et al. (2013), Baland et al. (2011), Baldacchino and Fairbairn (2006), Wilton (2015), Finney (1972)).

Nobel prize winner Arthur Lewis, who was born and raised in the tropical Caribbean islands, noted the negative economic effect of 'forced solidarity' on entrepreneurship, brought about by the social pressures on successful kinship members "...besieged by increased demands for support from a large number of distant relations ... [and, obliged] to share the reward with many others whose claims he does not recognize" (Lewis 1956: 114).

Poirine et al. (2017) find that in Tahiti (French Polynesia): the Chinese minority (made up of third generation immigrants from China) highly values thrift as opposed to sharing, while the reverse is true of the indigenous Polynesian majority. They also find that the Chinese minority is highly entrepreneurial, much more so that the indigenous Polynesians. They argue that this new "cultural dimension" (thrift versus sharing) fostered entrepreneurship in the industrial era.

4. The Debate about The Long Run Causes of The Tropical Development Gap

As Jeffrey Sachs noted: 'The most notable feature of global economic development – the continuing impoverishment of the tropics – remains to be explained' (Sachs 2001:10). Among the high-income economies, only three: Hong-Kong (province of China), Singapore and Taiwan are in the geographical tropics. It should be noted that they all share a Confucian culture with roots in temperate China. Income per capita is on average 4.5 times higher in the temperate climate zones than in the tropical climate zones (Sachs 2001:7).

It has been found that distance from the equator (Hall and Jones 1999), high latitudes or a temperate or snowy climate (Sachs 2000, 2001), and the prevalence of winter frost (Masters and McMillan 2000) correlate well with GDP per capita, growth of GDP per capita, or output per worker.
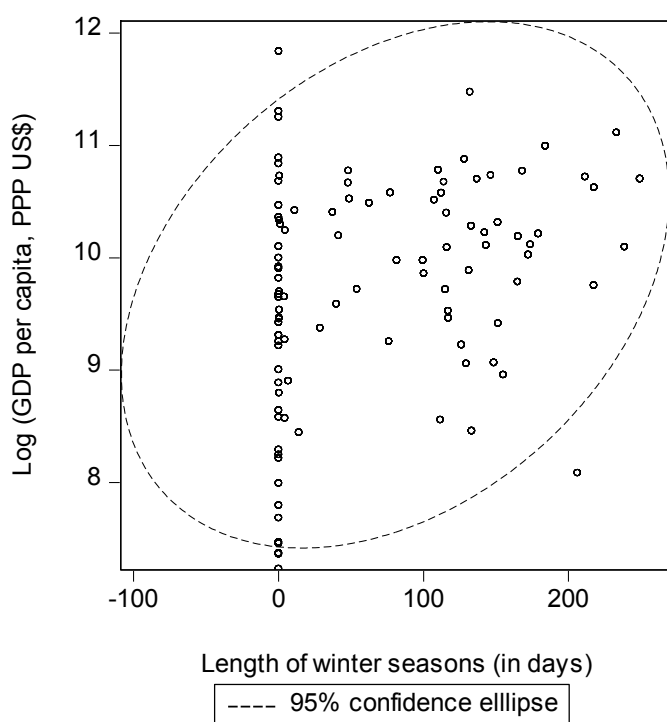
Figure 1: Gross Domestic Product per capita (in purchasing power parity US$, logarithmic scale) vs. the length of winter seasons (in days)

Figure 1 shows the link between the logarithm of GDP per capita (2013) in dollars at purchasing power parity and the length of the winter season, as proxied by the annual number of days during which the temperature is too low to allow plant growth, (with a 95% confidence ellipse), which corroborates this positive correlation. This gives a first hint at the role of climate in economic development.

A recent body of economic literature explains the tropical development gap by arguing that geography affects current development because of long-term indirect effects, transmitted from one generation to the next, going back to pre-industrial times: ancestors matter, or more precisely, what matters is how ancient is the Neolithic transition to agriculture that fashioned the culture of the ancestors in the very distant past (Landes 1988, Diamond 1997; Olsson and Hibbs 2005; Ashraf and Galor 2013, 2013, Spolaore and Wacziarg 2009, 2012, 2013). According to this literature, the early inhabitants of Eurasia passed on a biogeographic advantage to their descendants, because this continent cumulated geographic and biological conditions that favored the early spread of agriculture (from East to West) and the domestication of many plants (wheat, barley, rice) and

9

animals (horse, pig, goat, sheep, cow and chicken) that were not available on other continents. With sedentary agriculture became possible an agricultural surplus necessary to feed an elite of kings, warriors, priests and monks, scribes and accountants. This led to the birth of writing and early antique civilizations, opening the possibility of an accumulation of knowledge and experience with each generation. The advantage given to Europeans by « guns, germs and steel » (Diamond 1997), from the 15th century on, helped them colonize other parts of the world, and enabled them to transplant their agriculture, culture, institutions and technologies in the temperate parts of the New World where they set up settlers' colonies (North America, Australia, New Zealand). This theory explains the worldwide correlation between latitude and income per capita (Figure 3). Olsson and Hibbs (2005) do find evidence in favor of this theory. However Easterly and Levine (2003) find no such evidence that climate, latitude, continent orientation, and the early availability of domesticated vegetal and animal species, explain the modern spatial distribution of income per capita, other than through the quality of institutions.

One might suppose that, among the cultural endowments that the ancestors of the Eurasians (which include Europeans and Asians) probably passed on to their descendants, there might be a common cultural trait linked to the long practice of agriculture in a temperate, cold or Mediterranean climate: social norms and values stressing patience, planning, saving and accumulation over the long run.

On the contrary, other authors tend to downplay the role of culture and argue that only institutions matter in the long run. For example, Acemoglu and Robinson devote a chapter of their book 'Why Nations Fail' to "Theories that don't work", among which they include "The culture hypothesis" (Acemoglu and Robinson 2012:56). However, they do admit that "social norms, which are related to culture, matter and can be hard to change, and they also sometimes support institutional differences, this book's explanation for world inequality." (Acemoglu and Robinson 2012:57). Chang (2011) argues that climatic/cultural theories of development are too 'fatalistic' and neglect the reverse effect of development on cultural norms and values when estimating cross-country regressions.

According to Sachs (2000, 2001, 2003) and Gallup and Sachs (2000), tropical underdevelopment is mostly due to geographical and climatic handicaps that prevented development in the past and are still at work today: the prevalence of mosquito borne epidemics such as malaria, less population living close to the coasts and more landlocked countries in Africa and South America, and a lower productivity of tropical agriculture compared to temperate agriculture. Sachs disagrees with the statement that "culture matters" (Harrison and Huntington 2000) and argues that there is no

empirical evidence showing any role for culture to explain the tropical development gap (Sachs 2000).

Acemoglu, Johnson and Robinson (2002) and Acemoglu and Robinson (2012) argue that the "tropical gap" is the consequence of a "reversal of fortune" due to the fact that Europeans colonized the rest of the World after the fifteenth century, setting up "inclusive institutions" in the temperate colonies where most of them settled as small farmers (North America, Australia, New Zealand), and "extractive institutions" in the tropical colonies where they would not settle except for a small elite minority of plantation or mine owners exploiting the indigenous labor. According to this theory, the tropical gap was caused by the extractive institutions that European colonization set up in the tropical colonies and that are still in place today because of the resilience of the oligarchies descending from the European colonists, since the economic interest of this small elite is to maintain the institutional status quo. However, Easterly and Levine (2016), using data on the share of Europeans during colonial times, find that the adverse effects of extractive institutions linked to European colonization were more than offset by the human capital and technology that they brought with them. Their findings are consistent with the view that Europeans brought "cultural norms" that "had enduring effects on economic development" (Easterly and Levine 2016:229).

