# Charles University in Prague

Faculty of Social Sciences

Institute of Economic Studies


Master Thesis

**Which Aspects of Culture Play an Important Role in Economic Development?**


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## Declaration of Authorship

1. Hereby I declare that I have compiled this master thesis independently, using only the listed literature and sources.
2. I declare that the thesis has not been used for obtaining another title.
3. I agree on making this thesis accessible for study and research purposes.

Prague, May 13, 2016

Signature

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# Abstract

In this thesis, we examine the effect of four cultural variables on economic growth using data from World Values Survey, specifically, attitudes toward hard work, family ties, generalized morality, and views regarding the appropriate role of women in society. Compared to the previous studies, we use Instrumental Variable Bayesian Model Averaging (IVBMA) to deal rigorously with model uncertainty, omitted variable bias, and endogeneity of culture at the same time. We consider a number of instruments: genetic distance, legal origins, index of historical prevalence of infectious diseases, predicted trade shares, and historical plough use. Most of them have been widely used in growth economics literature. Examining twenty-nine regressors for forty-six countries, our results point to the importance of cultural variables for economic development. The strongest support receives family ties and attitudes toward hard work. Additionally, we find considerable support for other variables, namely ground frost, soil depth and trade.



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# Abstrakt

V této práci zkoumáme vliv kulturních proměnných na ekonomický růst.
K tomuto účelu používáme data z World Values Survey, jmenovitě přístup k tvrdé práci, rodinné vazby, všeobecnou morálku a názory na vhodnou roli žen ve společnosti. V porovnání s předchozí literaturou používáme metodu "Instrumental Variable Bayesian Model Averaging," (IVBMA), pomocí které řešíme problém modelové nejistoty, vynechání důležitých vysvětlujících proměnných a endogenity kultury. V analýze používáme řadu instrumentů: genetickou vzdálenost, původ právního systému, index historického rozšíření infekčních chorob, předpovězený obchod a historické užití pluhu. Většina z těchto instrumentů je hojně používaná v růstové ekonomii. Při uvážení dvaceti devíti vysvětlujících proměnných pro čtyřicet šest zemí naše výsledky poukazují na důležitost kulturních proměnných pro ekonomický rozvoj. Největší podporu nacházíme pro rodinné vazby a přístup k tvrdé práci. Dále nacházíme značnou podporu pro další proměnné, jmenovitě přízemní mráz, hloubku půdy a obchod.



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# Acronyms

| | |
|---|---|
| **BMA** | Bayesian Model Averaging |
| **IVBMA** | Instrumental Variable Bayesian Model Averaging |
| **PIP** | Posterior Inclusion Probability |
| **OECD** | Organisation for Economic Co-Operation and Development |
| **WVS** | World Values Survey |

# Master Thesis Proposal

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*Notes: The proposal should be 2–3 pages long. Save it as "yoursurname_proposal.doc" and send it to mejstrik@fsv.cuni.cz, tomas.havranek@ies-prague.org, and zuzana.irsova@ies-prague.org. Subject of the e-mail must be: "JEM001 Proposal (Yoursurname)".*

**Proposed Topic:**

Which Aspects of Culture Play an Important Role in Economic Development?

**Motivation:**

The importance of culture in explaining individual behaviour and economic success was recognized several centuries ago by, for example, Adam Smith, a century later by Karl Max and Max Weber. However, the marginalist revolution in economics sidelined cultural factors for some time. Today, the importance of culture has become widely recognized as it is illustrated by the main four areas of study: (1) Entrepreneurial culture, (2) Trust, (3) International business, (4) Comparative corporate governance (Beugelsdijk and Maseland 2011). Events such as the spectacular rise of East Asia or communism's demise contributed to the perception that models assuming full rationality and efficient markets are able to provide a very limited explanation of economic development. In this context, culture is seen as a possible "deep" determinant of economic development (Hall and Jones 1999; Acemoglu et al. 2001; Rodrik et al. 2004; Sen 2004; La Porta et al. 2008).

**Hypotheses:**

1. Hypothesis #1: Is there a strong causal relationship between culture (aspects of culture) and economic development?
2. Hypothesis #2: Are there certain aspects of culture that are significantly more conducive to economic development than others?
3. Hypothesis #3: Are these aspects of culture endogenous?

**Methodology:**

For the empirical testing, I plan to use cross-country regression using Bayesian Model Averaging framework. Such technique allows us to include many more regressors in a single-regression equation than classical econometrics, effectively reducing model uncertainty and omitted variable bias. To account for the possible endogeneity of culture, I intend to use Instrumental Variable Bayesian Model Averaging developed by Karl and Lenkoski 2012. The source of data will be World Values Survey, designed for cross-national comparison of values and norms.

**Expected Contribution:**

The expected contribution is to evaluate the relationship between culture and economic development within the rigorous framework of BMA (IVBMA). This technique gives us more confidence in the results because we simultaneously deal with model uncertainty and omitted variable bias. The previous literature does not account for these issues even though empirical growth literature accentuates model uncertainty (Fernandez et al. 2001; Durlauf et al. 2004; Eicher et al. 2012). Furthermore, this thesis aims to identify instrumental variables for proxy of culture since some previous works in the field do not account for possible endogeneity of culture.

**Outline:**

1. Introduction
2. Literature Review
3. Methodological Issues and Limitations
4. Bayesian Model Averaging
5. Data
6. Model
7. Assessment of the Results
8. Conclusion

**Core Bibliography:**


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Author

Supervisor

# 1 Introduction

Why disparities in levels of income and development substantially differ and are persistent is one of the central questions in growth economics. The world's richest and poorest countries level of gross domestic product per capita differs by a factor of 209. The Central African Republic, the poorest nation in the world for which the national statistics are available, has an income per capita of $630. By contrast, Qatar's income per capita is $132,099.[1] Naturally, a following question arises - what factors are behind these enormous differences in income and how can we mitigate them? Although economists have been trying to identify the fundamental forces that would explain differences in income for decades, our knowledge and understanding still is not deep enough to solve this puzzle. This thesis investigates one of many determinants of economic growth - culture. The idea that culture is a central driver of economic growth goes back to at least Max Weber and his classical work "The Protestant Ethic and the Spirit of Capitalism," in which he argues that the Protestant ethic of Calvinism was a major force behind the development of capitalism in its early stage. Weber saw culture as a causal force with respect to economic development. By contrast, Karl Max held a view that culture is determined by the level of economic development and by the economic interests of diverse social classes. Although Greif (1994) and Landes (1998), among others, have argued that culture plays an essential role in explaining the differences in income, cultural economics is still in its infancy. Among most notable studies that were at the beginning of empirical research of culture and its impact on economic development is Putnam et al.'s (1993) work which investigates differences in institutions in Italy, and these differences are traced back to certain cultural traits developed hundreds of years ago. Another important contribution is Knack and Keefer's (1997) work in which they attempt to explain differences in growth rates by including the famous question about trust from World Values Survey. Furthermore, recent research shows that cultural variables influence many economic outcomes. They even determine the speed of development and the wealth of nations (Guiso et al 2006; Fernandez 2008, 2011; Landes 1998).

Empirical growth literature accentuates model uncertainty (Fernandez et al. 2001; Durlauf et al. 2004; Eicher et al. 2012, among others). Growth econometrics has been successful in identifying determinants of growth, and plentiful theories have been developed. Hence, there is a significant degree of uncertainty about the "true" model of economic growth.

This thesis aims to contribute to the current literature by analyzing the impact of four cultural variables on economic growth, assessing their relative importance, and dealing with the following issues at the same time: (i) reducing omitted variable bias, (ii) evaluating several cultural variables in the same regression equation and (iii) coping with endogeneity of culture. We deal with model uncertainty by employing Instrumental Variable Bayesian Model Averaging (IVBMA) technique developed by Karl and Lenkoski (2012) which allows us

[1] The figures are in international dollars and are for year 2015. Source of data is International Monetary Fund.

to include many more regressors compared to classical econometrics. Therefore, it helps us to mitigate omitted variable bias and also incorporate instrumental variable procedure within BMA framework. We analyze four cultural variables in total: attitudes toward hard work, family ties, views about the appropriate role of women in society, and generalized morality using World Values Survey. All these variables have been used in literature to analyze impact of culture on numerous economic outcomes (Alesina and Giuliano 2010; Alesina et al. 2013; Tabellini 2008, 2010)

The results based on 46 countries and 29 explanatory variables suggest that culture is likely to play an important role in economic development, but given the numerous methodological problems (see Section 2), we interpret these results with caution. Moreover, our findings give considerable support to competing theories, namely to geographical and trade theories.

This thesis is organized as follows: Section 2 presents methodological issues and limitations connected with including culture in economic analysis. Section 3 reviews the relevant literature. A description of the data can be found in Section 4. Section 5 presents econometric specification and results. Finally, Section 6 concludes. Appendix with additional tables and detailed description of data follows.

# 2 Methodological issues and Limitations

In this section, we provide an overview of most important methodological issues when investigating the relationship between culture and economics. We do not cover all topics of research but focus our attention on most important ones. Additionally, we discuss the most common methods to study the impact of culture on economic development.

There are three main methodological problems when including culture in economics. Beugelsdijk and Maseland (2011) identify culture as being:

1) human-made
2) about ideas and worldviews underlying behaviour
3) about distinction between collective indetities
4) assumed as given to the individiual.

Since economics work from a model of reality in which behavioral patters are retraceable to individual, misalignment between cultural structures and economic theory occurs. Another problem that is closely related to this issue is the fact that most economic theory is based on the micro-economic behaviour of individual (Hodgson 2007a, 2007b) while culture operates at the collective level. The last issue we are going to discuss is of a different nature. Economists make an effort to establish universal laws and behaviour which is in contrast with cultural logics and perceptions of reality. For example, rationality can be uni-

versal but the results of the rational decision-making vary in different cultures, hence invalidating the universal model of economic decision-making. This tension between universalistic approach of economics and particularistic nature of culture comes from the phenomenon of a cultural bias. Beugelsdijk and Maseland (2011) argue that " the very distinction between the economic - referring to allegedly universal structures of behaviour modeled on West European and US self-images - and culture - referring to that which deviates from these structures - is already informed by ethnocentric bias" raises a methodological challenge. Every researcher has been trained in ways determined by her or his culture and so has to deal with this issue.

## 2.1 Methodological Challenges

**From micro-level to macro-level**

As we said, a methodological division between culture and economic theory lies in level disparity. Economic analysis starts out from individual level while culture operates at the collective level. There have been given three answers how to alleviate this misalignment. One way is to approach all behaviour as determined by structures. In other words, we bring economic theory to macro-level. The second approach sees culture as a result of actions by individuals, reducing all social phenomena to individual economic decisions. The third method deals with misalignment of culture and economics in a different way. It brings them together forming a single theoretical model. An example of such approach is the new institutional economics of Douglass North. However, this approach makes empirical work complicated. All suggested solutions have its pitfalls, and there is no clear winner. A detailed description of these issues can be found in Robinson (1950), Klein et al. 1994 and Manski (2000). Only approaches like Becker's "everything is economics" can avoid the discussion.

The second methodological issue is connected with the distinction between universality and that of particular. Beugelsdijk and Maseland (2011) provide a useful typology of studies of culture in economics adapted from Adler (1983). The typology is divided into two groups of studies. Idiographic research focuses on economic behaviour in its specific contexts while nomothetic research assumes that universal behaviour exists. Thus, the key distinction between those two is how they cope with their cultural perspective vis-a-vis other cultural perspectives. The idiographic research consists of parochial, ethnocentric and polycentric approaches. These approaches study cultures on a case-by-case basis, however, vary in their research focus. The nomothetic research is composed of comparative, geocentric and synergistic approaches. These methods assume universal behaviour but vary in the way how universality is achieved.

**Idiographic approaches**

The first category is parochial research which assumes that researcher, audience and research subject all come from the identical cultural background and so they are not aware of the implications of cultural difference. As a result,

even though a study is developed in one cultural context, it is thought to be applicable universally. Much of parochial approach can be found in economics that claims to deal with universal behaviour and mechanism although it has mainly been a product America and Europe.

Another line of studies is ethnocentric research. This approach, unlike parochial one, acknowledges different cultural structures and these structures are the object under study. However, insights from the perspective of home culture are applicable regardless of context. Thus, the difference with the parochial research lies in different cultures under consideration. Popkin (1979) is an example of a variant of ethnocentric approach that copes with the question of applicability of insights developed in culture A on culture B. He argues that Vietnamese peasants' behaviour is economically rational when choosing crops. Although it is not assumed that people automatically behave rationally, it is deemed that economic rationality is a yardstick for investigating other cultures - instead of asking "what is their behaviour like?" we pose the question:"Are they behaving like us?" Popkin's work can be thought of as questioning of applicability of rationality to developing countries. In this context, rationality is seen as the standard from which other cultures are assessed.

The last approach recognises that theories developed in one cultural setting have limited applicability. It focuses on establishing which elements of behaviour are culturally specific and describe it in terms of its own culture and at the same time developing a more general theory about the elements that exist in all cultures. Polycentric research assumes that behaviour is understandable only in terms of its own culture. In this way, one can avoid ethnocentrism because the applicability of insights is limited only within the context they have been developed.

Taking up such a position makes it impossible to describe anything that goes beyond the culture under consideration. Because each culture is unique, there are common structures or laws of behaviour based on which we can compare cultures. Not everybody adopts such extreme approach. The claim that there is no shared element of behaviour across cultures is not generally accepted. Hence, one can analyse cultural differences using other than idiographic research which depicts only the uniqueness of one case of culture. Such body of research is called nomothetic research which tries to establish general laws about behaviour.

