

Culture, Economic Preference and Economic Development with Python: Evidence from Two New Datasets

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Abstract: With the development of society, economy and technology, an increasing number of scholars are attaching more value to the power of culture. Consequently, this paper uses Python, a computer programming language, as a research tool for data analysis and examines the relationship between culture and economic outcomes using two new datasets of cultural features and economic preferences across countries, and based on two indicators of economic outcomes, income per worker and total factor productivity. In the course of the study, our independent variable data cultural economic preferences are derived from Geert Hofstede's Six-dimensional Cultural Index and Global Preferences Survey. In addition, our dependent variables income per worker and total factor productivity are obtained from the Penn World Table. With a known strong positive relationship between the cultural preference for individualism and economic outcomes, we initially screen out the preferences for a positive relationship with individualism by drawing a heat map model using Python. Then, we verify the conjecture that there is a positive correlation between cultural economic preferences and economic outcomes by producing scatter plots with the dependent variable added. The final regression model is made to determine the extent to which the independent and dependent variables are correlated by the magnitude of the correlation coefficient. Through our research, we find that culture has a significant impact on economic performance.

1 INTRODUCTION

The question of how culture drives economic growth has attracted perennial interest in both scholarly research and popular discussions in the public sphere. For instance, one of the most influential thinkers in history on this topic Weber (Weber 1930), attributed the rise of modern capitalism to protestant ethics, in particular Calvinist. Some recent empirical work in economics explores the economic impacts of certain narrowly defined dimensions of cultural factors, such as individualism v.s. collectivism Gorodnichenko and Roland (Gorodnichenko, Roland, 2017), patience (Chen 2013), and social structure (Granovetter 2005), etc. The challenge in studying culture and its resulting economic effects is that it encapsulates an extensive number of dimensions of social features, not to mention the difficulty of its measurement due to its time-varying nature and the substantial variations across regions, groups, and individuals. According to Gorodnichenko and Roland (Gorodnichenko, Roland, 2017), culture is defined in general as the set of values and beliefs people have about how the

world (both nature and society) works, as well as the norms of behavior derived from that set of values. This paper, although similarly, adopts a more specific definition of the culture. We treat each particular cultural characteristic as a stable/relatively commonly shared individual and social preferences of economic agents making decisions. More specifically, we use four groups of cultural economic preferences as independent variables. They are:

- Individualism
- Patience and Long-term Orientation
- Risk Attitude
- Social Preferences

Also, I use two economic outcomes, income per worker and total factor productivity, as measures of the dependent variables. Based on the existing economic models we find that the independent variables have a direct effect on individual economic behavior and macroeconomic performance. This paper can be seen as an extension of Gorodnichenko and Roland (Gorodnichenko, Roland, 2017) in terms of the cultural variables considered and the data set utilized. We replicate the positive relationship

between individualism and economic performance as measured by GDP per capita that they found in the paper. Then, the same framework is extended to other variables.

We utilize two cross-country databases to study the economic effects of the culture. Both databases are considered as possibly the best large-sample measurements of selective culture characteristics by existing research. The first data set is the same data set used in Gorodnichenko and Roland (Gorodnichenko, Roland, 2017), Geert Hofstede's six-dimensional culture index, (Hofstede 2001). And the second additional data set is from the Gallop Global Survey of Economic Preferences (Falk, et al, 2018), which measures different economic preferences such as patience, risk attitudes, etc. By using the same economic outcome measures and the same regression specification as in their paper, this paper finds that not only the degree of individualism is positively associated with economic outcomes, but also other cultural and preference characteristics can have a profound effect on economic outcomes. In addition to this, there is a correlation between data on cultural dimensions and data on preference characteristics. Thus, the paper has some credibility in demonstrating the correlation between different cultural dimensions and preferences and economic outcomes, and reflects some cross-country differences.