Economic historians McCloskey and Mokyr have long stressed the role of culture in the rise of the industrial revolution in Europe (McCloskey 2006, 2010, 2016; Mokyr 2017). Both authors disagree with Acemoglu and Robinson and the institutionalist school. They argue that it is culture or ideas (the bourgeois ideas in particular, as stressed by McCloskey) that shaped European institutions and affected technology 'by creating and nurturing institutions that stimulated and supported the accumulation and diffusion of "useful knowledge"' (Mokyr 2017:7).

McCloskey shows why a culture of thrift and long run orientation was an absolute necessity for group survival in Europe: 'because of the peculiarly unproductive character of their agriculture, the preindustrial European world needed urgently to abstain from consumption (…) one quarter to one third of the grain crop had to go back into the field as seed in the fall or the spring, its fruit to be harvested the next September' (McCloskey 2010: 129). However, she does not think that thrift is important in explaining comparative long run development trends, compared to other cultural factors that favored innovation, such as the glorification of bourgeois values compared to aristocratic values and norms.

However, it can be argued that both institutions and culture may foster or hamper economic development. As noted by Minkov and Blagoev (2009:6): 'economic growth does require appropriate policies but these can be easily implemented only in an appropriate culture'.

Spranz et al. (2012:463) argue that: 'Economic phenomena result from human activities, and do so over time. Furthermore, these activities are bound to rules formed within a cultural context, which also evolves through time. Combining both aspects elucidates why the examination of economic processes has to be understood as a cultural phenomenon.'

As an illustration, in many countries we find that under given national institutions, ethnic minorities tend to develop a stronger entrepreneurial orientation than the indigenous majority.

Such is the case of the Chinese people in Southeast Asia (Malaysia, Thailand, Indonesia), of the Levantines in Africa, the Indian minority in Melanesian Fiji, the Chinese minority in French Polynesia, etc. This might be explained by a selection bias for the first generation of migrants (the most ambitious and daring among the origin country who undertake the risky migration to the destination country are a self-selected sample of the origin population). But many studies find that the second and third generation minorities also show a higher entrepreneurial orientation. If only institutions mattered, there would be no way to explain such differences in the entrepreneurial orientation of ethnic minorities living under the same institutions as the indigenous majority, but if we admit that specific subcultures are linked to each minority ethnic group, we may explain such differences (Poirine et al. 2017).

If 'bad' (extractive) institutions obviously suppress economic growth regardless of the underlying culture, as shown by the examples of former East Germany (versus West Germany) and today's North Korea (versus South Korea), this does not necessarily imply that 'good' (inclusive) institutions will bring economic growth regardless of culture (Minkov and Blagoev 2009: 6). Institutions can be changed quickly but the underlying social norms and values necessary for the support of new institutions take much more time to change, as evidenced by the difficulties of the transition to capitalism of the ex-communist countries of eastern Europe (Hoff and Stiglitz, 2004), or by the low effectiveness of the regional institutions of southern Italy (Banfield 1958, Putnam 1993, Tabellini 2008).

5. Results

Our first proposition states that in tropical countries, people tend to value sharing more than thrift, and that the reverse is true in temperate/cold countries. Section 5.1 provides the empirical evidence using panel and cross-country data from the World Values Survey.

Our second proposition states that starting in industrial times, delayed return cultures stressing social norms of thrift and planning fostered entrepreneurship and economic development, while

immediate return cultures with a dominant sharing norm hampered them, holding institutions constant. This proposition is tested in section 5.2, using cross-country regression analysis.

5.1 Climate and Social Norms about Thrift and Sharing: Empirical Evidence

Variable choice and description

The World Values Survey (WVS)[3] can be used to test proposition one. Respondents are asked which qualities are important for children to learn at home. They are presented with a list of eleven qualities including "thrift, saving money and things" and "unselfishness" ('generosity' in Spanish), and they are asked to choose five qualities out of this list.

The average score for each country is the percentage of persons who selected this quality among the eleven possible choices presented to them on a card. This cultural information can therefore be quantified and used for statistical analysis, as suggested by Adkisson (2014), with all the care required to deal with potential econometric problems, such as the issue of endogeneity.

Since unselfishness is a quality linked to a social norm of sharing, we decided to approximate the thrift versus sharing vector by the thrift versus unselfishness vector, obtained by subtracting the average country score on unselfishness from the average country score on thrift (each score ranges from zero to 100 therefore the difference ranges between -100 to 100). This gives us a 'cultural dimension' (a concept pioneered by Hofstede, Hofstede and Minkov 2010) along which we can rank each national culture. From now on, we call this cultural dimension 'thrift versus sharing' (TVS). There are 6 WVS waves (1981-1984, 1990-1991, 1995-1998, 1999-2004, 2005-2009, 2010-2014) from which we obtain a panel of 223 available observations for the TVS variable. In order to compare our TVS cultural dimension with Hofstede's 'long-term orientation' (LTO) dimension (Hofstede and Minkov 2010), since both dimensions include the WVS item 'thrift' as a positive component, we also generate a cross section of 102 countries by averaging the values of the TVS variable across the WVS waves for each country. It can be noted that the correlation between this sample average and the last value of TVS, for the sixth survey (2010-2014) is equal to 0.93. The common 89-country sample correlation between our TVS dimension and the LTO dimension is 0.58. To be precise, LTO was empirically derived using principal component analysis, with the aim to find the highest correlation possible with a former measure of LTO from surveys in multinational companies in Asia, while our simpler measure is derived from a theory of cultural evolution based

on the idea that thrift and sharing are two alternative cultural survival strategies, implying that there exists a cultural dimension that we can measure along the thrift-sharing vector.

Since we want to allow for the contemporary role of institutional quality both on social norms about thrift versus sharing and on modern economic performance, we use a measure of institutional quality (called 'institutions' for short), which is an arithmetic average of each country's scores on the six components of the Worldwide Governance Indicators over the 2009-2013 period: government effectiveness, political stability and absence of violence/terrorism, regulatory quality, rule of law, voice and accountability, control of corruption.