**Nomothetic approaches**

The first approach in the row is comparative research. It assumes that universal dimensions of human behaviour exist and we can compare cultural differences using "scores." Nevertheless, such approach has to be careful not to fall into ethnocentrism. Let's say we are looking for differences between two cultures. We need to establish a common perspective based on which we can compare cultures under study in order to carry out a meaningful research. However, a sensible inquiry into cultural differences requires (a) a scale on which comparison can be made and (b) comparable units of culture.

To find suitable units of culture is not an easy task. Usually, when we com-

pare cultures, we compare states (Hofstede 1980, 2001; Iglehart 1997). However, a state has geographical boundaries and not necessarily cultural ones. To assume that one state equal one culture, that is the geographical boundaries of a state correspond to cultural boundaries of a community is a strong assumption. For example, one state can be predominantly Muslim in some areas while in other areas Christianity is the main religion. Even though using states as units has been criticised (McSweeney 2002a, 2002b) there is not consensus on which units would prevent potential problems.

Finding appropriate scales relevant for all culture under consideration is also a methodological challenge. Colonial heritage, language, religion or family structure have been used as categories for classifying and ranking cultures (Todd 1985; Stulz and Williamson 2003; Lane and Ersson 2005;). Using such variables may look plausible at first, but when we take a closer look, problems still appear. Frequently it is assumed that being a member of one religion group means being not a member of any other. While this is true for many faiths such as Christianity or Islam, it is not true for Buddhism or Taoism. Furthermore, most religions can be divided into various denominations. Even if research includes such denominations in their research, they are more aware of religion they grew up in. For example, Barro and McCleary (2003) include in their analysis Protestantism, Catholicism and Orthodox faith (specific traditions of Christianity), but Islam is only a single category. Moreover, members of the same denomination have very different opinions on topics outside of their religion (Iannaccone 1992a).

Next approach is geocentric research. In this research, insights are universally applicable, researcher and audience share the same culture so there are no cultural barriers, but the research subject is global - foreign direct investment, international trade or behaviour of multinationals. The crucial assumption is that culture is irrelevant in analysing these elements of behaviour of firms and individuals.

Lastly, synergistic approach differs in research question but keeps nomothetic approach toward culture. The question it attempts to answer is how individuals behave in interaction with other cultures while sharing assumption of universality with the comparative and geocentric research.

## 2.2 Research Methods

In the field of cultural economics, there are several research methods used. However, we limit our discussion to cross-cultural comparative experiments and cross-country regressions on quantified data about culture because this line of research is specific to cultural studies.

### Comparative experiments

The surge of experiments in economics in recent decades has been driven by a desire to create models based rather on actual patterns of behaviour and social practice of agents than stylised facts about behaviour of individuals (Bowles 2004). In recent years, experiments have been popular in demonstrating deviations from rationality assumption. Individuals behave more cooperatively and less opportunistically than it had been shown in mainstream theory. People with different cultural backgrounds participating in comparative experiments are usually asked to play a game. One example of a game is a so-called ultimatum game. The game includes two players and a sum of money. Player one gets to decide how much he or she wants to offer the other player. Player two can either accept the offered amount of money in which case both players get the agreed amount or reject in which case neither of player gets anything. Roth et al. (1991) find out that highly inequal proposals are rejected among developed countries contradicting homo oeconomicus. Henrich (2000) and Henrich et al. (2006) carry out a similar experiment with participants from both developing and developed societies and reveals that members of developing societies tend to accept lower sum of money than members of developed societies (and so behaving like homo oeconomicus).

Plentiful articles were published in recent years (Gachter et al. 2005; Gachter and Hermann 2009; Gintis 2008) along with overview books on differences in institutions, habits and economic behaviour using experimental methods (Ostrom 2005; Greif 2006). Samuelson (2005) summarises the main findings of ultimatum games. The results of such games differ significantly across societies and behavioural outcomes are related to the society in which experiments are carried out. Furthermore, intra-group differences such as age or gender show only marginal significance. Lastly, an evidence about preferences being shaped by culture and way of life is provided.

As with every method, comparative experiments have its drawbacks. Firstly, experiments operate on individual level while culture refers to collective structures. Thus, in order to generalise the results of experiments we need to assume that the behaviour found in the experiment is representative behaviour of the collective we aim to describe. In other words, comparative experiments have an issue with showing characteristics of the culture because their focus is on characteristics of individual behaviour.

Cultural bias also represents an obstacle. The assumption that the relation

between playing games and behaviour of individuals in everyday life is same in all societies is a source of ethnocentric bias. Such assumption is unrealistic since behaviour while playing games might be unacceptable in society A while it could be a part of daily life in society B. Hence, the results of games might not say much about willingness to cooperate or trust each other.

### Values surveys and dimensions of culture

Cross-cultural surveys are the most popular method when comparing cultures. The well-known sources of data are the datasets developed by Schwartz, Hofstede, the European Values Survey, World Values Survey and in recent years the Global Leadership and Organizational Behaviour Effectiveness (GLOBE) project. The surveys are conducted in a number of countries, asking a broad set of questions. The items are formed into dimensions on which different cultures can be ranked or scored. Surveys require a construction of scales because survey is a form of comparative research. There are two options; derive scales empirically or theoretically. We will talk about these methods as we introduce aforementioned surveys.

#### Hofstede's dimensions of culture

Geert Hofstede is well know for his ground-breaking book on cross-cultural differences, Culture's Consequences: International Differences in Work-Related Values. While working at IBM, Hofstede created a database of 116 000 morale surveys and interviewed 88 000 IBM employees living in 72 countries and regions. Based on data from IBM, Hofstede developed four cultural dimensions of culture:

1) **Power Distance** can be defined as the degree of inequality among people which the population of a country considers as normal: from relatively equal (that is, small power distance) to extremely unequal (large power distance).

2) **Uncertainty Avoidance** can be defined as the degree to which people in a country prefer structured over unstructured situations. Structured situations are those in which there are clear rules as to how one should behave. These rules can be written down, but they can also been unwritten and imposed by tradition.

3) **Individualism vs. Collectivism**, which is the degree to which people in a country prefer to act as individuals rather than as members of groups.

4) **Masculinity vs. Feminity** is the degree to which values like assertiveness, performance, success and competition, which in nearly all societies are associated with the role of men, prevail over values like the quality of life, maintaining warm personal relationships, service, care for the weak, and solidarity, which in nearly all societies are more associated with the role of women.

Each country is assigned a score on each dimension between 0 and 100 to show how interviewees feel about societal issues in question. Hofstede's work has received recognition but also a considerable amount of criticism. Concretely,

Schwartz pointed out several methodological issues such as lack of a theoretical framework and the need to use value measures that have the same meaning across cultures at the individual level (Schwartz 1994, 1999, 2004, 2006). Schwartz developed his own framework where he first theoretically derives a number of culture dimensions. He surveyed college students and school teachers from 67 countries between 1988 and 1998. He defined three following dimensions which are well described in Beugelsdijk and Maseland (2011):

1) **Embeddedness/Autonomy**: this dimension incorporates the desirable relationship between the individual and the group. Embeddedness refers to a cultural emphasis on the person as embedded in the group, while autonomy refers to a view on individuals as autonomous, independent persons. Schwartz distinguishes between two types of autonomy. Intellectual autonomy refers to the extent to which people are free to independently pursue their own ideas and intellectual directions. Affective autonomy does the same but then with respect to their affective desires.

2) **Hierarchy/Egalitarianism**: this dimension refers to the ideal way to elicit cooperative, productive activity in society. Hierarchy denotes the extent to which it is legitimate to distribute power, roles and resources unequally. Egalitarian commitment refers to the extent to which people are inclined to voluntarily put aside selfish interests to promote the welfare of others.

3) **Mastery/Harmony**: this dimension is supposed to reflect the relation of humankind to the natural and social world. Mastery expresses the importance of getting ahead by being self-assertive. Harmony denotes the importance of fitting harmoniously into the environment.

Competing project to Hofstede's and Schwartz's work is the international research GLOBE team. The goal of GLOBE project is to develop an empirically based theory to understand, interpret and predict the impact of specific cultural variables on leadership and organisational processes and the effectiveness of these processes (House et al. 2001, p. 492). GLOBE project includes nine dimensions of culture:

1) **Power Distance** : The degree to which members of a collective expect power to be distributed equally.

2) **Uncertainty Avoidance** : The extent to which a society, organization, or group relies on social norms, rules, and procedures to alleviate unpredictability of future events.

3) **Humane Orientation** : The degree to which a collective encourages and rewards individuals for being fair, altruistic, generous, caring, and kind to others.

4) **Collectivism I** : (Institutional) The degree to which organizational and societal institutional practices encourage and reward collective distribution o f resources and collective action.

5) **Collectivism II** : (In - Group) The degree to which individuals express pride, loyalty, and cohesiveness in their organizations or families.

6) **Assertiveness** : The degree to which individuals are assertive, confrontat ional, and aggressive in their relationships with others.

7) **Gender Egalitarianism** : The degree to which a collective minimizes gender inequality.

8) **Future Orientation** : The extent to which individuals engage in future - oriented behaviors such as delaying gratification, planning, and investing in the future.

9) **Performance Orientation** : The degree to which a collective encourages and rewards group members for performance improvement and excellence.

The methodology and nine dimension are described in detail in House et al. (2004).

The last survey we are going to discuss is World and European Values Survey. Both are a cross-national, large-scale, longitudinal surveys exploring human values. The popularity of these surveys stems from the fact that each country needs to have at least 1 000 respondents, who might be considered as a representative sample of the society, to be included in the project. EVS started in 1981 and initially covered 16 mainly Western European countries. Subsequent waves include additional countries from Central and Eastern Europe. In the 1990s, WVS emerged from EVS with the aim of better coverage non-Western countries and included the analysis of the development of a democratic political culture in emerging democracies. The database of both surveys includes several hundreds of questions on four topics: religion and morality, work and leisure, family, and broader societal issues. The studies which analyse the impact of trust on economic development (Zack and Knack 2001; Roth 2009; Horváth 2011) use the famous question on trust in WVS: "Generally speaking, do you think that most people can be trusted?"

Both theoretical or empirical value surveys are not free from criticism. One obvious problem is that values provide us with data on the micro-level, yet they are averaged to produce measures of national culture. Moreover, there is no consensus on a number of dimensions (MacIntosh 1998) because it is a subjective decision of researchers. Also, we have to ask ourselves what surveys actually measure. Do they really measure cultural values or they partly capture what respondents are currently preoccupied with (Clarke et al. 1999)?

There is also an ongoing debate about relation between values that are measured in surveys and economic outcomes. Hofstede assumes that values explain outcomes; they are stable and exogenous. However, recent findings in anthropology (Appadurai 1996) or economics (Bowles 1998, 2004) do not support values as an immutable variable. Lastly, Maseland and Hoorn (2009, 2010) argue that values measured in surveys are not independent of outcomes, claiming that rather than measuring underlying values, they measure marginal preferences.

# 3 Literature Review

Defining culture is an arduous task as it is a very wide and vague phenomenon. There are countless definitions of culture. A very basic way is to put it to the opposition of nature. For example, Ostwald (1907) defines culture as "that which distinguishes men from animals." Of course, such definition is not very useful, and not only for economists. Nunn (2012) defines culture as "decision-making heuristics or 'rules of thumb' that have evolved given our need to make decisions in complex and uncertain environments." He supports his definition with research done by Boyd and Richerson (1985, 2005) who use theoretical models to show that in case information acquisition is either imperfect or costly, the use of heuristics in decision-making process can arise optimally. Even though individuals may not behave in a way that is optimal in every moment, by relying on general beliefs or gut feelings, they save on the costs of acquiring the information that is necessary to behave always optimally (Nunn 2012). In other words, those beliefs and gut feelings yield fast and economical decision making that outweighs the costs of imprecision. Hofstede (1980) defines culture as: "the collective programming of the mind which distinguishes the members of one human group from another."

Some perceive culture as a primitive phenomenon embodied in preferences and values (Akerlof and Kranton 2000). Alesina and Giuliano (2015) point to a tension between empirical and theoretical definitions of culture. While empirical definition treats culture as "those customary beliefs and values that ethnic, religious, and social groups transmit fairly unchanged from generation to generation," theoretical definitions treat values and beliefs differently. Since we analyze cultural traits used in other studies, which use various definitions of culture, we do not adopt any specific definition.

Culture can influence economic development through several channels. One of them is formal institutions. Historical narratives of specific cases support the hypothesis that culture influences institutions. For example, Fisher (1989) documents how the four migration waves of the original settlers brought their cultural beliefs that caused significant differences in laws. Todd (1990) claims that underlying values that are ingrained in people from childhood through family systems determine the development of political systems.

Culture can also influence formal legal institutions. Lich et al. (2005) investigate whether laws on the books in various societies mirror the prevailing national culture. They show that national scores of cultural value dimensions correlate with indices of creditor rights and shareholder voting rights. In particular, a national culture that supports assertiveness in reconciling conflicting interests and that supports tolerance for the consequent uncertainty is correlated with using litigation to deal with economic conflicts. As a consequence, a national culture may delay reforms and put country on path dependence in corporate governance systems.

The last example is democracy. The first who attempted to relate culture to democracy were Almond and Verba (1963). They interviewed 1000 people in five countries (Great Britain, Mexico, Germany, Italy and the United States)

and based on that created a measure of political attitudes (cognitive, evaluative and affective orientations). The authors argue that political culture is essential to the operation of any political system.