1.1 Literature Review

This paper is related to three strands of literature. The first strand of the literature which is the most related to this paper is research that examines the relationship between culture, economic preferences and economic outcomes. Papers by Algan and Cahuc (Algan, Cahuc 2007), Birchenall (Birchenall 2014), Brock and Brighthouse (Brock, Brighthouse 2006) as well as Greif (Greif 1994) explore the impact of these variables on economic growth from the perspective of sociocultural preferences such as social attitudes, social network structures, social interactions, unique cultures, and relevant social organizations. Hofstede (Hofstede 2001) argues that corporate culture may play a crucial role in a company's profitability and long-term development. Another paper from Lucas Jr and Moll (Lucas, Moll 2014) shows the way people with different levels of productivity think, and social activities may determine the current level of production in the economy and its actual growth rate. Historical variables such as literacy and political system as tools can also explore the causal relationship between culture and economic

development, a conclusion reflected in the paper by Tabellini (Tabellini 2010). It is worth noting that Gorodnichenko and Roland (Gorodnichenko, Roland 2017) discussed the relationship between individualism-collectivism dimension of culture and innovation and long-term growth. Doepke and Zilibotti (Doepke, Zilibotti 2014) discussed the two-way relationship based on the single relationship between culture and economy, and provided different research perspectives. My thesis was improved on the basis of their research, and added preference features on the basis of cultural dimension.

The second line of literature broadly explores the driver of economic growth beyond culture and preferences. Other important factors discovered in the literature includes institutions, natural endowment, religions and so on. The paper by Acemoglu and Johnson (Johnson 2005) finds that property rights regimes have first-order effects on long-run economic growth, investment, and financial development. In addition to this, Hall and Jones (Hall, Jones, 1999) find that differences in social infrastructure across countries lead to large differences in capital accumulation, educational attainment, and productivity, and thus make income vary widely across countries. Perhaps a revolution can also be a major influence and drive history. For example, the consumer goods revolution represented in the paper by Greenwood et al. (Greenwood et al 2005) helps explain the rise in married female labor force participation that occurred in the last century. In our research we need to broaden our horizons to constantly incorporate fresh perspectives because the factors that influence the economy can be diverse. Acemoglu et al. (Acemoglu et al 2002) examined the relationship between geographic factors and economic prosperity, and Ashraf and Galor (Ashraf, Galor 2012) hypothesized, on the basis of geographic factors, that prehistoric Homo sapiens migrated out of Africa to various global settlements. The variation in migration distance of prehistoric Homo sapiens out of Africa to various settlements around the globe influenced genetic diversity and had a persistent hump effect on economic growth.

The third strand of literature examines the effect of culture on other specific economic outcomes other than economic growth, such as innovation. The paper by Bisin and Verdier (2001) examines the population dynamics of preference characteristics in a model of cultural intergenerational transmission. We find that economists have recently devoted considerable attention to women. For example, Fernandez and Fogli (2009) and Tertilt (2005) published enlightening papers exploring the impact of culture on female

fertility. In addition to this, Granovetter (2005) suggests that social structure and social networks may influence hiring, prices, productivity and innovation, and Greenwood and Guner (2010) explore the inextricable relationship between individuals' adherence to social norms and morality and technological progress in the economy, which merits further study. My paper improves on the study of Gorodnichenko and Roland (2017) by adding data on preference characteristics to the cultural dimension, making it richer.

2 DATA

2.1 Geert Hofstede's Six-Dimensional Cultural Index

Some scholars in economics and other fields have found that culture affects how people make decisions about things, and thus how society as a whole functions. If we want to study how people's preferences affect economic outcomes, we need to quantify 'culture'.

Individuals who grow up in different cultures, and are indoctrinated from an early age, will have very different preferences for things. Culture itself is abstract and complex, so it is difficult to measure. Thankfully, the Dutch social psychologist Geert Hofstede has made a groundbreaking research on the culture of modern countries and put forward the theory of cultural dimension. The concept of dimensions is not hypothetical, but is derived through summary induction.

The depth and breadth of research on cultural dimensions has evolved with the times. Currently, cultural dimensions have evolved from the initial four dimensions of values, behaviors, institutions, and multinational organizations to six dimensions to measure values. They are:

- **Power Distance:** emphasizes how the fact that people differ in physical and intellectual ability is treated in a society. Countries with a high power distance index may have inequalities in power and wealth that grow stronger over time; while countries with a low power distance index work to reduce these inequalities.
- **Individualism versus Collectivism:** Emphasis on the relationship between the individual and

the collective group. In individualistic societies, relationships between people are looser, with the goal of individual achievement; in collectivistic societies, human ties are stronger, with the goal of collective success.