Our first proposition states that thrift as a social norm and similar delayed return norms such as LTO stem from the need to store grain to survive a long winter season, while sharing as a social norm evolved from the need to share daily as a mutual insurance against the uncorrelated variation of daily food production in the context of hunting, fishing and continuous harvesting in a tropical climate with no winter season. As a consequence, we use a variable equal to the average number of winter days during which the temperature is too low to allow plant growth, henceforth called 'winter days', as proxy for the average length of winter seasons in a country. Data sources are mentioned in the appendix.
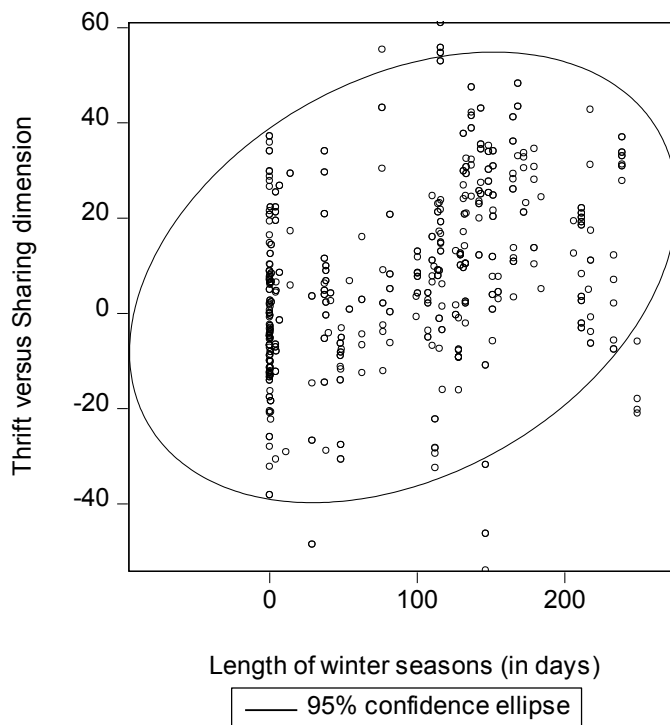

Figure 2: "Thrift versus Sharing" dimension vs. the length of winter seasons

Figure 2 shows the scatter graph between the TVS dimension and the length of the winter season in each country. Detailed examination of the scatter graph by country shows that the "Asian Tigers" (Singapore, Hong Kong, Taiwan, South Korea) and Malaysia are outliers, with higher than average scores for a given winter length. However, it is interesting to note that Singapore, Taiwan, Hong Kong are tropical countries with a Chinese culture, that is, with an ancestral culture rooted in temperate mainland China. Malaysia also has a dynamic Chinese business community. South Korea has a Confucian culture and a temperate climate. Aside from these few outliers, the scatter diagrams corroborate the positive correlation between the thrift versus sharing variable and the average length of winter seasons, as a longer winter season fosters thrift rather than sharing as social norms, because of the need to store grain to survive.
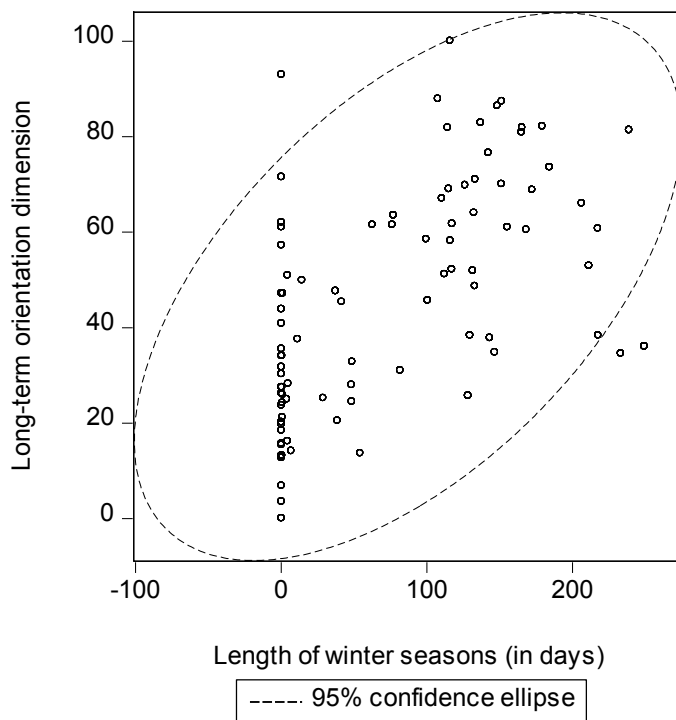

Figure 3: "Long-term orientation" dimension vs. the length of winter seasons

Figure 3 shows that a similar positive correlation between winter days and "long-term orientation" (LTO), a "cultural dimension" proposed by Hofstede and Minkov (2010), which embeds values oriented towards future rewards, such as saving, persistence, and adapting to changing circumstances. It is computed from three items of the World Values Survey, among which "thrift" is the most heavily weighted with a positive sign (see appendix).

South Korea, Taiwan, Hong Kong and Singapore are again outliers when plotted against winter days: they have a much higher than average long-term orientation score relative to the length of their winter seasons. Except for the outliers, the empirical evidence thus lends support to the theory that both cultural dimensions about thrift versus sharing and long-term orientation depend on the length of the winter seasons.

Estimation strategy

To test our first proposition, we first regress our TVS cultural dimension against the variables winter days and institutions, using also competing explanatory variables, which are significant determinants of long-term orientation in Galor & Özak's thorough study (2016): ancestry-adjusted rain-fed low-input caloric yield in 1500 AD, the post-1500 caloric yield change after the Columbian Exchange, and the Neolithic transition timing (Galor & Özak 2016). Given the likely endogeneity of the institutional variable, we use a two-stage least squares regression with 'kgptemp' (percent of population living in the temperate zone in each country) as instrument for institutions, following the estimation method used in Acemoglu et al. (2002), Easterly and Levine (2003,2016) and Sachs (2003). Indeed, this instrumental variable is correlated with institutional quality for historical reasons exposed by Acemoglu et al. (2002) but is not correlated with the dependent variable since climate cannot have a direct contemporaneous effect on social norms (the literature suggests that social norms change very slowly from one generation to the next, as shown by Algan and Cahuc 2010, who studied inherited trust among US immigrants). Within that estimation framework, a regressor endogeneity test, also known as a Durbin-Wu-Hausman test, rejects the null hypothesis and confirms that the institutional proxy is endogenous. To be more precise, this test consists in running a secondary estimation where the test variables are treated as exogenous rather than endogenous, and then comparing the J-statistic between this secondary estimation and the original estimation. Since in our EViews econometric package, 'exogenous variables may be specified by including a variable as both a regressor and an instrument, whereas endogenous variables are those which are specified in the regressor list only', we made sure that the model was identified by

including as many instruments as there were parameters in the model[4]. Furthermore, we present the Cragg-Donald (1993) statistics for weak instruments with Stock-Yogo (2015) critical values[5]., available for our two-stage least squares regressions, implemented with heteroskedasticity and autocorrelation consistent covariances. The test rejects the null hypothesis of a weak instrument at a 10% confidence level, for all regressions presented in this paper.

We also include dummies for the Asian Tigers outliers (Hongkong, Singapore, Taiwan and South Korea), and for the communist and ex-communist countries (Albania, Armenia, Azerbaijan, Bulgaria, Bosnia Herzegovina, Belarus, China, Croatia, Czech Republic, Estonia, Georgia, Hungary, Kazakhstan, Kyrgyzstan, Lithuania, Latvia, Moldova, Macedonia, Poland, Romania, Russia, Slovakia, Slovenia, Ukraine, Uzbekistan, Vietnam) to account for their institutional specificities. Our base regression result, using panel data, is presented in Table 1, column 1.

The robustness of our empirical results is tested in column 2 by adding significative variables found in the thorough investigation by Galor and Özak (2016, table 2), such as the average ancestry-adjusted 1500 AD caloric crop yield for low-input rain-fed crops, the change in crop yield produced by expansion in crops post-1500 AD, and the Neolithic transition timing (see appendix for definitions), as well as a range of additional geographical controls (mean elevation, distance to coast or river, terrain roughness, landlocked, island). We do not include latitude in the geographical controls, to avoid collinearity problem with our variable winter days. Such control variables test the robustness of the estimation by taking into account competing explanation: according to Galor and Özak (2016), higher crop yields measured in caloric units favored higher agricultural investments in the distant past, which fostered long-term orientation, a cultural dimension close to our TVS variable. According to Landes (1988), Diamond (1997) and other authors already cited, an earlier date for the Neolithic transition gave a head start to the Eurasian continent in the development of agriculture and early civilizations able to nourish a political and intellectual elite, leading to an accumulation of knowledge and more long-term planning due to the importance of grain storage in such early civilizations. The geographical controls are added to allow for competing explanations by Sachs (2000,2001,2003) and Gallup and Sachs (2000) about the geographical and climatic handicaps still at work today in tropical countries, that might have an independent effect on TVS or LTO.