To clearly define what can be marked as a part of culture in economics research and what is outside of this field is difficult. Some authors do not explicitly state that their work belongs to culture-economics literature. Nevertheless, they deal with structures of behaviour or discuss ideas that they perceive as given to a group's identity. Other authors use the term "culture" very loosely. For example, Ziegler (2007) investigates the international flower trade, evaluating the different cultural meanings of flowers and trade relations in the commodity chain. The author points out that "flowers serve no utilitarian purpose; rather, they signal consumers' social and cultural decisions about expressing love, mourning, status, and identity." Even though culture-economics research is diverse and ambiguous, Beugelsdijk and Maseland (2011) identify the main four areas of study: (1) International Business, (2) Comparative corporate governance, (3) Entrepreneurial culture and (4) Trust. We are not going to cover the first three areas since it is beyond the scope of this thesis. Instead we are going to focus on trust studies and extend it by other relevant literature.

**Trust**

The most investigated aspect of culture is the concept of social capital of which trust is deemed to be the most important dimension (Fukuyama 1995). Trust received a great deal of attention, pioneering study was done by Knack and Keefer (1997) where per capita growth is regressed on trust. Its importance is highlighted by many studies such as Guiso et al.'s (2006), Tabelllini's (2007) presidential lecture at the yearly meeting of the European Economic Association or by Dixit (2009). The popularization of trust (and culture) started off with Putnam et al.'s (1993) work on Italian regions in which they argue that the crucial factor in explaining effectiveness of regional governments and economic performance in Italy is due to regional differences in social structure. Putnam et al. (1993) compare horizontal and vertical social relationships and claim that horizontal relationships, based on trust and shared values, are associated with higher social capital, and the economy is more efficient. Putnam's study spurred a vivid discussion and triggered numerous studies trying to relate social capital with national economic performance. Before we go into reviewing the extensive literature, it is essential to be aware of the classification of trust. We need to distinguish between the sources of trust, the scope of trust and levels of trust. For the scope of trust, we need to ask: "whom do we believe?" Do we tend to believe the society in general, or just a few people within a small circle? With regard to the levels of trust, we are interested whether trust takes place among individuals or trust within society as a whole. Lastly, the sources of trust can stem from general norms of society or trust coming from bounded rational decision-making.

Trust is usually defined as a characteristic of interpersonal relationships or a property of individuals. One can think of trust as an expectation of one's

reliability with respect to their fairness, the predictability of behaviour and obligations in actions and negotiations while having a possibility to behave opportunistically (Zaheer at el. 1998). To relate culture (trust) to macroeconomic outcomes is a difficult task because we have a theory that operates on micro level, yet we need to carry out analysis on macro level (culture is a phenomenon at macro level).

The attraction of trust lies in its micro-foundations which fit the commonly used frameworks in economics. It requires a slight modification to include trust in most of the models. Moreover, due to trust having psychological aspects, it is a suitable object for behavioral economics (Fehr 2009). Lastly, the possibility to move up trust from micro to macro-level allows to develop hypotheses at the societal level. The credibility and strength of trust have been further reinforced by the fact that formed hypothesis coincides with real world observations of Putnam et al. (1993) and many others (Banfield 1958; Greif 2006).

Several direct channels through which trust might affect macro-economic benefits have been suggested. One argument concerns the reduction of transaction costs (Lane and Bachmann 1998; Nooteboom 2002). Firstly, it reduces transaction costs via the third party providing options for control in social networks. Secondly, trust is connected with the facilitation of highly uncertain transactions. It facilitates the exchange of resources and transformation that are essential for high performance, but are hard to value and transfer through market easier (Uzzi 1996). Thirdly, trust carries information function (Gulati 1998). For example, search cost can be reduced via social networks of trusting relationships between firms which can ally together (Gulati 1995). In this example, trust is a substitute for contractual safeguards.

The indirect channels include the improved government performance through which economic growth is boosted. Boix and Posner (1998) argue that social capital is conducive to effective governance via facilitating the articulation of citizens' demands. Furthermore, social capital creates costly mechanism of enforcements effectively securing compliance. Also, it reduces transaction costs in the sphere of citizen-government relations since social capital forms the expectations that citizens have about the behaviour of others. Finally, it increases the probability of the articulation of collective demands that improve the welfare for everyone. Boix and Posner conclude that social capital ultimately leads to lower probability of individuals behaving opportunistically and as a consequence, the resources can be invested elsewhere. Knack (2000) provides similar reasoning. In his opinion, social capital influences governmental performance in three ways. Firstly, it broadens government accountability; high level of trust and more civic-minded citizens improve governmental performance via increasing the level and improving character of political participation, mainly by enhancing public-interested behaviour and reducing rent-seeking activities. Secondly, it affects facilitation of agreement when political preferences are strongly polarized. Greater social capital means that not only people trust each other more, but it also entails better "public spiritedness" which can serve as glue in the time of conflict. Certainly when both parties have the public welfare at heart and trust each other, they are more willing to compromise. The last

point concerns innovation in policy making when society faces a new challenge. Putnam et al. (1993) observe that more civic parts of Italy were able to deal with newly formed problems better (i.e., family clinics). The reason for this may be connected with the resistance to policy changes. Countries with low social capital are plagued with distrust, low level of civic-mindedness and lack of abilities to lead a meaningful dialogue. Most of the economists, however, aim at approaching problem of trust more directly, in the form of growth regressions by building on the concept of morality (Tabelllini 2008). Here we encounter a methodological problem. Economists' arguments on why countries (societies) with higher level of trust are more successful rely on micro-level arguments derived from transaction cost theory and game theory (Glaeser et al. 2000), yet analysis frequently takes place at macro-level. The jump from micro to macro-level is not trivial. Moreover, it may be illegitimate because what may be true for individuals, may not be true for the society as a whole (Fine 2001). Table 1 lists most common arguments in studies aiming at directly linking trust to economic growth. To sum up, trust is deemed to increase the efficiency of investment, physical and human capital, promote innovation and reduce transaction costs and principal-agent problems.

Now, we turn our attention towards empirical findings. The vast majority of the studies use as a measure of trust a question from the World Values Survey: "Generally speaking, do you think that people can be trusted?"(Knack and Keefer 1997; Zak and Knack 2001). Respondents can either answer "most people can be trusted" or "can't be too careful." The result is then the percentage of respondents in the country that chose "most people can be trusted." Knack and Keefer's (1997) article is the most influential among of these macroeconomic studies. The authors attempt to assess the importance of social capital with respect to economic pay-off using a sample of 29 countries. They focus on trust because they believe it is the most important aspect of social capital. Their conclusion is that trust has a statistically significant effect of economic growth. The extension made by Zak and Knack (2001) analyzing trust-growth relationship using 41 countries come to the same conclusion - trust (measured using "generally speaking" question) has a positive and significant impact on economic growth.

Helliwell and Putnam (1995) analyzed regional growth differentials in Italian regions and found that social capital is positively related to growth. However, their index of social capital does not include generalized trust, but it includes civic community, institutional performance, and citizen satisfaction instead. On the other hand, Schneider et al. (2000) carries out an analysis of trust based on a sample of 58 European regions and finds a negative and significant relationship with growth. Casey (2004) reports that ranks of the trust scores from WVS of 11 British regions coincide with the ranking of regional economic development. A study done by Beugelsdijk and Van Schaik (2005a), in which they regress social capital on economic growth using a sample of 44 European regions, points to a positive and significant effect. However, once Beugelsdijk and Van Schaik (2005b) control for country-specific effects using more elaborate models and apply robustness analysis, significance of trust disappears. In a similar vein,

Table 1: Theoretical arguments linking trust to economic growth (adopted from Beugelsdijk and Maseland 2011)

| |
|---|
| 1.High levels of trust reduce transaction costs, especially the contract and control costs associated with economic transactions. |
| 2. High levels of trust make a society less dependent on formal institutions, as trust is an (imperfect) substitute for a legal system. Trust allows for low-cost enforcement of contracts. This is especially the case in principal–agent settings when a principal has to trust the agent to deliver goods or services, but cannot supervise the quality or effectiveness of their work (without incurring high costs). Trust is an efficient enforcement mechanism. At the aggregate level, trust is argued to reduce the levels of fraud and crime in a society. |
| 3. High levels of trust reduce the costs of defecting in prisoner dilemma situations. Bilateral and multilateral reputation mechanisms lead to potential punishment, such as loss of reputation and ostracism. |
| 4. High levels of trust and social capital enable actors to solve collective-action problems in an efficient way. Related to the transaction costs argument, the Coase theorem is put forward as part of the explanation. The Coase theorem holds that when transaction costs are low, actors will be able to negotiate solutions to collective-action problems more efficiently than could be achieved by outside regulation (Whiteley 2000; Coase 1990). |
| 5. High levels of trust trigger investment because trust is associated with long-time horizons beneficial for risky investments. According to some authors (e.g. Whiteley 2000), high levels of trust are associated with low levels of risk averseness, which will be beneficial for innovative investments. Empirical evidence for this argument is lacking, however. |
| 6. High levels of trust make investments in education more efficient because the returns on the accumulation of human capital are assumed to be higher (cf. Bjørnskov 2009). According to Whiteley (2000: 451), "educational investment may not work effectively in a low trust society if employment practices are strongly influenced by ascriptive criteria such as kinship and ethnicity." |

Akcomak and Ter Weel (2009) investigate an interplay between social capital, innovation and per capita income growth in 102 European regions between 1990 and 2002. They test the hypothesis that social capital indirectly affects per capita income growth through innovation. The results suggest that social capital fosters innovation which in turn positively influences growth. Furthermore, the estimates provide no evidence of direct effect of social capital on per capita income growth.

To summarize, the regional-level studies do not yield unambiguous positive and significant effects of trust on economic growth (Beugelsdijk and Maseland 2011). Beugelsdijk et al. (2004) set out to perform robustness analysis building upon dataset used in Knack and Keefer (1997) and Zak and Knack (2001). They found that trust in the sample of 29 original countries is significant only in 4.5% models. Interestingly, adding the 12 mostly less developed countries, increased the significance of trust and the effect size doubled. The results of this study imply that the sample structure drives the importance of trust. A subsequent study by Ahlerup et al. (2009) which takes into account endogeneity of trust and institutions, confirms the hypothesis that the marginal effect of trust on growth increases with lower quality of institutions. They interpret this finding as evidence that trust is non-linear. Horváth (2013) employs BMA together with 2SLS to assess whether trust is a salient determinant of growth. The results confirms the importance of trust for growth as well as the substitution effect between trust and institutions.

Research on trust (and social capital) is not free from criticism. Trust is related to institutions and this leads to an identification problem. Positive and significant correlation of 0.627 between generalized trust and trust in institutions is reported by Van Oorschot et al. (2006). Berggren and Jordahl (2006) find a positive correlation of 0.58 between aggregate trust and the Economic Freedom Index.

Common practice in case we deal with endogenous variables is the use of intrumental variables. An instrumental variable has to meet two criteria: (a) it must be correlated with endogenous variable and (b) it must be uncorrelated with the error term in the second stage equation. Point (a) can be easily verified, (b) is causing much trouble. Typical instrumental variables that have been used are Tabellini's (2008) literacy rates and historical political institutions, Knack and Keefer's (1997) ethinc/linguistic homogeneity or common religion used by Guiso et al. (2009). These variables have one common feature: there are also plausible arguments claiming that these variables violate the point (b), in other words: "they are not exogenous to the error term beyond doubt" (Fehr 2009). Some studies take sub-national route. By analyzing the impact of trust at lower level, country-specific institutions are controlled for. Additionally, regions are relatively homogenous compared to country studies that include countries with diverse cultures like Germany and Japan in the same regression. This is relevant because countries may differ in terms of relevant proxies for culture (social capital). Lastly, usually country itself is diverse thus, we are losing country specific features.

As we already said, regional studies frequently find trust to be negative or

insignificant, and significance of trust in country-level regressions depends on the underlying sample, specifically on the inclusion of least developed economies. Therefore, we need to ask what trust, as it has been used in the literature, reflects. It can simply be a proxy for institutional quality. Nevertheless, we can be sure that an identification problem exists.

Validity is another methodological problem that plagues trust research. Uslaner (2002) argues that the ordering of responses influences how respondents answer the question about trust. Furthermore, the real meaning of the answers has been questioned (Moore 1999). Putnam (2000) claims that the meanings of the responses are unclear. He argues that people reporting "most people can be trusted" can mean any of three things: " 1) other people's behaviour has not really changed, but we have become more paranoid; 2) the respondents are actually reporting that honesty is rare these days; or 3) neither our ethical demands nor other people's behaviour have actually changed, but now we have more information about their treachery, perhaps because of more lurid media reports." Aditionally, there is a debate over what is meant by "most people" (Delhey and Newton 2005). Miller and Mitamura (2003) elaborate on the validity of WVS trust question. Essentially, they claim that the question does not constitute one scale. It is composed of two discrete items, trust and caution, instead of more ideal trust and distrust. The issue is that trust and caution are not opposite to each other. The authors carry out an experiment consisting of Japanese and American students showing that when caution is not included and trust is measured on a seperate scale, the US students are more trusting than Japanese students. By contrast, in WVS from 1997 Japan has higher levels of trust (43%) than America (36%). Miller and Mitamura's (2003) findings suggests that "generally speaking" question lacks internal validity and is biased.

Next issue we are going to discuss is level problems. The problem lies in the fact that micro-level insights regarding transaction costs are used as arguments in trust-growth studies. Empirical studies use a different measure of trust. As we already mentioned, at the macro-level trust is measured using WVS question. On the other hand, micro-level trust has been measured in several ways. Frequently it is operationalized through a multi-item scale composed of questions that respondents are asked when discussing specific partners or individuals (Gamesam 1994; Brock Smith and Barclay 1997). Beugelsdijk (2006) compares micro and macro measures of trust and concludes that firm-level trust is not trust of the macroeconomic literature. Because we have a trusting relationship does not mean that the reduction of transaction costs can be simply transformed into the statement that high interpersonal trust reduced transaction costs in an economy, which in turn positively affects GDP (Fine 2001).