- **Uncertainty Avoidance:** refers to the degree to which culture enables members of society to accept unclear situations and tolerate uncertainty.
- **Masculinity versus Femininity:** This dimension is mainly used in order to determine whether the society in which one lives is a masculine or feminist society. Masculinity mainly includes characteristics such as competitiveness and assertiveness, while femininity mainly includes characteristics such as being more modest and attentive. Generally speaking, this distinct gender difference creates a different color culture. In societies that are more masculine, gender differences create a greater difference in jobs; in societies that are more feminist, there is no significant difference between the jobs held by men and women.
- **Long-term Orientation versus Short-term Orientation:** This dimension measures the degree of acceptance of people in different cultures for deferred enjoyment of material and spiritual satisfaction. It measures people's attitudes toward issues such as time, inheritance, status hierarchy, face, respect for tradition, exchange of gifts, and helping each other. This interpretation comes from Charles W.L. Hill¹.
- **Indulgence versus Restraint:** This dimension is essentially a measure of happiness, whether simple pleasures are satisfied. The greater the degree to which society allows for people's basic needs and desire to enjoy life's pleasures, the greater the value of their own indulgences will be, and the less people will discipline themselves. This is the latest dimension added.

Geert Hofstede and his team have studied and collected data on the size of cultural dimensions in 109 countries around the world, covering all seven continents and major regions of the world. In this article we use a revised version from 2015 to assist in the study.

¹ An explanation of long-term versus short-term orientation comes from Charles W.L. Hill's 1993 book

International Business: Competing in the Global Marketplace.

2.2 Global Preferences Survey

The Global Preference Survey collected preference data from 80,000 people in 76 geographically and culturally diverse countries around the world. These countries are on different continents and have different levels of cultural and economic development. With an average sample size of 1,000 people per country, these respondents represent 90 percent of the world's population and income, making these samples more global in perspective. These countries include 15 countries in the Americas, 25 in Europe, 22 in Asia Pacific, and 14 in Africa, 11 of which are sub-Saharan African countries. The specific preference survey is a measure of respondents' propensity for ways and actions through a quantitative item and a qualitative question. Researchers ask respondents in a choice scenario a number of questions and self-assess respondents' preferences on a Likert scale (Likert scale is an 11-point scale).

This Preference Survey measures and collects data sets on patience, risk-taking, trust, altruism, positive reciprocity, and negative reciprocity in different countries. These preferences influence individuals' choices in a variety of contexts and also help us to explore the impact on specific economic outcomes and the prediction of important economic behaviors based on cultural dimensions in combination with preferences. They can also provide control variables if we want to identify the causal effects of other factors associated with preferences. Since global preferences cover the preferences of a representative sample of each country, they provide a better indication of country-level averages and become the best choice for our study. This data set is divided into a country-level data set and an individual-level data set. The country level shows the average behavioral performance of the population of the whole country with respect to six preferences; the individual level is the conclusion drawn by the survey agency interviewing a specific number of people within a country from different regions, ages, genders, and even languages. Both can be used for our in-depth study of macroeconomics and microeconomics. Here we use country-level data:

- **Patience/Time Preference:** Patience comes from people's understanding, respect and tolerance of things, as well as a measure of opportunity cost. The willingness to give up what is good for you today in order to gain more in the future is high.

- **Risktaking:** Willingness to try things that others are afraid to perform easily and with a high element of uncertainty.
- **Positive Reciprocity:** The willingness to give back to others after receiving help from them is high.
- **Negative Reciprocity:** There is little willingness to reciprocate after receiving help from others.
- **Altruism.** Altruism: an act of selflessness, i.e., concern for the welfare of others.