To further test the robustness of the explanatory variable winter days, in Table 2, we use an alternate outcome variable, LTO, using the same specification for explanatory variables as above. Since LTO is available only for one wave of the WVS survey, we use cross-section regressions

instead of panel regressions for a comparison between TVS and LTO as alternate dependent variables. More precisely, we take the average of TVS values for all WVS waves available for each country to obtain cross-country data and use the same two-stage least squares method with the same instrumental variable kgtemp as in Table 1.

We also conducted a preliminary investigation into possible nonlinearities, proxied by a quadratic form of the explanatory variable winter days, as certain countries experience such long winters that it is not possible anymore to grow crops, hence perhaps reducing the incentive for thrift. The lack of significance or robustness of the quadratic estimates allowed us to assume that the linear specification of the models was appropriate.

Regression Results

Base panel regressions of TVS against institutions and winter days (Table 1)

Table 1 presents the results of panel regressions. The first column represents our base regression of TVS on winter days and our dummies for fixed and regional effects. The coefficient for winter days is positive, as expected, and significant at a 1% level. The coefficient for Institutions is negative and significant at a 5% level, which could mean that a good institutional quality and a welfare state tend to weaken the motive for thrift by providing social security for the old age or in case of illness or unemployment. The coefficient for the Asian tigers' dummy is positive and significant, as expected given the previous explanation for their role as outliers in Figures 2 and 3.

The second column adds additional explanatory variables, found to be significative influences and long-term orientation by Galor and Özak (2016). The coefficients for institutions and winter days remain highly significant, as is the change in crop yield since 1500 and some geographical controls, but the crop yield in 1500 AD and the Neolithic transition timing are not significant. The adjusted R^2 is also equal to 37% for both regression. This shows that the winter days variable is robust to the introduction of competing explanatory variables.

Table 1: Regressions of Thrift vs. Sharing (panel data)

Independent variable	(1)	(2)
Winter days	0.09 ***	0.18 ***
	(3.47)	(4.09)
Institutions	-6.51 **	-15.43 ***
	(2.23)	(3.56)
Crop Yield (ancestry-adjusted, pre-1500)		0.20
		(0.24)
Crop Yield Change (ancestry-adjusted)		3.15 ***
		(3.13)
Neolithic Transition Timing (ancestry-adjusted)		0.00006
		(0.10)
Constant	n.s.	n.s.
Fixed effect for each WVS wave	n.s.	n.s.
Dummy for Asian Tigers	(+) **	(+) **
Dummy for Gulf countries	n.s.	n.s.
Dummy for Ex-Communist countries	n.s.	n.s.
Additional Geographical Controls:		
Mean elevation		(-) **
Distance to coast or river		(-) ***
Terrain roughness		n.s.
Landlocked		(-) *
Island		n.s.
Cragg-Donald statistic for weak instrument (with Stock-Yogo critical values)	72.3 *	40.7 *
R^2	0.39	0.43
Adjusted R^2	0.37	0.37
Sample: available observations (6 waves for WVS)	222	211

Method: Two-stage Least Squares, Heteroskedasticity and Autocorrelation Consistent Covariance.
Instrumental variables: kgptemp, winter days, and all other exogenous explanatory variables.
T-statistics are indicated between parentheses below the coefficients.
***, **, and * imply significance at 1%, 5%, and 10% level.   "n.s." = not significant

Robustness tests for winter days using TVS or LTO

Table 2 shows the results of cross-country regressions on TVS (columns 1 and 2) and LTO (columns 3 and 4), with the same specifications as above

The coefficient for winter days is highly significant when explaining TVS (column 1), even when adding competing explanatory variables (column 2), or when explaining LTO, without added explanatory variable (column 3) or with competing variables (column 4). Institutions as well as some geographical controls also tend to affect TVS more significantly than LTO, but the crop yield around 1500 AD and the Neolithic transition timing appears to matter more significantly for LTO than for TVS, which is to be expected, since these variables were selected by Galor and Özak (2016) to explain the former variable and not the latter.

In summary, our results show that the length of the winter season has a positive and significant effect on both TVS or LTO and that this result is robust to the introduction of geographical controls, the Neolithic transition timing, and a competing explanation by ancestral crop yields in 1500AD and crop yield change since then, proposed by Galor and Özak (2016).

Table 2: Regressions of Thrift vs. Sharing, and Long-Term Orientation (cross-country data)

Independent variable	Thrift versus Sharing		Long-Term Orientation	
	(1)	**(2)**	**(3)**	**(4)**
Winter days	0.10 ***	0.22 ***	0.09 **	0.14 **
	(2.70)	(3.50)	(2.10)	(2.45)
Institutions	-6.82 **	-17.42 ***	6.70 *	2.08
	(2.07)	(3.05)	(1.68)	(0.38)
Crop Yield (ancestry-adjusted, pre-1500)		1.15		2.81 **
		(1.01)		(2.27)
Crop Yield Change (ancestry-adjusted)		2.43		2.00
		(1.36)		(1.18)
Neolithic Transition Timing (ancestry-adjusted)		0.0007		0.002 *
		(0.70)		(1.82)
Constant	n.s.	n.s.	(+) ***	n.s.
Dummy for Asian Tigers	(+) ***	(+) ***	(+) ***	(+) ***
Dummy for Gulf countries	n.s.	n.s.	n.s.	n.s.
Dummy for Ex-Communist countries	n.s.	n.s.	(+) ***	(+) *
Additional Geographical Controls:				
Mean elevation		(-) **		n.s.
Distance to coast or river		(-) **		n.s.
Terrain roughness		n.s.		n.s.
Landlocked		n.s.		n.s.
Island		n.s.		n.s.
Cragg-Donald statistic for weak instrument (Stock-Yogo critical values)	55.3 *	29.6 *	50.1 *	32.7 *
R^2	0.32	0.31	0.55	0.62
Adjusted R^2	0.29	0.20	0.53	0.55
Sample: available observations	102	97	90	86

Method: Two-stage Least Squares, Heteroskedasticity and Autocorrelation Consistent Covariance.
Instrumental variables: kgptemp, winter days, and all other exogenous explanatory variables.
T-statistics are indicated between parentheses below the coefficients.
***, **, and * imply significance at 1%, 5%, and 10% level.   "n.s." = not significant

5.2. Thrift versus Sharing, Institutions and the Tropical Gap: Empirical Evidence

Our second proposition provides a novel explanation of the tropical development gap: in pre-industrial times, the equatorial or tropical climates set the agricultural conditions fostering immediate return values which are still persistent today. When modern times came, countries with immediate return cultures of sharing were at a disadvantage in a capitalist setting, while countries with temperate or moderately cold climates, having developed the delayed return cultures adapted to intensive agriculture with seasonal storage over several millennia, were more apt to adopt an individualistic mentality and a culture of thrift, patience and long-term orientation, fostering economic development in a capitalist setting. We first describe the estimation strategy, then present the results.