Lastly, Kirkman et al. (2009) argue that cultural variables may have much stronger effects under certain conditions. We could improve our understanding by establishing the boundary conditions for cultural value effects. This would improve the understanding and interpreting study findings and help to determine the conditions under which cultural values are likely to have more meaningful influences on organizationally relevant outcomes (Taras et al. 2010).

The importance of trust in current literature cannot be stressed enough. We

devote a considerable amount of attention to trust-growth studies because many methodological pitfalls apply to other cultural traits we are about to discuss. For the sake of brevity, we are going to review only the cultural traits that have received a lot of attention in economics and are highly relevant for our topic.

**Individualism versus Collectivism**

Cross-cultural psychologists consider individualism vs. collectivism the main dimension of cultural variation (Heine 2008). Several contributions (Greif 1996, 2006; Gorodnichenko and Roland 2013) find considerable support for this domain. Individualism highlights the importance of personal freedom, self-realization and achievements. Therefore, culture of individualism awards social status to personal accomplishments such as scientific discoveries. It also brings disadvantages. More individualistic societies make collective actions harder to realize since everybody pursue his/her interests without internalizing collective interests. Collectivistic societies on the other hand, perform collective action easier because members of society are able to internalize group interests better, but by encouraging conformity, they discourage innovation. Gorodnichenko and Roland (2013) construct an endogenous growth model which uses Hofstede's individualism as the main cultural variable. They use genetic distance as an instrumental variable to deal with endogeneity and find a robust causal effect of individualism on innovation, income per worker and total factor productivity.

Pronoun drop has been used as an instrument for Hofstede's individualism by Gorodnichenko and Roland (2013). The relationship between culture and language has been an important issue for anthropology and psychology since Sapir-Whorf hypothesis which postulates that language determinates, or at least influences, the way perceive our world (Sapir 1970; Whorf 1956). There is abundant literature arguing that cognitive processes affect our language use, but language also determines our higher order cognitive processes, for example, value judgments or social inferences, by virtue of its inherent involvement in the process of obtaining cultural practices (Kashima and Kashima 1998). They link the obligation of pronoun use in language to the degree of psychological differentiation between the speaker and the social context of speech. For instance, languages like English have to use subject pronouns ("I", "you") even though the referent is unambiguous. This signals that the referent is highlighted as a figure against the context. On the other hand, languages such as Japanese or Korean license to drop pronouns and so the conceptual differentiation between person and context is reduced. Therefore, the speaker "blends in" the context (is being contextualized) when he or she drops pronoun and his or her uniqueness decreases. To clarify, "contextualization" is meant in a narrow sense - the self is not the focus of conceptual attention. Kashima and Kashima (1998) evaluated pronoun use in 39 languages in 71 countries. The authors coded whether or not grammatical rules allowed for pronoun drop and it turned out that Hofstede's individualism is negatively correlated, and Schwartz's autonomy is positively correlated with their constructed variable. Thus, countries that score low on Hofstede's individualism are expected to have a licensed pronoun drop. There-

fore, the pronoun drop variable makes a good candidate for an instrumental variable in cultural studies. It is sufficiently relevant for culture and at the same time it is likely to satisfy the exclusion restriction.

Interestingly, individualism-collectivism dimension has received the most attention from cross-cultural organizational behaviour and psychology literature (Taras et al. 2010). The research concluded that there has been an overreliance on this dimension compared to Hofstede's other cultural dimensions. Individualism domain has also been widely criticized for its fuzzy definition (Earley and Gibson 1998).

**Family Ties**

Banfield (1985) and Coleman (1990) analyze different cultural traits related to family values. Both observe that societies that have strong ties between family members tend to promote codes of good conduct within a small circle of related individuals. In such societies, selfish behaviour is deemed to be acceptable outside of the small network. On the other hand, societies that family ties are less important promote codes of good conduct outside the family and therefore, such society is more able to identify itself with a society of abstract individuals.

A great deal of attention to family ties has been devoted by Alesina and Giuliano (2010; 2011; 2013). They measure family ties using three WVS questions (see data section for details). In their analyses, a variety of outcomes are investigated such as political participation, labor-force participation of women, young adults and the elderly, measures of generalized trust, geographical mobility, and household production. Essential findings are that societies based on strong family ties have lower levels of generalized trust and lower civic sense. Moreover, home production, prevalently done by women, youngsters and elderly, tend to be higher according to the "male breadwinner hypothesis." Besides the three question used by Alesina and Giuliano, objective measures such as frequency of contact among family members or how close/far away children live to their parents can be used. For example, in southern Europe, approximately 70% of children live less than 5 kilometers from their parents' house, while in Denmark the number is much lower - 30% (Alesina et al. 2015).

Bertrand and Schoar (2006) show that in countries where family ties are strong, family capitalism is more frequent. They show that this industrial structure is not optimal; nepotism in hiring decreases the average quality of the firm. Moreover, managers, who are family members, tend to be more risk-averse. Lastly, family firms tend to stay smaller.

Forms of family structures influence the resistance to or diffusion of social changes in Europe such as secularism, Protestantism and the acceptance and diffusion of communism (Tod 1985, 1990). The author describes family types along two dimensions: horizontal and vertical. The horizontal relationship (among siblings) is either egalitarian, or non-egalitarian. That is siblings receive an equal share of family wealth after their parents die, or one of the siblings is favoured and receives all the family's wealth. The vertical relationship (between parents and children) is either liberal or authoritarian. That is

children gain independence at an early age and move out as soon as they get married, or continue staying at home even after marrying.

When we combine Todd's dimensions we obtain 4 possible types of family organization: 1) the stem family (authoritarian + non-egalitarian), 2) the communitarian family (authoritarian + egalitarian), 3) the absolute nuclear family (liberal + non-egalitarian), 4) the egalitarian nuclear family (liberal + egalitarian).

An application of Todd's classification of families in Duranton et al. (2009) explains regional disparities across Europe in educational attainment, social capital, household sizes, labour participation, sectoral structure, inequality, and wealth. Galasso and Profeta (2012) using Todd's classification show that family structures are essential for explaining different types of pension systems. Moreover, they show that Todd's definition of nuclear and extended family is correlated with the family ties measured using 3 WVS questions in Alesina and Giulano (2010).

**Generalized Morality**

Tabellini (2008, 2010) explores generalized versus limited morality in relation to economic development. In hierarchical societies, codes of good conduct and sincere behaviour are frequently confined to members of the family or to the clan. Outside of this small circle, behaviour is characterized by opportunism and selfishness is regarded as natural and morally acceptable. Generalized morality, on the contrary, is characterized by cooperative behaviour towards everyone in society. This idea originally comes from Platteau (2000). In modern democratic societies, the rules of good conduct apply to many social situations. Tabellini combines question from WVS and by using principal component analysis, he creates generalized morality variable (more details are provided in the next section). This variable is included in growth regression of European regions and instrumented by the literacy rate at the end of the XIXth century, and the historical political institutions to isolate exogenous variation. The results support the view that generalized morality plays a role in economic development.

**Attitudes Towards Work and the perception of poverty**

The famous work of Max Weber, Protestant Ethic and the Spirit of Capitalism, relies on this trait. According to Weber, the Protestant revolution supported a different attitude toward hard work, accumulation of wealth and success in the current life compared to Catholic doctrine which was predominant in Europe. Recently, research has stressed different views regarding the role of hard work. For some people, hard work is a gate to success and a better life, a possibility for many, leading to higher social mobility. Others believe that to succeed in life, one needs luck and personal connections. Alesina and Glaeser (2004) argue that these view deeply rooted and change very slowly. Several contributions have shown that beliefs about the income-generating process might be fundamental in determining structure of economic organization (Benabou and Ok, 2001; Benabou and Tirole 2006; Di Tella et al. 2007).

Related to views about hard work are perceptions about poverty. A question from WVS asks whether respondents believe that the poor could become rich if they made enough effort. We can interpret this statement as a moral judgment about the poor - are they lazy or do they have bad luck? Alesina and Glaeser (2004) explore the difference between Europeans and Americans regarding attitudes toward the poor. They point to differences in generosity of the respective welfare states. Moreover, they highlight an interesting observation - the poor are viewed with less sympathy when they belong to a linguistic or religious minority.

**Views on the appropriate role of women in society**

Alesina et al. (2013) examine the historical origins of current differences in views regarding the appropriate role of women in society. They set out to test the hypothesis whether technology, namely the use of plough in agriculture during pre-industrial time, influenced the historical gender division of labour and subsequently the evolution of gender norms. They find that societies that used plough in the past today have more unequal gender norms measured using two questions from WVS (see data section), female labour participation, participation in politics and entrepreneurship. Their results are consistent across country-level, district level, and ethnicity-level. Another interesting example of how differences in technology can influence norms has been shown by Fernandez-Villaverde et al. (2013). They build a model where altruistic parents exercise a direct socializing effort on their daughters. This comes at a cost that rationalizes how technological advancement in contraception leads to a greater occurrence of premarital sex and to a shift in sexual mores.

# 4 Data

Our dataset includes: (i) average of log GDP per worker between 1996 and 2000; (ii) cultural variables (4) (variables of interest); (iii) instrumental variables (5); (iv) control variables.

Countries (46) in the sample include: Albania, Argentina, Armenia, Australia, Azerbaijan, Bangladesh, Belarus, Bulgaria, Colombia, Croatia, Czech Republic, Dominican Republic, El Salvador, Estonia, Finland, Georgia, Germany, Hungary, Chile, China, India, Japan, Latvia, Lithuania, Macedonia, Mexico, New Zealand, Nigeria, Norway, Peru, Philippines, Poland, Romania, Russia, Slovakia, Slovenia, South Africa, South Korea, Spain, Sweden, Switzerland, Turkey, Ukraine, the United States, Uruguay and Venezuela.

## 4.1 Variables of Interest

We analyze four cultural variables from World Values Survey.

We measure the relevance of family ties in society using three questions, following Alesina and Giuliano (2010). The first question asks a respondent how important family is in his/her life. The second and the third question let respondent choose between two statements: "Regardless of what the qualities and faults of one's parents are, one must always love and respect them" versus "One does not have the duty to respect and love parents who have not earned it by their behavior and attitudes," and "Parents' duty is to do their best for their children even at the expense of their own well-being" versus "Parents have a life of their own and should not be asked to sacrifice their own well-being for the sake of their children". We take the sum of all of them. Given the way the variables are coded, higher value corresponds to stronger family ties.

Another cultural value that we include in our analysis is concerned with views regarding the role of women in society. Based on Alesina et al. (2013) we select two questions (statements) from WVS: "When jobs are scarce, men should have more right to a job than women" (agree or disagree), and "On the whole, men make better political leaders than women do" (strongly agree, agree, disagree, strongly disagree). Similarly to family ties, we sum up both questions. Higher number corresponds to a greater degree of discrimination of women.

The third variable of interest is generalized morality. We follow Tabellini (2010) and take four questions from WVS as a proxy for generalized morality. They are: trust, tolerance and respect for other people, obedience, and feeling of control over own life. Trust is measured asking the following question: "Generally speaking, would you say that most people can be trusted or that you can't be too careful in dealing with people?". For tolerance and respect, and obedience respondents are asked to choose five qualities that deem to be important for children to learn at home from a list containing eleven options. The last variable, control over own life, is measured asking: "Some people feel they have completely free choice and control over their lives, while other people feel that what we do has no real effect on 10 what happens to them. Please use this scale (from 1 to 10) where 1 means "none at all" and 10 means "a great deal"

to indicate how much freedom of choice and control in life you have over the way your life turns out". We use the following formula to aggregate the questions into one variable: $gm = trust + control + tolerance \,\&\, respect - obedience$. Higher value implies greater level of generalized morality.

The last variable taken from WVS is related to the perception of whether hard work pays off or not. Specifically, respondents are asked to choose between two statements on a scale from 1 to 10: "In the long run, hard work usually brings a better life" versus "Hard work does not generally brings success - it is more a matter of luck and connections." Higher value corresponds to more hard working society.

## 4.2 Instrumental Variables

**Genetic Distance**

Genetic distance received a great deal of attention in economics. Guiso et al. (2009) see it as a proxy for both genetic and cultural dissimilarity which is an origin of a potential bias altering people's propensity to trust each other and engage in trade. A different view holds Spolaore and Wacziarg (2009). They argue that genetic distance can be seen as a barrier to the diffusion of technologies because people that are more distant from each other tend to communicate less and thus benefit less from technological innovation. Bisin and Verdier (2000, 2001), among others, argue that the major determinant of the individual' cultural values is the parental transmission of culture. It is clear that parents pass on their cultural values and their genes to their children. Populations that interbreed frequently ought to be genetically close as well as culturally close due to a very similar parental transmission mechanism. These facts constitute grounds for usage of genetic distance as a proxy measure of differences in parental transmission of cultural values. As far as we know, there are no proofs of genetic distance causing some countries to become wealthier than others. Therefore, it is likely to satisfy the exclusion restriction.

One way genetic distance is measured was developed by Cavalli Sfroza et al. (1994). It is based on DNA polymorphism (an occurrence in which a gene or a DNA sequence exists in two or more different forms [alleles]). Division of blood groups into A, B and O is an example of polymorphism. While all populations have A, B, O alleles, frequency of these forms substantially differ across populations. For instance, the O allele is present in 98% of American Natives populations, but only 61% of African populations. Other genes have similar frequency variations as ABO alleles do. Cavalli-Sforza et al. (1994) derive a measure of the differences in the genetic composition of two populations by summing the differences in frequencies of these polymorphisms which serves as a first approximation.