Trust. A strong belief in the reliability, truthfulness, competence, or power of someone or something.²

2.3 Penn World Tables

The Penn World Tables abbreviated as PWT is a database containing information on the relative levels of income, output, inputs and productivity, covering 183 countries from 1950 to 2019. These datasets initially had only national economic data to measure real GDP for different countries and different regions. after continuous expansion, the economic indicators were gradually updated to include basic information on countries and years for data on capital, productivity, and population. The coverage varies in terms of countries and periods, economic sectors included and indicators available. Thus, these databases can be used to answer different types of questions about the productivity performance of countries. Because of the desire to study the relationship between culture, preferences and economic variables, we decided to introduce some data from Penn World Tables as dependent variables, they are: log income (at purchasing power parity) per worker and log total factor productivity in 2019, which are used to represent the income level and productivity level of workers in different countries. It is worth mentioning that total factor productivity is the efficiency of production activities over time and is considered as an indicator of scientific and technological progress, and its sources include technological progress, organizational innovation, specialization and production innovation.

Here, if we want income per worker data, we need to set the desired year in the Penn World Tables dataset: for example, 2019, ISO country code. The key points to focus on are Expenditure-side real GDP at chained PPPs (in mil. 2019US dollar), abbreviated as 'rgdpe' and Number of persons engaged (in millions), abbreviated as 'emp'. The abbreviation is

² Notes.—Source: The fifth and sixth preference

definitions come from Wikipedia

‘emp’. As we know, we can get the wage per worker by dividing the real GDP on the expenditure side of the PPP by the total number of workers. If we need data for total factor productivity, we need the specific year (year) in the PWT dataset: 2019, the ISO country code, and ‘ctfp’, which means total factor productivity level at current purchasing power parity, in order to make the variance of the dependent variable more constant as the independent variable increases, we choose to multiply the overall data by the logarithm to obtain Log Income Per Worker and Log Total Factor Productivity.

3 STYLYZED FACTS

3.1 Correlation between Different Culture and Preference Measures

After collecting data from both the Geert Hofstede Six-Dimensional Culture Index data set and the Gallop Global Preference Survey, we learned that both use the ISO country code, a set of abbreviations or symbols used to identify countries, so we combined the two data sets using this feature of the country code. Obviously, we obtained a data set of cultural dimension indices and economic preferences for 73 countries. In addition, we produced a correlation coefficient matrix and heat map of the two in Figure 1. That is, the correlation coefficient between any two variables is used to see if there is an interesting association between culture and a particular preference. The closer the value in the heat map is to 1, the stronger the correlation between the two; the closer the value is to -1, the stronger the negative correlation; and the correlation between the two is close to 0, indicating no research potential. We can clearly see that these characteristics are undoubtedly the most relevant to" themselves We don't need this result, because individualism has been shown to influence specific economic outcomes in previous studies, we first focus on the simple correlations between individualism and other economic preferences/cultural dimensions. As can be seen from the figure, individualism has a strong correlation with patience with a value of 0.65, followed by trust with a value of 0.21, while other characteristics also show positive correlations, but with little significance. The finding between patience and individualism is very interesting, so in the case of

a strong correlation we must pay attention to whether patience also affects economic outcomes. The highest positive correlation with patience can be found in the heat map where the cultural and preference factor is long-term orientation, with a correlation value of 0.36, followed by indulgence and restraint with a value of 0.32. When trying to filter cultural characteristics and preferences that have research potential by setting the criteria for a positive correlation with individualism and patience higher than 0.1, we obtain several values with criteria that are met. They are:

- Trust: its correlations with individualism and patience were 0.21 and 0.19 respectively.
- Long-term orientation: its correlation with individualism is relatively small at 0.12, but its correlation with patience is slightly higher with a value of 0.36;
- Indulgence and restraint: its correlations with both are 0.14 and 0.32;
- Negative reciprocity: its correlations are 0.15 and 0.26, respectively;
- Risk-taking: its correlation with individualism is 0.11 and correlation with patience is 0.23.

3.2 Correlation between Cultural /Preference Measures and Economic Outcomes

After becoming familiar with some basic correlations, it is more intuitive to use a scatter plot to represent the correlation between the independent and dependent variables. We made a scatter plot³ between individualism and log income per worker and log total factor productivity, which can be clearly seen to be roughly similar to the image in the original article Gorodnichenko and Roland (2017). Thus, we can determine that our research is in the right direction. Next, we need to verify the degree of correlation of cultural and economic preferences that may affect economic outcomes.