Estimation strategy

To test the historical-institutional theory of Acemoglu and Robinson, and our theory of the agro-climatic origins of ancestral social norms about thrift and sharing, we run a regression to explain current gross domestic product per capita (at purchasing power parity), with two explanatory variables (institutions, TVS), and a dummy for Gulf countries.

However, if economic development makes it possible to improve the quality of institutions in the long-term (by allowing a more effective public service and better paid civil servants, policemen and judges), there is the possibility of reverse causality, higher GDP per capita causing better 'institutions'. A regressor endogeneity test (Durbin-Wu-Hausman) confirms that the explanatory variables institutions and thrift versus sharing (TVS) are endogenous. Therefore, we use again a two-stage least square regression with 'kgptemp' (percent of population living in the temperate zone in each country) as instrument for institutions. This instrumental variable for institutions has been used by Acemoglu et al. (2002), Easterly and Levine (2003) and Sachs (2003). Its partial correlation coefficient with institutions is 80%. We use the variable 'winter days' as an instrumental variable for TVS, as in the regressions previously presented. This model specification is coherent with our theory. First, agro-climatic conditions are the long-run deep rooted causes that determine both institutional quality (related to colonial history according to Acemoglu and Robinson 2012) and social norms about thrift and sharing (related to agricultural practices depending on climate).

Second, institutions and social norms rooted in past pre-industrial agro-climatic conditions then become the proximate causes of contemporary differences in GDP per capita.

Regression results

Table 3 presents the results of the regressions of log (Gross domestic product per capita, in purchasing power parity), on TVS, using panel data on the six waves of the WVS.

The base regression is shown in column 1, where the coefficients for both institutions and TVS are highly significant, as well as the dummy for Gulf countries.

Once again, the Cragg-Donald weak instrument test rejects the null hypothesis that the instruments (kgtemp and winter days) are weak.

Column 2 adds the geographical controls, and Neolithic transition timing, which are all significant. The coefficients for institutions and TVS have the same significance level and similar values than in the base regression.

These results tend to show that TVS has a positive and independent effect on GDP per capita, controlling for institutions. In other words, the effect of TVS (social norms), is not due only to its indirect long-term effect on the quality of formal institutions, but also to its direct contemporary effect on the efficiency of such institutions in fostering economic development.

Table 3: Regressions of Log (Gross Domestic Product per capita, PPP US$) (panel data)

Independent variable	(1)		(2)	
Thrift versus Sharing	0.010	**	0.008	**
	(2.51)		(2.23)	
Institutions	0.93	***	0.86	***
	(12.9)		(12.7)	
Neolithic Transition Timing (ancestry-adjusted)			0.0001	***
			(5.41)	
Constant	(+)	***	(+)	***
Fixed effect for each WVS wave	n.s.		n.s.	
Dummy for Gulf countries	(+)	***	(+)	***
Additional Geographical Controls:				
Mean elevation			(-)	***
Distance to coast or river			(+)	***
Terrain roughness			(+)	**
Landlocked			(-)	***
Island			n.s.	
Cragg-Donald statistic for weak instrument (with Stock-Yogo critical values)	25.2	*	28.0	*
R^2	0.47		0.62	
Adjusted R^2	0.45		0.59	
Sample: available observations (6 waves for WVS)	215		205	

Method: Two-stage Least Squares, Heteroskedasticity and Autocorrelation Consistent Covariance.
Instrumental variables: kgptemp, winter days, and all other exogenous explanatory variables.
T-statistics are indicated between parentheses below the coefficients.
***, **, and * imply significance at 1%, 5%, and 10% level.   "n.s." = not significant

6. Discussion and policy implications

Our results support Dohmen et al. (2015) findings: patience, long-term orientation, thrift versus sharing seem to be all highly correlated with a wide range of variable linked to contemporary economic development. The debate is about the independent effect of such social norms on comparative development: do they have a direct effect, holding institutions constant, or an indirect effect only, through fostering "inclusive" institutions in the industrial capitalist era?

Holding institutions constant, by observing differences between regions, or even individuals within a country or region, Dohmen et al. (2015) do find and independent effect of patience on income, education attainment, saving rates and other variables linked to development.

Our results also tend to support an independent effect of thrift vs sharing on comparative development, holding institutions constant. This does not mean that the indirect effect through institutional change did not exist, but that its effect is also to make formal institutions work more efficiently to promote development: culture and institutions are thus complementary factors of economic growth in the long run.

Climatic/cultural theories of development have been criticized as being too 'fatalistic' (Chang 2011:490-492). However, social norms detrimental to development at one point in history may have been or may become beneficial at another point in time and space, and they are not "cast in stone" (Acemoglu and Jackson 2011:1). Thrift became optimal in the context of sedentary agriculture in temperate climates, because it increased the chances of survival of the thrifty groups during the winter months. This does not imply that thrift is more efficient than sharing in any historical context.

Geoffrey Hodgson (2005:95) argued that 'institution building must involve a judicious combination of careful legislation with simultaneous efforts to encourage the development of habits and other informal cultural features that are consistent with policy goals. Legislation cannot go faster than the development of human habits and informal social norms'. This is the reason why this research is important for development policy: social norms can be changed, through education[6], and they should be changed when they are not compatible with the desired institutional changes. Appropriate policies and economic incentives can foster cultural change in the realm of economic values, as well as institutional change: 'The success of economic catch-up development depends essentially on the interconnection between pre-existing informal constraints on the one hand and novel, imported institutions on the other.' (Spranz, Lenger, and Goldschmidt 2012:459).

This is why our results cannot be criticized as fatalistic, in the sense that they would imply a permanent development handicap for tropical countries in the future (Singapore, a country which is right on the equator, but with a Confucian culture rooted in mainland China, is a perfect counter-example going against this fatalistic opinion).

7. Conclusion

This paper contends that both formal rules (institutions) and informal rules (social norms) matter for economic development. This means that social norms have a direct effect on long-run development, in addition to their possible indirect effect through fostering or hindering long-run institutional change. Our first proposition states that temperate or cold agro-climatic conditions in pre-industrial times fostered social norms stressing long-term planning, patience and thrift (delayed return cultures with long term orientation), whereas in tropical climates foraging or tropical horticulture with continuous harvesting all year long fostered social norms of sharing (immediate return cultures with short-term orientation).

We find evidence for this proposition using the World Values Surveys: the cultural dimension 'thrift versus sharing' increases with the length of the winter season. The same correlation with winter length is found when using Hofstede's 'long-term orientation', a cultural dimension correlated with our TVS dimension. Our results seem robust to the introduction of geographic controls and alternate variables suggested by competing explanations by Landes (1988), Diamond (1997), Sachs (2000, 2001, 2003), Gallup and Sachs (2000) and Galor and Özak (2016), such as the timing of the Neolithic transition as well as ancestral caloric yields circa 1500 AD and changes of these yields since then.

Our explanation of the link between ancestral agro-climatic condition and LTO or TVS is different from that of Galor and Özak (2016). According to them, higher crop yields in caloric units fostered agricultural investment and therefore long-term orientation. We find some empirical results that seem to support our theory, namely, that winter length in days is a better predictor both of LTO and TVS than ancestral crop yields, when controlling for a range of geographic and historical factors, as well as contemporary institutional quality.