We use data from Gorodnichenko and Roland (2013) who use only neutral genetic markers which do not have any direct effect on genetic fitness as an instrumental variable for culture. Using ethnic shares of Fearon (2003) and their data, the authors aggregate genetic data from more than 2 000 groups of population and construct country-level data. The benchmark country is the

USA which is the most individualistic country in their sample. Also, Spolaore and Wacziarg (2009) construct genetic distance data including a broader set of genes, but the number of groups is only 42.

**Index of Historical Prevalence of Infectious Diseases**

Historical prevalence of infectious diseases is our another instrumental variable. Some evidence points to regional variation in infectious diseases as an important factor in explaining the origin of various kinds of cross-cultural differences. For example, diseases correlate with differences in mating structures (Low 1990) and parenting practices (Quinlan 2007). Finchers et al. (2008) claim that higher pathogen prevalence forced communities to adopt more collectivist values highlighting tradition, putting stronger limits on individual behaviour and exhibiting less openness towards foreigners.

To allow for testing such hypothesis at country-level, Murray and Schaller (2010) develop an index of historical prevalence of infectious diseases within 230 geopolitical regions. The index includes 9 diseases: trypanosomes, leishmanias, schistosomes, leprosy, malaria, typhus, filariae, tuberculosis and dengue. The authors used epidemiological atlases to estimate the prevalence of each disease in each region.

**Historical Plough Use**

Ester Boserup (1970) develops the hypothesis that differences in gender roles can be explained by looking at a form of agriculture traditionally practiced before industrialization took place. The author determines important differences between plough cultivation and shifting cultivation. The latter is labour intensive and requires a use of handheld tools like the digging stick or the hoe. On the contrary, plough cultivation is capital intensive and requires much of upper body strength, grip strength, and bursts of power to effectively pull the plough or control the animal that pulls it. Therefore, plough culture puts men in an advantageous position in farming relative to women. Since soil preparation is of high importance in agriculture (accounts for one-third of the total time), societies practicing plough agriculture established a specialization of production along gender lines. As one would expect, men worked outside the home while women did tasks around the house. Such division of labour subsequently created norms about the appropriate role of women in society. Societies that traditionally used plough agriculture developed the belief that the natural role for women is at home. These beliefs persist for a long time, even after the economy moves out of agriculture, affecting the participation of women in activities performed outside the home. Alesina et al. (2013) test this hypothesis using pre-industrial ethnographic data, contemporary measures of individuals' beliefs about gender roles, and measures of female participation in activities outside the home at country, ethnic and individual level. Controlling for various factors, the authors find strong support for Boserup's hypothesis.

**Legal Origin**

The idea that legal origin could serve as an instrumental variable for institutions belongs to La Porta et al. (1998). If we simplify the concept enough, we can say that there are two legal origin traditions - one is common law, which originated in England, and the second is civil law upon which French, German and Scandinavian legal systems are based. The French civil code of 1804 is meant to be accessible to the general population and was formed by legal scholars. Napoleon saw the importance of exporting French civil law to other countries and made it one of his priorities. Consequently, civil law made an impact in numerous countries including Italy, Poland, Northern and Sub-Saharan Africa or Indochina. Additionally, French legal tradition had a major influence on Spanish and Portuguese legal systems, which contributed to proliferation of French law to Central and South America. German civil code appeared at the and of the 19th century and spread its influence to Switzerland, Austria, China, Yugoslavia, Greece, Czechoslovakia, and Hungary. Since England, Germany and France spread its legal systems primarily through conquest and imperialism, historical legal origins are deemed to be to a large extent exogenous.

**Instrument for Trade**

Frankel and Romer (1999) constructed predicted trade/GDP shares on the basis of gravity equation. The authors first regress bilateral trade flows on distance between the trade partners, country mass and several other geographical variables, and then computing a predicted aggregate trade share for every country based on the estimated coefficients. The obtained predicted trade share is then used as an instrumental variable for actual trade shares in growth regression.

## 4.3 Control Variables

**Geography**

Geography received a great deal of attention in economics and is deemed to be one of major driving factors behind economic development. There are numerous studies aiming at linking geographic characteristics to economic development such as the climate (Kamarck 1976, Masters and McMillan 2001), terrain ruggedness (Nunn and Puga 2009), natural openness (Rappaport and Sachs 2003), and resource endowment (Sachs and Warner 2001). Geography also influences human actions in the past as well as today. Even seemingly negligible geographic differences may have a large impact on economic development. For instance, the varying conditions in soil and climate made plantation agriculture and its dependence on slavery more or less lucrative in different parts of the United States (Engerman and Sokoloff 2002). Gallup et al. (1998) call for a re-introduction of geography into the econometrics and theoretical studies of cross-country economic growth. The authors provide several geographical variables they deem to be important for economic development: (i) Tropical climate - hinders growth probably due to higher disease burden and limitations

on agricultural activity. (ii) Coastal regions have a big advantage over hinterlands. (iii) Landlocked countries seem to be particularly disadvantaged, mainly because cross-border of labor is more difficult than internal migration; infrastructure development across national borders is much more difficult to arrange than similar investments within a country, and coastal countries may have military or economic incentives to impose costs on interior landlocked countries. (iv) High population density seems to be conducive for growth in coastal areas that have good access to internal, regional and international trade. (v) population growth across economies in the recent past is strongly and negatively correlated with their relative potential for economic growth.

Hence, we include several geographical variables in our analysis. One of them is taken from Masters and McMillan (2001) who construct a variable that attempts to measure the prevalence of seasonal frosts, hypothesizing that absence of winter frost plays an important role in explaining economic growth. They argue that ground frost has two positive effects. Firstly, it influences human health via selectively killing exposed organisms that help people control the transmission of disease. This leads to a reduction of morbidity and mortality rates, and uncertainty, consequently promoting the accumulation of human capital. Secondly, ground frost mitigates proliferation of plant and animal diseases, and facilitating the accumulation of deeper and richer topsoils by controlling the organisms that mineralize soil organic matter. One of the undeniable positives of ground frosts is its unambitious exogeneity, unlike other indicators of biological activity such as soils or vegetation which are heavily influenced human investment even in the prehistoric times. Their cross-country growth regressions confirm their hypothesis, and they select a threshold for ground frost of five days per month in winter.

Terrain ruggedness is another important factor. Nunn and Puga (2009) construct a measure of terrain ruggedness and include it in cross-country regressions. There are two channels through which it influences economic development. The negative effects of rugged terrain on economic outcomes are well established. Cultivation becomes difficult, steep slopes create erosion, and the control of water is much more complicated. The Food and Agriculture Organization (1993) reports that for slopes greater than 2 degrees, the benefits of cultivation usually do not cover necessary costs, and for slopes greater than 6 degrees, cultivation is not feasible. Moreover, since earthwork costs are higher, building costs are much greater when terrain is uneven (Rapaport and Snickars 1999; Nogales et al. 2002). Another drawback of uneven terrain is slow and expensive transportation. An interesting study by Allen, et al. (2005) highlights these effects of uneven terrain in Papua New Guinea. They document that steep terrain renders the production of cash crops very demanding and it also makes it much more expensive or sometimes impossible to transport the crops to the markets. As a consequence, inhabitants living in these parts have poorer health and lower income. On the other hand, Nunn and Puga (2009) argue that terrain ruggedness had positive effects during the slave trades. Populations were able to hide in caves or watch the lowlands and incoming paths in order to protect themselves against raids and kidnapping which were the most common methods

of enslavement. The authors find a support for both channels.

**Other Control Variables**

Besides the variables mentioned above, we include several more regressors in our analysis. The importance of institutions is well established (North 1990; Knack and Keefer 1995; Hall and Jones 1999; Acemoglu et al. 2001; Rodrik et al. 2004). Institutions are regarded as a fundamental cause of economic growth and are commonly defined as "rules of the game in society" or more formally as "the humanly devides constraints that shape human interaction" (North 1990). We use World Governance Indicators as a proxy for institutions. Because we have six indicators of institutional quality and only one instrument, we use principal component analysis and extract the first component and use it in the regression equation. Trade represents another important driver of economic development (see, for example, Sachs and Warner 1995). We include trade as a share of GDP in our analysis. The rest of the control variables are: absolute latitude and longitude, jurisdictional hierarchy beyond local community, tropical climate, economic complexity, average temperature, average precipitation, communism dummy, distance from the UK, landlock dummy, hemisphere dummies, island dummy, length of coastline, proportion of population within 100km of the coastline, presence of large domesticated animals, soil depth, practice of intensive agriculture, patrilocal society, extended family. Details including sources can be found in the appendix.

# 5 Bayesian Model Averaging

BMA has experienced an increase of popularity in economics literature over the last two decades thanks to the computational advances. BMA is commonly used to deal transparently and rigorously with the problem of model uncertainty. In the field of growth economics which has developed many competing theories over years, model averaging can be of a tremendous help.

Fernández et al. (2001) contributed to popularization of BMA in economics. The authors use BMA on a dataset containing forty one regressors which yield over two trillion possible models ($2^{41}$).

Bayesian econometrics is built on a few rules of probability. Assume we have two random variables, X and Y. From equating $p(X,Y) = p(X|Y)\,p(Y)$ and $p(Y,X) = p(Y|X)\,p(X)$ we acquire Bayes' rule that lies at the core of Bayesian econometrics:

$$p(Y|X) = \frac{p(X|Y)\,p(Y)}{p(X)} \tag{1}$$

Let $M_l$ denote l different models. Every model depends on a vector of parameters $\theta_l$. Using Bayes' rule we have:

$$p(\theta_l|y, M_l) = \frac{p(y|\theta_l, M_r)\,p(\theta_l|M_l)}{p(y|M_l)} \tag{2}$$

where $p(y|\theta_l, M_l)$ is the likelihood function, $p(\theta_l|M_l)$ is the prior density and $p(\theta_l|y, M_l)$ is referred to as the posterior density. The prior, $p(\theta_l|M_l)$, is not dependent on the data. It summarizes what the researcher knows about $\theta$ prior to seeing the data. In growth econometrics, there are not any beliefs or information which are common or shared among researchers, thus noninformative priors are used in most cases. Common practice is to assign the prior a low importance, so it plays little role in posterior formula.

The likelihood function, $p(y|\theta_l, M_l)$, is the density of the data, it is called "the data generating process."

The posterior, $p(\theta_l|y, M_l)$, is of fundamental interest. It says how much we know about $\theta_l$, given the data.

Similarly, for $X = y$ and $Y = M_l$ we obtain:

$$p(M_l|y) = \frac{p(y|M_l)\,p(M_l)}{p(y)} \tag{3}$$

where $p(M_l|y)$ is referred to as posterior model probability. It allows for

ranking of models and model comparison.

Now lets us consider a dataset with a dependent variable $Y$ with n observations and a set of k regressors $X_1.....X_k$. We would like to identify which regressors are robust determinants of our dependent variable. In frequentist econometrics, a common approach is to specify a set of the core regressors (core model) and then to assess robustness by adding additional regressors. However, the procedure is non-transparent and faces problems from a decision-theoretic perspective. When using BMA, number of explanatory variables is limited only by number of observations. Therefore, by using BMA we can include many more regressors, reduce model uncertainty and omitted variable bias.

Assume that the we are interested in the effect of, for example, trade on economic growth. To assess its robustness when theory or empirical research suggests that there are many potential determinants of economic growth and, therefore, numerous models ( for $k$ regressors we have $2^k = l$ different models) may be problematic with frequentist methods. But within BMA framework, it is a straightforward task. Let $\omega$ be a vector of parameters which has a common interpretation across all models. In our case, we are interested in trade coefficient so $\omega$ is that coefficient in every regression. What Bayesian econometrics says is that all we know about $\omega$ is included in its posterior $p(\omega|y)$. By rules of probability:

$$p(\omega|y) = \sum_{l=1}^{L} p(\omega|y, M_l)\, p(M_l|y) \tag{4}$$

The above formula says that to obtain information about $\omega$, we estimate every model ($p(\omega|y, M_l)$) and average them where weights are the posterior model probabilities $p(M_l|y)$. This way, one can obtain the posterior inclusion probability which tells us what is the probability that a given regressor belongs to the "true" model. In (4), $M_1$, . . . , $M_l$ are different models under consideration. The posterior probability for model $M_l$ is given by:

$$p(M_l|y) = \frac{p(y|M_l)\, p(M_l)}{\sum_{l=1}^{L} p(y|M_l)\, p(M_l)} \tag{5}$$

where

$$p(y|M_l) = \int p(y|\theta_l M_l)\, p(\theta_l|M_l) d\theta_l \tag{6}$$

is the integrated likelihood of model $M_l$, $\theta_l$is the vector of parameters of model $M_l$, $p(\theta_l|M_l)$ is the prior density of $\theta_l$ under model $M_l$, $p(y|\theta_l, M_l)$ is

the likelihood, and $p(M_l)$ is the prior probability that $M_l$ is the true model, assuming that one of the model under consideration is true.

Since our econometric specification (see the next section) includes many endogenous variables, we need to use instrumental variable procedure. We use Instrumental Variable Bayesian Model Averaging technique developed by Karl and Lenkoski (2012). Koop et al. (2012) and Eicher et al. (2012) also developed a framework that is able to deal with endogeneity within BMA framework. However, Karl and Lenkoski's (2012) framework is straightfroward to implement and has limited issues regarding mixing compared to other methods. Unfortunately, only UIP parameter prior with uniform model prior is available.