Finally, we present some evidence in favor of our second proposition that delayed return cultures fostered economic development in the industrial era while immediate return cultures hampered it. To sum up, institutions matter, and they may be shaped by culture in the long run as Acemoglu and Robinson (2012:57) do admit, but culture also seems to matter independently of institutions: in

countries where thrift dominates sharing, institutions may work more efficiently and at the least cost to society in the long run.

However, the problem of the endogeneity of institutions and social norms to national income levels make it difficult to disentangle the direct effects of social norms on economic performance from their indirect effects through institutions, social capital and human capital.

To truly hold institutions constant and test for an independent effect of social norms on development, future research could focus on regional sub-national data when they are available (as in Dohmen et al. 2015), or on instances when groups of distinct cultural origins (ethnic minorities for example) live in the same country under the same national institutions for historical reasons, in order to test whether differing value systems and social norms originating in ancestral agricultural practices lead to different results regarding social norms about thrift and sharing (Poirine et al. 2017)..

One drawback of our research is that it uses country averages for all variables. The research could be improved by using more detailed climate data, to better take into account the climatic differences between regions in very large countries such as the United States, China or Australia, or in many tropical countries such as Ethiopia, New Guinea, southeast Asia or the Andean countries, between high elevation and low elevation regions: farmers living in the highlands, who are used to storing grain should be thriftier and share less than people living in the lowlands of hunting, fishing, gathering and animal husbandry. People living in the artic regions of hunting and fishing should value sharing more than reindeer herders, who accumulate livestock to prevent hunger on bad years. Moreover, our data do not take into account the effect of migrations from temperate to tropical countries, such as European migrations to the New World countries or mainland Chinese migrations to Singapore and Taiwan (two tropical 'outliers' very high on long-term orientation). Such migrations transfer ancestral social norms from the origin to the destination countries in the modern era.

Finally, it is worth noting that our theory does not imply that thrift is more efficient than sharing in any context: 'there is no requirement that outcomes of a selection process are necessarily optimal or improvements on their precursors. Insofar as these outcomes carry connotations of refinement or efficiency, it is efficiency relative to the given environment'(Hodgson and Knudsen 2006: 6). To illustrate this, sharing is still an optimal social norm in the context of a few ecological niches such as the small bands of hunters/gatherers in the Amazonian forest, the Australian desert, the African savanna, or the Artic climate of the Inuit in Greenland or the Canadian northern regions, because it maximizes their chance of survival as a group. Sharing (i.e. pooling the earnings from) the catch of

the day is still practiced nowadays among Japanese shrimp fishermen belonging to the same fishing cooperative association (Carpenter and Seki 2005): this is an interesting example of a sharing niche subculture embedded in the wider Japanese thrifty culture, because mutual insurance through sharing the daily catch is more efficient than storing it in the context of day to day random uncorrelated variations of the said catch. This concept of an evolutionary cultural niche embedded in a wider culture has been pioneered by Mokyr (2017:29).

Moreover, our theory does not imply any absolute moral superiority of one set of norms over the other, for, as Hayek stated, 'I do not claim that the results of group selection of traditions are necessarily 'good' — any more than I claim that other things that have long survived in the course of evolution, such as cockroaches, have moral value' (Hayek 1988:27).

References

Acemoglu D. and Jackson, M.O., 2011. History, Expectations and Leadership in the Evolution of Social Norms, Working Paper 17066, National Bureau of Economic Research.

Acemoglu D., Johnson, S. & Robinson, J.A., 2002. Reversal of Fortune: Geography and Institutions in the Making of the Modern World Income Distribution, *Quarterly Journal of Economics*, *117:* 1231-1294.

Acemoglu D. & Robinson, J., 2012. *Why Nations Fail*, London: Profile Books.

Adkisson, R.V., 2014. Quantifying Culture: Problems and Promises, Journal of Economic Issues, 48 (1): 89-108.

Algan Y. & Cahuc P., 2010. Inherited Trust and Growth, *American Economic Review, 100:* 2060-2092.

Ashraf, Q., and Galor, O., 2013. The 'Out of Africa' Hypothesis, Human Genetic Diversity, and Comparative Economic Development. *American Economic Review, 103(1):* 1-46.

Baland, J.-M., Guirkinger, C. & Mali, C., 2011. Pretending to Be Poor: Borrowing to Escape Forced Solidarity in Cameroon, *Economic Development and Cultural Change*, *60(1):* 1-16.

Baldacchino, G. & Fairbairn, T.I.J., 2006. Editorial: Entrepreneurship and Small Business Development in Small Islands, *Journal of Small Business and Entrepreneurship*, *19(4):* 331–340.

Banfield, E. C., (1958. The moral basis of a backward society, Chicago: The Free Press,

Carpenter, J. & Seki, E., 2005. SP: Field Experimental Evidence from a Japanese Fishing Community, IZA discussion paper n° 1691.

Boyd, R. & Richerson, P.J. (1985) *Culture and the evolutionary process.* Chicago IL: University of Chicago Press.

Boyd, R. & Richerson, P.J. (2005) Not by genes alone: How Culture Transformed Human Evolution, Chicago: Chicago University Press.

Bowles, S. & Gintis, H. (2011). *A Cooperative Species: Human Reciprocity and Its Evolution*. Princeton, New Jersey Oxford: Princeton University Press.

Buggle, J. & Durante, R., 2016. Climate Risk, Cooperation and the Co-Evolution of Culture and Institutions, Working Paper, Sciences Po, Paris, November 2016. Downloaded from http://www.johannesbuggle.com/docs/climate.pdf

Cavalli-Sforza, L.L., & Feldman, M.W. (1981) Cultural transmission and evolution: A quantitative approach. Princeton, NJ: Princeton University Press.

Chang, H.J., 2011. Institutions and Economic Development: Theory, Policy and History, *Journal of Institutional Economics*, *7(4):* 473–98.

Cragg, J.G. & Donald, S.G., 1993. Testing Identifiability and Specification in Instrumental Variable Models, *Econometric Theory, 9(2):* 222-240.

Diamond, J., 1997. *Guns, Germs and Steel: The Fate of Human Societies*, New York: Norton & Co.

Di Falco, S. & Bulte, E., 2011. A Dark Side of Social Capital? Kinship, Consumption, and Savings, *Journal of Development Studies*, *47(8):* 1128-1150.

Doepke M. & Zilibotti F., 2008. Occupational choice and the spirit of Capitalism, Quarterly Journal of Economics, *123 (2):* 747-93

Doepke M. & Zilibotti F., 2013. Culture, Entrepreneurship and Growth, IZA Discussion Paper N° 7459, IZA, June 2013.

Dohmen, T., Enke, B., Falk, A., Huffman, D., Sunde, U., 2015. Patience and the Wealth of Nations, mimeo, University of Chicago. https://www.cens.uni-bonn.de/team/board/armin-falk/patience-falk.pdf

Easterly, W., & Levine, R., 2003. Tropics, germs, and crops: how endowments influence economic development, *Journal of Monetary Economics, 50(1):* 3-39.

Easterly, W., and Levine R., 2016. The European Origins of Economic Development, *Journal of Economic Growth, 21(3):* 225–257.

Figlio, D., Paola, G., Özek, U. & Sapienza, P., 2016. Long-Term Orientation and Educational Performance, Working Paper 22541. National Bureau of Economic Research.