# 6 Econometric specification and results

Our goal is to assess the impact of the selected cultural traits on economic growth. While there is no doubt that there exists a relationship between culture and growth, we want to show that this relationship is a causal one. Robert Inglehart in his book "Modernization and Postmodernization" makes a proposition that eventually all societies wil converge in their development to the point of diminshing returns, which forms the motivation toward other goals such as friendship or the importance of self-expression. That is members of society become wealthy and educated enough to move their attention to other aspects of human life. To rule out the possibility that economic development determines culture, we employ instrumental variable procedure. Thus, our model looks like:

$$Y = \alpha + \beta W + \varphi X + + \epsilon$$

$$W = \delta + \theta Z + \eta$$

where Y is logarithm of GDP per worker between 1996 and 2000, X is a set of exogenous variables, W is a set of endogenous variables (trade, family ties, generalized morality, views about the role of women), Z is a set of instruments (predicted trade shares, historical pathogen prevalence, genetic distance, plough use), and $\epsilon$, $\eta$ are an error terms. We focus on levels of income instead of growth rates asthis approach has been widely criticized (Easterly et al. 1993; Hall and Jones 1999).

As we said earlier, we instrument trade, which is measured as a sum of exports plus imports divided by GDP, with predicted trade shares using gravity equation as it is described in Frankel and Romer (1999). Institutions are instrumented with legal origin, which is a dummy variable taking value one if country has common law system, and 0 for civil law system. Legal origin is argued to be a large extent exogenous to growth because it was imposed on countries by imperialism and conquest.

Next, we instrument generalized morality with genetic distance. We interpret genetic distance as a proxy for cultural (transmission of cultural values from parents to children) and genetic dissimilarity. Therefore, societies that

are genetically distant tend to trust each other less, and cooperative behaviour, which is charateristic for generalized morality, breaks down.

Another endogenous variable is family ties which is instrumented with the index of historical prevalence of infectious diseases. Even though cross-country differences in family ties have most likely long historical roots, we formally address potential issue of causality. Higher pathogen prevalence pushes societies to be less open, put stronger limits on individual behaviour and to embrace tradition. Thus, we expect higher pathogen prevalence to be postively related to family ties.

Finally, views about the appropriate role of women in the society is instrumented with historical plough use. Alesina et al. (2013) test hypothesis that differences in gender roles can be explained by looking at a form of agriculture traditionally practiced before industrialization took place. They find considerable support for the hypothesis using several measures of women participation in society including two questions from WVS, which we use in our analysis.

Table 2. presents the results of the second-stage regression. Tables 3. and 4. show the results of first-stage regressions. Variables are ordered according to its type: the first are endogenous and then exogenous variables. In the first column is PIP (posterior inclusion probability), in the second column is posterior mean. Family ties variable scores the highest among the cultural variables - its PIP is 0.66, and its mean is positive. Given the way the variable is coded, higher number implies stronger family ties. Thus, this finding suggests that countries with stronger family ties enjoy greater economic growth. There is no clear answer to the expected sign of the mean because literature lists both positive and negative effects of family ties on economic outcomes ( Coleman 1990; Bertrand and Schoar 2006; Alesina and Giuliano 2010). Other variables of interest have its PIPs below 0.5.

Surprisingly, views about the role of women received almost 0 probability. It is possible that the questions used to create the variable do not capture this cultural trait very well. Also, one would expect that the sign would be negative (i.e. greater discrimination of women leads to lower GDP growth). In the next subsection, we try to address the first issue by including another question from WVS, and the second issue by removing Japan and Korea from our sample because these countries experienced spectacular economic growth, yet are known for being patriarchal societies.

No less surprising is PIP of generalized morality. Given the support of theoretical and empirical literature (Platteau 2000; Tabellini 2008, 2010), PIP of generalized morality of 0.19 is very low. As we said in Section 3, the importance of trust is dependent on sample structure. Eicher et al. (2007) show that the determinants of growth differ sharply for the OECD and non-OECD countries. Masanjala and Papageorgiou (2008) show that the determinants in Africa differ from those in the rest of the world. Trust is more important for countries with low quality institutions (i.e. African countries). This may be true for generalized morality as well (our sample includes only two African countries). Lastly, PIP for hard work is 0.3 and has a positive sign as expected. In the next subsection, we add another two items that ask about attitudes toward work.

Table 2: Baseline results, second stage

| | PIP | Mean |
|---|---|---|
| Trade | 0,793655556 | 0,795421851 |
| Family | 0,773277778 | 0,016874287 |
| Morality | 0,185388889 | 0,00492683 |
| Women | 0,029944444 | 0,000548755 |
| Inst | 0,190766667 | 0,029169426 |
| intercept | 0,894644444 | 1,797228898 |
| hard.work | 0,162444444 | 0,008854688 |
| abs_long | 0,007711111 | 3,17E-05 |
| abs_lati | 0,083055556 | 0,002427938 |
| frost.days5 | 0,942955556 | 1,039542277 |
| economic_complexity | 0,067255556 | 0,000490635 |
| coastline | 0 | 0 |
| island | 0,238122222 | 0,000829431 |
| pop100km | 0,297755556 | 0,057319992 |
| political_hierarchies | 0,120933333 | 0,008759876 |
| intensity_agriculture | 0,259677778 | -0,020902715 |
| patrilocal | 0,2155 | -0,033207252 |
| extended_fam | 0,194944444 | 0,024694551 |
| south | 0,208833333 | 0,005314419 |
| w_e | 0,536622222 | 0,269703213 |
| avg_temperature | 0,067188889 | -0,002027254 |
| avg_precipitation | 0,004411111 | 7,40E-06 |
| communist_dummy | 0,493522222 | -0,216767957 |
| rugged | 0,129566667 | -0,010413504 |
| large_animals | 0,338466667 | -0,110367323 |
| soil_depth | 0,7208 | 0,693670165 |
| landlocked | 0,2045 | 0,019906281 |
| geo_UK_distw | 0 | 0 |
| tropical_climate | 0,270766667 | -0,020614592 |

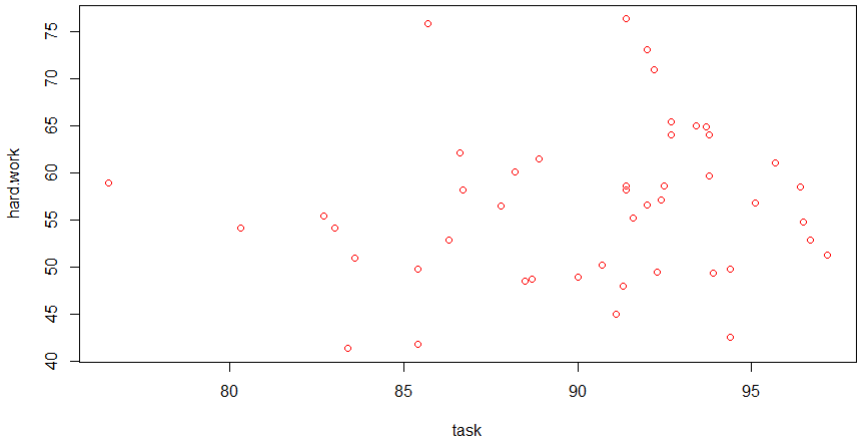
Besides cultural variables, we include in our analysis trade, institutions, geographical variables, agricultural and historical variables. Trade has a positive sign and the highest PIP among all endogenous regressors - 0.79. This finding confirms the importance of trade for economic development which is in line with Dollar and Kraay (2003) and Eicher et al. (2012), among others. By contrast, posterior inclusion probability is only 0.2 for institutional quality variable. There are arguments in favour of institutions (North 1990; Acemoglu et al. 2001; Rodrik et al. 2004; Acemoglu et al. 2004) as well as against them (Glaeser et al. 2004; McCloskey 2010). Gorodnichenko and Roland (2013) investigate the importance of Hofstede's individualism on economic development and show a specification where institutions are insignificant at any conventional level. The recent literature suggests that the interplay of culture and institutions should be analyzed (Acemoglu and Jackson 2012; Guiso et al. 2013; Bowles and Gintis 2010), i.e., institutions can matter more or less under certain conditions. Interestingly, index of pathogen prevalence seems to be much stronger instrument than legal origins. Higher pathogen prevalence implies lower institutional quality which is in line with the argument of Acemoglu et al. (2001).

Two additional variables stand out. The first is frost.days5 with PIP of 0.92. Masters and McMillan (2001) argue that ground frost may play a crucial role in development: "ground frost plays a role in human health, by selectively killing exposed organisms that help people control the transmission of disease. This, in turn, reduces morbidity, mortality, and uncertainty, hence promoting the accumulation of human capital [Bloom and Sachs 1998]. Frost also plays an important role in agriculture, by helping people control plant and animal diseases [Kellman and Tackaberry 1997], and also facilitating the build-up of deeper and richer topsoils by controlling the organisms that mineralize soil organic matter [van Wambeke 1992]." The second is soil depth with PIP of 0.7. Clearly, the deeper the soil is, the easier is to cultivate crops and farmers have a wider choice of plants since some are not suitable to be grown in shallow or rocky soil. The importance of ground frost and soil depth gives support to proponents of geography (Diamond 1997, Sachs 2001) who argue that geography is at the center of the story of the economic development.

## 6.1 Alternative specifications

As we said in the previous subsection, we would modify some of our variables by adding additional items from WVS. Firstly, we modify "women" variable by adding the following item: "A university education is more important for a boy than for a girl." Table 5. presents the results of this modification. We can see that the results are more or less the same. Institutions, trade, family ties and generalized morality have somewhat slightly higher PIP while hard work's PIP decreased. Also, the removal of Japan and Korea from the sample does not change the sign of "women" variable (not reported). The reason for its relative unimportance might be due to measurement error (Alesina et al. 2013 themselves claim that the variable is measured in a very narrow sense) or weak instrument.

Figure 1: Task vs. Hard Work




Next, we add two items from WVS to hard work variable. They are: "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." And: "I almost always continue to work on a task until I am satisfied with the result." We sum all the items into one variable. The way the items are coded, the higher number corresponds to more positive attitudes toward work. Table 8. shows the results of second stage regression. Here, a different picture emerges. While views about the appropriate role of women variable does not change, family ties drop to 0.45, generalized morality decline to almost 0, and hard work increased above 0.5. It is useful to look at the plot of original hard work variable against the " I almost alway continue to work .... " statement ("task" variable). From Figure 1. we can see sharp differences between these items. In many countries, people does not feel that hard work leads to success, yet when they are asked about whether they keep working on a task until they feel satisfied with it, the resulting number is surprisingly high. This suggests that the views about hard work are not very well captured by our intial variable or inconsistency of respondents.

# 7 Conlusion

In this thesis, we investigate the impact of four cultural traits, generalized morality, family ties, attitudes toward hard work, views about the appropriate role of women in society, on GDP per worker. Growth economics literature has stressed several issues with assessing importance and validity of potential determinants of macroeconomic growth, namely reverse causality and omitted variable bias

(Durlauf 2004; Fernandez et al. 2001). We attempt to alleviate both issues. Reverse causality is addressed by employing instruments that have been widely used in literature, namely legal origin, genetic distance, predicted trade shares and pathogen prevalence. Additionally, we include historical plough use as an instrument for views about the appropriate role of women in society. Omitted variable bias is dealt with by including twenty-five additional covariates from different streams of growth economics research such as geography, trade, institutions and history. We deal with said issues by employing IVBMA framework developed by Karl and Lenkoski (2012).

With regard to cultural variables, no clear winner resurfaced. Generalized morality and perceptions of the appropriate role for women received very low PIP in baseline results, 0.19 and 0.03 respectively. Attitudes toward hard work received PIP of 0.3 in baseline results. Once we include additional items from WVS, its PIP increased to 0.54, an indication that it is a vital determinant of macroeconomic growth. The strongest support received family ties with PIP of 0.66 in baseline specification, and decreases to 0.45 when we modify other cultural variables. Additionally, we do find strong support for trade view and proponents of geography.

Our survey of literature, and our results lead us to the following reflections: (1) The way cultural traits, as are operationalized in current literature, might not reflect its theoretical counterpart very well. The change in PIP of attitudes toward work is a good example. (2) Identification problems still remain. All instruments we use are not free from criticism, and exclusion restrictions might not be satisfied. For example, although legal origin is perceived as a relatively good instrument for institutions, its PIP in first stage regression is not very high. By contrast, pathogen prevalence seems to be a stronger instrument for institutions. (3) We assume linearity of our variables, but it is not likely that most of the regressors are linear. For instance, family ties are likely to have a negative impact on economic development at some point- very strong family ties might induce amoral behaviour outside of the family circles, aggression towards foreigners and less openness in general.

Moreover, cultural economics has identified numerous issues when comes to analyzing culture - a leap from micro-level to macro-level, internal validity, a vague definition of culture, and sample dependency to name a few. Researchers need to be able to define clearly the questions they address. Furthermore, empirical research needs to be based on better quality data. Miller and Mitamura (2003) propose a multidimensional measure which alleviates measurement and conceptual issues associated with single-item variables. Also, it is important to understand when culture matters. Recent literature has started to model interplay between institutions and culture which could advance our understanding of the culture-institutions-growth relationship.