Finney B., 1972. Big-men, Half-men and Trader-chiefs: Entrepreneurial Styles in Australian New Guinea and French Polynesia, in: T.S. Epstein, and D.H. Penny (Eds.), *Opportunity and Response: Case Studies in Economic Development*, London: C. Hust & Company, 114-130.

Frake, C. O., 1962. *Cultural ecology and Ethnography, American Anthropologist*, New Series, *64 (1):* Part 1, 53-59.

Gallup, J.L., Sachs, J.D., 2000. Agriculture, Climate, and Technology: Why Are the Tropics Falling behind? *American Journal of Agricultural Economics, 82(3):* 731-737.

Galor, O & Özak, O., 2016. The Agricultural Origins of Time Preference *American Economic Review, 106(10):* 3064-3103.

Gaygisiz, E., 2013. How are cultural dimensions and governance quality related to socioeconomic development? *The Journal of Socio-Economics, 47:* 170-179.

Godoy, R., Byron, E., Reyes-Garcia, V., Leonard, W.R., Patel, K., Apaza, L., Perez, E. Vadez, V., and Wilkie, D.., 2004. Patience in a Foraging-Horticultural Society: A Test of Competing Hypotheses, *Journal of Anthropological Research, 60(2):* 179-202.

Grimm M., Gubert, F., Koriko, O., Lay, J. & Nordman, C.J., 2013. Kinship Ties and Entrepreneurship in Western Africa, *Journal of Small Business & Entrepreneurship*, *26(2):* 125-150.

Guiso L., Sapienza, P. & Zingales, L., 2006. Does Culture Affect Economic Outcomes? *Journal of Economic Perspectives*, *20 (2):* 23-48.

Hall R.E. and Jones, C.I., 1999. Why Do Some Countries Produce So Much More Output Per Worker Than Others? *The Quarterly Journal of Economics*, *114 (1):* 83-116.

Harrison L.E & Huntington, S.P. (Eds.), 2000. *Culture Matters: How Values Shape Human Progress*, Basic Books.

Hayek, F. A., 1988. *The Fatal Conceit. The Errors of Socialism. The Collected Works of F.A. Hayek*, vol.1, ed. by William W. Bartley III. Chicago: University of Chicago Press.

Hodgson, G.M., 2005. Institutions and Economic Development: Constraining, Enabling and Reconstituting, in S. de Paula & Dymski, G.A. (Eds.), *Reimagining Growth: Towards a Renewal of Development Theory*, London: Zed Books, pp. 85– 98.

Hodgson, G.M., and Knudsen, T., 2006. Why We Need a Generalized Darwinism, and Why Generalized Darwinism Is Not Enough, *Journal of Economic Behavior & Organization*, *61(1):* 1–19.

Hoff, K. and Sen, A., 2006. The Kin System as a Poverty Trap, in: Bowles, S., Durlauf, S. N. and Hoff, K. (Eds.), *Poverty Traps*, New York: Princeton University Press, 95- 115.

Hoff, K., & Stiglitz, J.E., 2004. After the big bang? Obstacles to the emergence of the rule of law in post-communist societies, *American Economic Review*, *94(3):* 753–763.

Hofstede, G.& Bond, M.H., 1988. The Confucian Connection: From Cultural Roots to Economic Growth, *Organization Dynamics*, *16(4):* 5–21.

Hofstede G. & Minkov, M., 2010. Long-versus short-term orientation: new perspectives, *Asia Pacific Business Review*, 16:4, 493-504.

Hofstede, G., Hofstede, G. J. & Minkov, M., 2010. *Cultures and Organizations, Software of the Mind: Intercultural Cooperation and its Importance for Survival*, New York: McGraw Hill.

Landes, D.S., 1988. *The Wealth and Poverty of Nations: Why Some are so Rich and Some So Poor*, New York: W.W. Norton.

Layton, R., 2005. Are hunter-gatherer immediate return strategies adaptive? in: T. Widlok & Tadesse, W. (Eds.), *Property and Equality, vol. 1: Ritualization, Sharing, Egalitarianism*, New York: Berghahn, 130–150.

Lewis, A.,1956, *The theory of Economic Growth*, George Allen & Unwin, London, 1956.

Litina, A., 2016, Natural land productivity, cooperation and comparative development, *Journal of Economic Growth*, 21(4):351-408.

Mace R. & Jordan, F.M., 2011. Macro-evolutionary studies of cultural diversity: a review of empirical studies of cultural transmission and cultural adaptation, *Philosophical Transactions of the Royal Society, 366(1563):* 402-411.

Maridal, J.H., 2013. Cultural impact on national economic growth, *The Journal of Socio-Economics, 47:* 136-146.

Martin L.L. & Shirk, S., 2008. Immediate return societies: What can they tell us about the self and social relationships in our society? in: Wood, J,V., Tesser, A. & Holmes, J.G. (Eds.), *The Self and Social Relationships*, New York, Hove : Psychology Press, 159-182.

Masters W.A. & McMillan, M.S., 2000. Climate and Scale in Economic Growth, *Journal of Economic Growth, 6(3):* 167-186.

McCloskey, D., 2006. *The Bourgeois Virtues: Ethics for an Age of Commerce.* Chicago: University of Chicago Press.

McCloskey, D., 2010. *Bourgeois Dignity: Why Economics Can't Explain the Modern World.* Chicago: University of Chicago Press.

McCloskey, D., 2016. *Bourgeois Equality: How Ideas, Not Capital or Institutions, Enriched the World*, Chicago: University of Chicago Press.

Minkov M. & Blagoev, V., 2009. Cultural Values Predict Subsequent Economic Growth, *International Journal of Cross Cultural Management, 9(1):* 5-24.

Mokyr, J., 2017. *A Culture of Growth, the Origins of the Modern Economy*, Princeton University Press, Princeton and Oxford.

North, D., 1990. *Institutions, Institutional Change and Economic Performance*, Cambridge, UK: Cambridge University Press.

Peterson, N., 1993. Demand Sharing: Reciprocity and the Pressure for Generosity among Foragers, *American Anthropologist, 95 (4):* 860-874.

Olsson, O & Hibbs, D.A. Jr., 2005. Biogeography and Long-Run Economic Development, *European Economic Review, 49(4):* 909–38.

Olsson, O. & Paik, C., 2016. Long run Cultural Divergence, *Journal of Development Economics*, *122:* 197-2013.

Poirine B., Dropsy V. & Gay J.F., 2017. Entrepreneurship and social norms about thrift versus sharing: the Chinese-Tahitian experience, *Asia Pacific Business Review*, 23(5):641-657.

Putnam R., 1993. *Making Democracy Work*, Princeton, NJ: Princeton University Press.

Sachs J., 2000. Notes on a New Sociology of Economic Development, in: Harrison L.E. & Huntington, S.P., (Eds.), *Culture Matters: How Values Shape Human Progress*, Basic Books.

Sachs, J., 2001. Tropical underdevelopment, Working Paper 8119, National Bureau of Economic Research.

Sachs, J., 2003. Institutions don't rule: direct effects of geography on per capita income, Working Paper 9490, National Bureau of Economic Research.

Sahlins, M. & Service, E.R. (Eds.), 1960. *Evolution and Culture*, Ann Arbor: University of Michigan Press.

Shoam, A. & Malul, M., 2013. Cultural attributes, national saving and economic outcomes, *The Journal of Socio-Economics, 47:* 180-184.

Spolaore, E. & Wacziarg, R., 2009. The Diffusion of Development, *Quarterly Journal of Economics*, *124(2):* 469–529.