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# Appendix

- **Dependent variable:** log of average GDP per worker between 1996 and 2000 taken from PWT 6.3. Citation: Alan Heston, Robert Summers and Bettina Aten, Penn World Table Version 6.3, Center for International Comparisons of Production, Income and Prices at the University of Pennsylvania, August 2009.
- **Family ties, generalized morality, hard work, view on the role of women:** World Values Survey, wave 3, 1995-1998. Citation: WORLD VALUES SURVEY Wave 3 1995-1998 OFFICIAL AGGREGATE v.20140921. World Values Survey Association (www.worldvaluessurvey.org). Aggregate File Producer: Asep/JDS, Madrid SPAIN.
- **Hofstede's individualism dimension:** https://geert-hofstede.com/national-culture.html
- **Genetic distance:** Mahalanobis genetic distance between the population in a given country and the population in the USA. Source: Gorodnichenko and Roland (2013)
- **Pronoun drop: Source:** 1 if language allows to drop pronoun. Source: Kashima and Kashima (1998)
- **Legal origin:** 1 if common law, 0=civil law. Source: La Porta et al. (1998)
- **Traditional plough use:** is the estimated proportion of citizens with ancestors that used the plough in pre-industrial agriculture. The variable ranges from 0 to 1. The underlying data are from Ethnographic Atlas. Source: Alesina et al. (2013)
- **Predicted trade shares:** logarithm of predicted trade shares computed on the basis of a bilateral trade equation. Source: Dollar and Kraay (2003)
- **Index of historical prevalance of infectious diseases:** the index is based on disease prevalence data obtained from old epidemiological atlases and includes either 9 or 7 items (trypanosomes, leishmanias, schistosomes, leprosy, malaria, typhus, filariae, tuberculosis and dengue). Source: Murray and Schaller (2009).
- **Terrain ruggedness index:** It is the average across points on a grid 1 kilometer apart within a country of an index of terrain ruggedness. The index is defined as follows. Let $e_{r,c}$ denote elevation at the point located in row r and column c of a grid of elevation points. Then the Terrain Ruggedness Index for this point is calculated as: $\sum_{i=r-1}^{i=r+1}\sum_{j=c-1}^{j=c+1}\left(e_{i,j}-e_{r,c}\right)^2$. Source: Nunn and Puga (2012)
- **ground frost:** proportion of land with more than 5 frost-day per month in winter

- **Institutions:** 6 indicators of institutional quality: Voice and Accountability, Political Stabillity and Absence of Violence, Government Effectiveness, Regulatory Quality, Rule of Law, Control of Corruption. Source: http://info.worldbank.org/governance/wgi/index.aspx#home
- **Trade:** logarithm of openness for year 1995. Source: Penn Tables 6.3. Citation: Alan Heston, Robert Summers and Bettina Aten, Penn World Table Version 6.3, Center for International Comparisons of Production, Income and Prices at the University of Pennsylvania, August 2009.
- **absolute latitute:** Source: Gallup et al. (1998)
- **absolute longtitude:** Source: Gallup et al. (1998)
- **jurisdictional hiearchy beyond local community:** the number of jurisdictional hierarchies in the society to quantify the political sophistication of an ethnic group. The original measure, taken from variable v33 of the Ethnographic Atlas, measures the number of jurisdictional hierarchies beyond the local community. The variable takes on the values of 1 to 5, with 1 indicating no levels of hierarchy beyond the local community and 5 indicating four levels. Since the local community represents one level of authority, the variable measures the number of jurisdictional hierarchies in the society. Source: Alesina et al. (2013)
- **tropical climate:** fraction of land that is tropical or subtropical. Source: Alesina et al. (2013)
- **economic complexity:** the measure comes from variable v30 of the Ethnographic Atlas. Each ethnic group is categorized into one of the following categories describing their pattern of settlement: nomadic or fully migratory, semi-nomadic, semi-sedentary, compact but temporary settlements, neighborhoods of dispersed family homes, separated hamlets forming a single community, compact and relatively permanent, complex settlements. The variable takes on the values of 1 to 8, with 1 indicating fully nomadic groups and 8 groups with complex settlement. Source: Alesina et al. (2013)
- **average temperature:** is measured as average daily temperature (in degrees Celsius), measured between 1950 and 1959. The underlying temperature data are from the Terrestrial Air Temperature and Precipitation: 1900-2006 Gridded Monthly Time Series, Version 1.10. Source: Alesina et al. (2013)
- **average precipitation:** is measured as the average rainfall each month (in millimeters) during the same time period. The underlying rainfall data are from the Terrestrial Air Temperature and Precipitation: 1900-2006 Gridded Monthly Time Series, Version 1.10. 8. Source: Alesina et al. (2013)

- **communism dummy:** 1 if the country was a communistic country. Source: Alesina et al. (2013)
- **distance from UK:** logarithm of the population-weighted distance of a country from the UK. Source: Gorodnichenko and Roland (2013)
- **landlock dummy:** 1 if the country is a landlocked country. Source: Spolaore and Wacziarg (2013)
- **west-east hemisphere dummy:** 1 if the country is located in western hemisphere. Source: Spolaore and Wacziarg (2013)
- **north-south hemisphere dummy:** 1 if the country is located in southern hemisphere. Source: Spolaore and Wacziarg (2013)
- **island dummy:** 1 if the country is an island. Source: Spolaore and Wacziarg (2013)
- **length of coastline:** length of costline, in km. Source: Spolaore and Wacziarg (2013)
- **proportion of population within 100km of the coastline:** the proportion of the population in 1994 within 100 km of the coastline. Source: Gallup et al. (1998)
- **presence of large domesticated animals:** the historical presence of large domesticated animals is measured using variable v40 of the Ethnographic Atlas. The original variable groups the type of animal husbandry practiced into seven categories: absence of large domesticated animals; pigs are the only large animals; presence of sheep and/or goats without any larger domesticated animals; presence of equine animals; presence of deer; presence of camels, alpacas or llamas; and presence of bovine animals. From the information, an indicator variable is created that equals zero if the society is coded in the first category and one if the society is coded in the second to seventh category. Source: Alesina et al. (2013)
- **soil depth:** is measured as the proportion of ancestor's land within a 200 kilometer radius of the group's centroid that has been identified as having 'no', 'few', or 'slight' soil depth constraints. The soil data are from the GAEZ 2002 database. Source: Alesina et al. (2013)
- **practice of intensive agriculture:** the measure is constructed from variable v28 of the Ethnographic Atlas, which classifies societies based on their agricultural intensity. Ethnicities are grouped into one of the following categories: no agriculture, casual agriculture, extensive or shifting agriculture, horticulture, intensive agriculture and intensive irrigated agriculture. The constructed indicator variable captures societies belonging to the last two categories. Source: Alesina et al. (2013)

- **patrilocal society:** the variable is constructed from variable v12 of the Ethnographic Atlas. Ethnicities are grouped into the following categories based on postmarital residence rules: avunculal, ambilocal, optionally uxorilocal or avunculocal, optionally patrilocal, matrilocal, neolocal, no common residence, patrilocal, uxorilocal or virilocal. From these categories, an indicator for ethnic groups that are patrilocal is created.

- **extended family:** the information is taken from variable v8 of the Ethnographic Atlas, which classifies ethnic groups' family structures into the following categories: independent (monogamous) nuclear family, independent (polygynous) nuclear family, independent polyandrous families, polygynous (with co-wives), polygynous (without co-wives), minimal extended families, small extended families, large extended families. Using this information, an indicator for ethnic groups with extended families (including minimal, small and large extended families) is created. Source: Alesina et al. (2013)

Table 3: Baseline results, first stage, PIP

| PIP | Trade | Family | Morality | Women | Inst |
|---|---|---|---|---|---|
| genetic distance | 0,433 | 0,488 | 0,504 | 0,501 | 0,492 |
| pathogen | 0,226 | 0,492 | 0,495 | 0,504 | 0,899 |
| TradeIV | 0,494 | 0,55 | 0,512 | 0,512 | 0,226 |
| legal.origin | 0,15 | 0,511 | 0,507 | 0,512 | 0,633 |
| plow | 0,14 | 0,496 | 0,507 | 0,498 | 0,403 |
| int | 0,999 | 0,499 | 0,5 | 0,496 | 0,509 |
| hard.work | 0,012 | 1 | 0,997 | 0,988 | 0,089 |
| abs_long | 0,002 | 0,76 | 0,278 | 0,857 | 0,014 |
| abs_lati | 0,01 | 0,997 | 1 | 0,962 | 0,034 |
| frost.days5 | 0,126 | 0,479 | 0,506 | 0,496 | 0,591 |
| economic_complexity | 0,037 | 0,702 | 0,499 | 0,495 | 0,147 |
| coastline | 0 | 0 | 0,001 | 0 | 0 |
| island | 0,129 | 0,508 | 0,519 | 0,497 | 0,337 |
| pop100km | 0,23 | 0,515 | 0,504 | 0,511 | 0,384 |
| political_hierarchies | 0,048 | 0,486 | 0,513 | 0,501 | 0,49 |
| intensity_agriculture | 0,136 | 0,501 | 0,498 | 0,49 | 0,824 |
| patrilocal | 0,106 | 0,498 | 0,501 | 0,512 | 0,472 |
| extended_fam | 0,144 | 0,507 | 0,508 | 0,511 | 0,308 |
| south | 0,103 | 0,517 | 0,492 | 0,494 | 0,661 |
| w_e | 0,198 | 0,533 | 0,496 | 0,512 | 0,568 |
| avg_temperature | 0,016 | 0,979 | 0,459 | 0,423 | 0,072 |
| avg_precipitation | 0,001 | 0,637 | 0,236 | 0,171 | 0,012 |
| communist_dummy | 0,182 | 0,499 | 0,526 | 0,501 | 0,519 |
| rugged | 0,041 | 0,526 | 0,48 | 0,489 | 0,146 |
| large_animals | 0,13 | 0,495 | 0,484 | 0,503 | 0,616 |
| soil_depth | 0,601 | 0,488 | 0,482 | 0,488 | 0,472 |
| landlocked | 0,484 | 0,509 | 0,502 | 0,499 | 0,349 |
| geo_UK_distw | 0 | 0,038 | 0,086 | 0,007 | 0 |
| tropical_climate | 0,13 | 0,506 | 0,487 | 0,501 | 0,375 |

Table 4: Baseline results, first stage, Mean

| Mean | Trade | Family | Morality | Women | Insti |
|---|---|---|---|---|---|
| genetic distance | -0,145 | -0,002 | -0,009 | 0,007 | 0,057 |
| pathogen | -0,031 | -0,044 | -0,078 | 0,107 | -0,973 |
| TradeIV | 0,071 | -0,361 | -0,264 | -0,075 | 0,006 |
| legal.origin | -0,018 | -0,143 | 0,052 | 0,104 | 0,47 |
| plow | -0,012 | -0,005 | 0,03 | 0,075 | 0,071 |
| intercept | 1,663 | 0,099 | 0,048 | 0,024 | -0,283 |
| hard.work | 0 | 2,837 | 1,235 | 0,872 | -0,004 |
| abs_long | 0 | -0,278 | -0,051 | 0,256 | 0 |
| abs_lati | 0 | 1,284 | 1,274 | 0,641 | 0,001 |
| frost.days5 | -0,004 | -0,012 | 0,047 | 0,094 | 0,445 |
| economic_complexity | 0 | 0,888 | 0,167 | -0,089 | -0,005 |
| coastline | 0 | 0 | 0 | 0 | 0 |
| island | 0,01 | 0,015 | 0,055 | -0,018 | -0,021 |
| pop100km | 0,04 | 0,109 | -0,031 | -0,207 | -0,018 |
| political_hierarchies | -0,001 | 0,044 | 0,134 | 0,188 | -0,173 |
| intensity_agriculture | -0,006 | 0,012 | -0,032 | 0,071 | 1,038 |
| patrilocal | 0,007 | -0,023 | -0,082 | 0,071 | 0,241 |
| extended_fam | 0,014 | -0,093 | 0,035 | 0,152 | -0,014 |
| south | 0,003 | 0,071 | 0,039 | -0,024 | 0,524 |
| w_e | -0,029 | 0,282 | -0,009 | -0,203 | -0,39 |
| avg_temperature | 0 | 2,086 | 0,226 | 0,188 | 0,003 |
| avg_precipitation | 0 | 0,168 | 0,035 | -0,017 | 0 |
| communist_dummy | 0,021 | 0,093 | -0,028 | 0,121 | -0,327 |
| rugged | 0 | 0,235 | 0,059 | -0,084 | 0 |
| large_animals | 0,011 | 0,004 | 0,019 | 0,104 | 0,556 |
| soil_depth | 0,268 | 0,064 | 0,026 | -0,013 | -0,155 |
| landlocked | 0,098 | -0,025 | 0,064 | 0,194 | 0,087 |
| geo_UK_distw | 0 | 0 | 0 | 0 | 0 |
| tropical_climate | -0,005 | 0,074 | -0,017 | -0,002 | 0,078 |

Table 5: Results for women2, second stage

| | PIP | Mean |
|---|---|---|
| Trade | 0,824422222 | 0,858851607 |
| Family | 0,7166 | 0,015661016 |
| Morality | 0,215355556 | 0,005809796 |
| Women2 | 0,030577778 | 0,000409943 |
| Inst | 0,283244444 | 0,055785033 |
| intercept | 0,892122222 | 1,762902428 |
| hard.work | 0,202522222 | 0,011607705 |
| economic_complexity | 0,058966667 | 0,000387922 |
| island | 0,229011111 | 0,005547778 |
| intensity_agriculture | 0,264488889 | -0,030849261 |
| patrilocal | 0,2316 | -0,040268593 |
| extended_fam | 0,225244444 | 0,026324956 |
| south | 0,214033333 | 0,001962328 |
| avg_temperature | 0,084155556 | -0,004039177 |
| avg_precipitation | 0,005066667 | 9,39E-07 |
| communist_dummy | 0,496833333 | -0,221130717 |
| rugged | 0,149911111 | -0,014880881 |
| w_e | 0,676222222 | 0,379304233 |
| landlocked | 0,227022222 | 0,020336734 |
| geo_UK_distw | 0 | 0 |
| tropical_climate | 0,279433333 | -0,014940546 |
| pop100km | 0,2841 | 0,051192639 |
| political_hierarchies | 0,122711111 | 0,010669822 |
| coastline | 0 | 0 |
| abs_long | 0,008133333 | 4,83E-05 |
| abs_lati | 0,092233333 | 0,003613086 |
| frost.days5 | 0,920833333 | 0,969517991 |
| large_animals | 0,380611111 | -0,136126773 |
| soil_depth | 0,706311111 | 0,687381578 |

Table 6: Results for women2, first stage, PIP

| PIP | Trade | Family Ties | Morality | Women2 | Institutions |
|---|---|---|---|---|---|
| pathogen | 0,264 | 0,492 | 0,509 | 0,506 | 0,964 |
| genetic distance | 0,446 | 0,488 | 0,499 | 0,503 | 0,484 |
| legal.origin | 0,167 | 0,51 | 0,524 | 0,496 | 0,53 |
| TradeIV | 0,492 | 0,539 | 0,547 | 0,512 | 0,227 |
| plow | 0,152 | 0,497 | 0,495 | 0,498 | 0,396 |
| intercept | 1 | 0,491 | 0,51 | 0,491 | 0,524 |
| hard.work | 0,011 | 1 | 0,999 | 0,993 | 0,11 |
| economic_complexity | 0,028 | 0,68 | 0,489 | 0,494 | 0,12 |
| island | 0,137 | 0,479 | 0,486 | 0,493 | 0,356 |
| intensity_agriculture | 0,138 | 0,484 | 0,51 | 0,517 | 0,801 |
| patrilocal | 0,108 | 0,497 | 0,5 | 0,511 | 0,419 |
| extended_fam | 0,135 | 0,482 | 0,51 | 0,507 | 0,304 |
| south | 0,095 | 0,49 | 0,51 | 0,499 | 0,697 |
| avg_temperature | 0,014 | 0,985 | 0,449 | 0,442 | 0,064 |
| avg_precipitation | 0,002 | 0,549 | 0,256 | 0,169 | 0,004 |
| communist_dummy | 0,166 | 0,496 | 0,496 | 0,502 | 0,569 |
| rugged | 0,039 | 0,533 | 0,501 | 0,5 | 0,148 |
| w_e | 0,196 | 0,515 | 0,503 | 0,502 | 0,444 |
| landlocked | 0,466 | 0,484 | 0,504 | 0,501 | 0,322 |
| geo_UK_distw | 0 | 0,034 | 0,105 | 0,009 | 0 |
| tropical_climate | 0,116 | 0,501 | 0,502 | 0,508 | 0,391 |
| pop100km | 0,224 | 0,504 | 0,49 | 0,507 | 0,369 |
| political_hierarchies | 0,04 | 0,485 | 0,488 | 0,52 | 0,386 |
| coastline | 0 | 0 | 0,006 | 0,001 | 0 |
| abs_long | 0,001 | 0,724 | 0,363 | 0,983 | 0,013 |
| abs_lati | 0,011 | 1 | 1 | 0,969 | 0,03 |
| frost.days5 | 0,123 | 0,518 | 0,485 | 0,496 | 0,481 |
| large_animals | 0,151 | 0,488 | 0,476 | 0,502 | 0,591 |
| soil_depth | 0,594 | 0,501 | 0,491 | 0,491 | 0,459 |

Table 7: Results for women2, first stage, Mean

| Mean | Trade | Family Ties | Morality | Women2 | Institutions |
|---|---|---|---|---|---|
| pathogen | -0,036 | -0,034 | -0,099 | 0,07 | -1,244 |
| genetic distance | -0,138 | -0,003 | -0,009 | 0,005 | 0,077 |
| legal.origin | -0,019 | -0,134 | 0,052 | 0,066 | 0,327 |
| TradeIV | 0,071 | -0,342 | -0,303 | -0,094 | -0,021 |
| plow | -0,013 | -0,006 | 0,023 | 0,044 | 0,026 |
| intercept | 1,669 | 0,093 | 0,048 | 0,023 | -0,29 |
| hard.work | 0 | 2,828 | 1,233 | 1,054 | -0,005 |
| economic_complexity | 0 | 0,833 | 0,195 | 0,013 | -0,002 |
| island | 0,009 | 0,009 | 0,053 | -0,014 | -0,01 |
| intensity_agriculture | -0,007 | 0,017 | -0,024 | 0,065 | 0,965 |
| patrilocal | 0,007 | -0,014 | -0,096 | 0,027 | 0,192 |
| extended_fam | 0,013 | -0,083 | 0,032 | 0,112 | -0,011 |
| south | 0,001 | 0,064 | 0,051 | -0,024 | 0,578 |
| avg_temperature | 0 | 2,216 | 0,212 | 0,191 | 0,003 |
| avg_precipitation | 0 | 0,133 | 0,039 | -0,018 | 0 |
| communist_dummy | 0,019 | 0,101 | -0,035 | 0,094 | -0,399 |
| rugged | 0 | 0,261 | 0,016 | -0,131 | -0,005 |
| w_e | -0,027 | 0,256 | 0,007 | -0,122 | -0,202 |
| landlocked | 0,092 | -0,015 | 0,061 | 0,145 | 0,052 |
| geo_UK_distw | 0 | 0 | 0 | 0 | 0 |
| tropical_climate | -0,004 | 0,069 | -0,015 | 0,012 | 0,072 |
| pop100km | 0,038 | 0,096 | -0,027 | -0,162 | 0,032 |
| political_hierarchies | -0,001 | 0,029 | 0,137 | 0,208 | -0,118 |
| coastline | 0 | 0 | 0 | 0 | 0 |
| abs_long | 0 | -0,232 | -0,072 | 0,458 | 0 |
| abs_lati | 0 | 1,292 | 1,284 | 0,83 | 0,001 |
| frost.days5 | -0,006 | -0,002 | 0,043 | 0,067 | 0,282 |
| large_animals | 0,012 | 0,013 | 0,023 | 0,095 | 0,504 |
| soil_depth | 0,262 | 0,064 | 0,035 | 0,004 | -0,093 |

Table 8: Results for hard work2+women2, second stage

| | PIP | Mean |
|---|---|---|
| Trade | 0,778233333 | 0,778818794 |
| Family | 0,4549 | 0,010905679 |
| Morality | 0,072333333 | 0,001494721 |
| Women2 | 0,0197 | 0,000285556 |
| Inst | 0,355133333 | 0,093594767 |
| intercept | 0,856944444 | 1,587755683 |
| hard.work2 | 0,547566667 | 0,015408511 |
| south | 0,2307 | -0,013883842 |
| w_e | 0,6514 | 0,331231986 |
| intensity_agriculture | 0,311922222 | -0,049908732 |
| patrilocal | 0,274355556 | -0,051425153 |
| landlocked | 0,211044444 | 0,018208477 |
| geo_UK_distw | 3,33E-05 | 8,80E-11 |
| tropical_climate | 0,278377778 | -0,035466085 |
| pop100km | 0,2463 | 0,025529859 |
| political_hierarchies | 0,130988889 | 0,012476015 |
| coastline | 0 | 0 |
| abs_long | 0,013555556 | 8,49E-05 |
| abs_lati | 0,069177778 | 0,001685572 |
| frost.days5 | 0,886766667 | 0,847886389 |
| avg_temperature | 0,067866667 | -0,00328758 |
| avg_precipitation | 0,004633333 | 1,02E-05 |
| communist_dummy | 0,400844444 | -0,140805322 |
| rugged | 0,156844444 | -0,015786812 |
| large_animals | 0,518544444 | -0,274420719 |
| soil_depth | 0,595977778 | 0,463929291 |
| economic_complexity | 0,080444444 | 0,001487964 |
| island | 0,2346 | 0,010380573 |
| extended_fam | 0,247511111 | 0,048334434 |

Table 9: Results for hard work2+women2, first stage, PIP

| PIP | Trade | Family | Morality | Women2 | Institutions |
|---|---|---|---|---|---|
| pathogen | 0,3 | 0,501 | 0,504 | 0,514 | 0,961 |
| genetic distance | 0,456 | 0,489 | 0,48 | 0,498 | 0,495 |
| legal.origin | 0,204 | 0,513 | 0,505 | 0,506 | 0,528 |
| TradeIV | 0,422 | 0,531 | 0,507 | 0,483 | 0,332 |
| plow | 0,143 | 0,499 | 0,5 | 0,498 | 0,423 |
| intercept | 1 | 0,506 | 0,483 | 0,492 | 0,573 |
| hard.work2 | 0,004 | 1 | 0,912 | 1 | 0,185 |
| south | 0,1 | 0,499 | 0,512 | 0,491 | 0,64 |
| w_e | 0,133 | 0,514 | 0,508 | 0,519 | 0,5 |
| intensity_agriculture | 0,136 | 0,481 | 0,493 | 0,505 | 0,786 |
| patrilocal | 0,088 | 0,505 | 0,503 | 0,509 | 0,451 |
| landlocked | 0,468 | 0,49 | 0,506 | 0,515 | 0,328 |
| geo_UK_distw | 0 | 0,002 | 0,02 | 0,01 | 0 |
| tropical_climate | 0,12 | 0,483 | 0,492 | 0,5 | 0,357 |
| pop100km | 0,205 | 0,504 | 0,5 | 0,514 | 0,426 |
| political_hierarchies | 0,047 | 0,496 | 0,53 | 0,519 | 0,345 |
| coastline | 0 | 0,001 | 0 | 0,002 | 0 |
| abs_long | 0,006 | 0,282 | 0,14 | 0,997 | 0,014 |
| abs_lati | 0,006 | 0,576 | 0,995 | 0,489 | 0,06 |
| frost.days5 | 0,148 | 0,497 | 0,483 | 0,509 | 0,575 |
| avg_temperature | 0,011 | 0,991 | 0,597 | 0,415 | 0,07 |
| avg_precipitation | 0,002 | 0,364 | 0,256 | 0,239 | 0,01 |
| communist_dummy | 0,187 | 0,501 | 0,504 | 0,495 | 0,563 |
| rugged | 0,037 | 0,555 | 0,49 | 0,493 | 0,151 |
| large_animals | 0,137 | 0,512 | 0,509 | 0,524 | 0,597 |
| soil_depth | 0,492 | 0,5 | 0,49 | 0,505 | 0,454 |
| economic_complexity | 0,029 | 0,655 | 0,514 | 0,479 | 0,166 |
| island | 0,145 | 0,512 | 0,488 | 0,499 | 0,366 |
| extended_fam | 0,135 | 0,488 | 0,497 | 0,504 | 0,31 |

Table 10: Results for hard work2+women2, first stage, mean

| Mean | Trade | Family | Morality | Women2 | Institutions |
|---|---|---|---|---|---|
| pathogen | -0,045 | -0,074 | -0,038 | 0,037 | -1,248 |
| genetic distance | -0,182 | -0,004 | -0,004 | 0,007 | 0,068 |
| legal.origin | -0,028 | -0,088 | 0,12 | 0,044 | 0,309 |
| TradeIV | 0,058 | -0,172 | -0,211 | 0,007 | -0,105 |
| plow | -0,013 | 0,029 | 0,055 | 0,06 | 0,047 |
| intercept | 1,704 | 0,072 | 0,04 | 0,009 | -0,316 |
| hard.work2 | 0 | 0,972 | 0,322 | 0,446 | -0,004 |
| south | 0,002 | 0,052 | 0,029 | -0,026 | 0,488 |
| w_e | -0,013 | 0,178 | -0,077 | -0,146 | -0,285 |
| intensity_agriculture | -0,008 | 0,029 | 0,007 | 0,06 | 0,974 |
| patrilocal | 0,004 | -0,01 | -0,033 | 0,025 | 0,213 |
| landlocked | 0,094 | -0,035 | 0,062 | 0,158 | 0,041 |
| geo_UK_distw | 0 | 0 | 0 | 0 | 0 |
| tropical_climate | -0,007 | 0,053 | -0,004 | -0,014 | 0,016 |
| pop100km | 0,033 | 0,116 | -0,033 | -0,166 | 0,109 |
| political_hierarchies | -0,001 | 0,024 | 0,254 | 0,163 | -0,094 |
| coastline | 0 | 0 | 0 | 0 | 0 |
| abs_long | 0 | -0,051 | -0,012 | 0,487 | 0 |
| abs_lati | 0 | 0,374 | 1,203 | 0,206 | 0,002 |
| frost.days5 | -0,012 | -0,008 | 0,047 | 0,073 | 0,438 |
| avg_temperature | 0 | 2,187 | 0,545 | -0,013 | 0,003 |
| avg_precipitation | 0 | 0,074 | 0,045 | -0,037 | 0 |
| communist_dummy | 0,025 | 0,073 | -0,028 | 0,106 | -0,399 |
| rugged | 0 | 0,364 | 0,074 | -0,122 | -0,012 |
| large_animals | 0,008 | 0,018 | 0,063 | 0,081 | 0,496 |
| soil_depth | 0,193 | 0,042 | 0,028 | -0,017 | -0,062 |
| economic_complexity | 0 | 0,751 | 0,218 | -0,035 | -0,01 |
| island | 0,012 | 0,003 | 0,053 | -0,019 | -0,051 |
| extended_fam | 0,012 | -0,092 | 0,068 | 0,097 | -0,003 |