Spolaore, E. & Wacziarg, R., 2012. Long-Term Barriers to the International Diffusion of Innovations, in: Frankel, J. & Pissarides, C. (Eds.), *NBER International Seminar on Macroeconomics 2011*, Chapter 1, 11-46, Chicago: University of Chicago Press.

Spolaore, E. & Wacziarg, R., 2013. How Deep Are the Roots of Economic Development? *Journal of Economic Literature*, *51(2):* 1–45.

Spranz, R., Lenger, A. & Goldschmidt, N., 2012. The Relation between Institutional and Cultural Factors in Economic Development: The Case of Indonesia, *Journal of Institutional Economics*, *8(4):* 459–88.

Steward J.H., 1955. *Theory of Culture change: the methodology of multilinear evolution*, Urbana: University of Illinois Press.

Stock, James H., and Motohiro Yogo. "Testing for Weak Instruments in Linear IV Regression." In Identification and Inference for Econometric Models: Essays in Honor of Thomas Rothenberg, edited by Donald W. K. Andrews and James H. Stock, pp. 80-108. New York: Cambridge University Press, 2015.

Tabellini G., 2008. Culture and Institutions, Journal *of the European Economic Association*, Proceedings of the Twenty-Second Annual Congress of the European Economic Association, *6 (2/3):* 255-294.

Veblen, T., 1898. Why is economics not an evolutionary science? *Quarterly Journal of Economics*, *12(4):* 373-397.

Weber, M., 1930. *The Protestant Ethic and the Spirit of Capitalism*, London/Boston: Unwin Hyman.

Williamson, O. E., 2000. The New Institutional Economics: Taking Stock, Looking Ahead, *Journal of Economic Literature*, *38(3):* 595–613.

Wilton W., 2015. Want to support enterprise development in developing countries? Think about the other salient factors, An investigation of Zimbabwe and Pacific Island countries, *International Journal of Entrepreneurship and Small Business*, *25(3):* 282-295.

Woodburn, J., 1982. Egalitarian societies, *Man (New Series)*, *17(3):* 431-451.

Footnotes

1. Some cultural traits, such as the social norm of demand sharing, enforced by group pressure for generosity, have remained unchanged and well adapted in the few forager tribes that managed to avoid contact with modern civilizations in the most remote forests and deserts of Amazonia, Australia, Africa or Papua New Guinea (Peterson 1993).

2. It is obvious that individuals can be both thrifty and generous (as shown by the famous example of Bill Gates), but our theory is not about an individual's psychology, but about the preferred social norms of cultural groups.

3. The European Value Survey is not used since it would bias the overall sample towards rich countries, which are mostly located in temperate climate zone: the median value of GDP for European countries is almost twice higher than for countries in the World Value Surveys, and almost all European nations have a latitude greater than 40 degrees.

4. http://www.eviews.com/help/helpintro.html#page/content/gmmiv-IV_Diagnostics_and_Tests.html

5. The Cragg-Donald (1993) statistics for weak instruments with Stock-Yogo (2015) critical values, is similar to the Kleibergen and Paap Wald statistics, which is not available in our Eviews package.

6. It is interesting to note that the fable 'la cigale et la fourmi' (the grasshopper and the ant) was written by Jean de La Fontaine who was the tutor of the child prince of king Louis XIV of France. He wanted to teach the Prince why thriftiness is an important value that children must learn in the context of a rural country with a long winter. But La Fontaine was himself inspired by a similar fable written in ancient Greece by Esope, around the 6th century B.C. This shows that thriftiness was already a social norm in Greece at that time.

Appendix: list of variables and sources

Variable	Description	Source
GDP per capita	Gross Domestic Product per capita, converted in international dollars using purchasing power parity rates (based on the 2013 ICP), for 2013	World Development Indicators database (World Bank) https://data.worldbank.org/products/wdi
Institutions	Arithmetic average of each country's scores on 'government effectiveness', 'political stability and absence of violence/terrorism', 'regulatory quality', 'rule of law', 'voice and accountability' and 'control of corruption', averaged over 2009-2013.	Worldwide Governance Indicators database (World Bank) www.info.worldbank.org/governance/wgi/
Thrift versus Sharing	Difference between Thrift and Sharing, based on average country score on questions V17 and V20 of the World Values Survey, (wave 6, 2010-2014). The percentages were obtained from the answer to the question: '*Here is a list of qualities that children can be encouraged to learn at home. Which, if any, do you consider to be especially important? Please choose up to five!*'.	World Values Survey: waves 1 to 6 official aggregate v.20150418 (World Values Survey Association) www.worldvaluessurvey.org Aggregate File Producer: Asep/JDS, Madrid Spain.
Long-term orientation (LTO)	This index is computed from three WVS items: thrift (with a positive sign), national pride (with a negative sign), and importance of service to other (with a negative sign). This last item seems related to 'unselfishness'. Therefore, LTO is close to our 'thrift versus sharing' vector.	Table 2 in Hofstede and Minkov (2010:499)
Kgptemp	Percent of population living in the temperate zone in each country	Country Geography Data http://www.pdx.edu/econ/jlgallup#datasets
Winterdays = 365.5 – Temp_gp	Temp_gp = Average number of days per year during which temperature allows plant growth in a country	Global Agro-Ecological Zones http://www.fao.org/nr/gaez/en/
Crop Yield (ancestry-adjusted, pre-1500)	Maximum caloric yield produced across crops available pre1500CE for a 5'x5' cell under agro-climatic conditions and low inputs, in tons per hectare per year.	Galor and Özak (2016) Global Agro-Ecological Zones http://www.fao.org/nr/gaez/en/
Crop Yield Change (ancestry-adjusted)	Change in maximum caloric yield produced by expansion in crops post-1500CE for a 5'x5' cell under agro-climatic conditions and low inputs, in tons per hectare per year.	Galor and Özak (2016) Global Agro-Ecological Zones http://www.fao.org/nr/gaez/en/
Neolithic Transition Timing (ancestry-adjusted)	The number of thousand years elapsed (as of the year 2000) since the majority of the population residing within a country's modern national borders began practicing sedentary agriculture as the primary mode of subsistence.	Galor and Özak (2016) Agricultural Transition Data Set (Putterman) http://www.brown.edu/Departments/Economics/Faculty/Louis_Putterman/agricultural%20data%20page.htm
Mean	The mean elevation of a country in km above	Galor and Özak (2016)

elevation	sea level, calculated using geospatial elevation data reported by the G-ECON project at a 1-degree resolution.	Geographically based Economic data (G-Econ) https://gecon.yale.edu/
Distance to coast or river	The distance, in thousands of km, from a GIS grid cell to the nearest ice-free coastline or sea-navigable river, averaged across the grid cells of a country.	Galor and Özak (2016) Country Geography Data http://www.pdx.edu/econ/jlgallup#datasets
Terrain roughness	The degree of terrain roughness of a country, calculated using geospatial surface undulation data reported by the G-ECON project at a 1-degree resolution.	Galor and Özak (2016) Geographically based Economic data (G-Econ) https://gecon.yale.edu/
Landlocked	Dummy variable = 1 if the country is landlocked	Galor and Özak (2016) CIA's World Factbook online https://www.cia.gov/library/publications/the-world-factbook/
Island	Dummy variable = 1 if the country shares a land border with any other country.	Galor and Özak (2016) CIA's World Factbook online https://www.cia.gov/library/publications/the-world-factbook/