By plotting the images, we visualize the positive and negative situation and the degree of correlation between the independent and dependent variables. We broadly divided the cultural and economic preferences into four study sections based on this criterion. These are (1) individualism and power distance. (2) patience and longterm orientation versus short-term orientation. (3) risk-taking attitude. (4) social preference. In addition to these three dimensions, we found other characteristics that would

³ The paper uses scatter plots of individualism, patience, risk-taking, and trust as representative images of the four

research directions of cultural and economic preferences

positively affect economic outcomes. They are trust, positive reciprocity and negative reciprocity. Obviously, whether a person is willing to trust others in economic activities and whether a person is willing to give back after receiving help from others are personal preferences in social life. Therefore, we decided to classify trust, positive reciprocity and negative reciprocity as social preferences in this paper.

- Individualism and Power distance: The scatter plot between individualism and income per worker/total factor productivity indeed shows that workers have higher income levels and have higher total factor productivity in countries with a strong individualistic spirit. In addition, power distance in the plot indicates that it can result in strong negative influences on economic effects.
- Patience and Long-term Orientation: By plotting the patience/long-term orientation scatter plot, we find that patience and individualism have a stronger impact on economic outcomes, while long-term orientation also unsurprisingly affects workers' income and has a positive but small impact on total factor productivity.
- Risk Attitude: By plotting a scatter plot of risk-taking and income per worker/total factor productivity, we find that more adventurism leads to lower worker incomes and total factor productivity, which is contrary to our original conjecture.
- Social Preference: The relationship between individualism and trust has been discussed in the literature of Gorodnichenko and Roland (2017). In addition, they have concluded that there is a positive but not a strong relationship between the economic outcome of employees' income and trust. In the heat map, the correlation between positive reciprocity and individualism is -0.081 and the correlation with patience is 0.016. Although the correlation is not strong, the scatter plot shows that it strongly affects the income level of workers, indicating that the higher the trust, the higher the income level of workers in the country. In the scatter plot, it shows that trust positively affects total factor productivity. As well as both positive and negative reciprocity positively affects workers' income and total factor productivity, the reasons for the effect are worth further discussion.

4 EMPIRICAL ANALYSIS

We use the original data from our references to reproduce their findings. Unfortunately, although we use the data of the culture dimension from Geert Hofstede's website, after combining it with the PWT data (i.e., the data set with income per worker/total factor productivity) and removing the undefined or unrepresentable values, we only get 72 observations of income per worker, and we can't get 96 observations from the original data. This is probably due to the fact that the original paper used Penn World Tables version 6.3 to obtain income per worker data for the year 2000, and we used Penn World Table version 10.0 to obtain income per worker data for the year 2019, with some changes in the countries and ways of data collection as the years progressed. The estimated value of the explanatory variable parameter in the one-dimensional linear regression model of individualism and income per worker built in the original paper is 0.030, and the correlation coefficient in our replicated regression results is 0.0158, which approximates 0.016 and also yields a relatively significant result.

In the original paper, researchers used total factor productivity data from Hall and Jones (1999), we use data from Penn World Table version 10.0 on TFP levels for different countries in 2019 at current purchasing power parity. Our sample of observations is also smaller than the original literature with 77 observations, the number is 66. It is difficult to determine the exact difference between the two data sets because of the different sources, years and methods of data collection. In the original article, the correlation coefficient between individualism and log total factor productivity from Hall and Jones (1999) was 0.013, and in our regression results the regression coefficient was 0.003, again yielding relatively significant results.

Next, we can start doing the same linear analysis with the variables we are concerned with. The results are as follows.

4.1 Regression Framework

$$\text{LIPWR}_i = a + \beta \text{CUL}_i + \epsilon_i \quad (1)$$

where LIPWR is the log income per worker of country i , and CUL represents the particular cultural variable used as the explanatory variable that varies across questions.

The regression results are reported in Table 1.

$$\text{LCTFP}_i = a + \beta \text{CUL}_i + \epsilon_i \quad (2)$$

where LCTFP is the log total factor productivity of country i , and CUL represents the particular cultural

variable used as the explanatory variable that varies across questions.

The regression results are reported in Table 2.

4.2 Individualism and Power Distance

Tables 1 and 2 present OLS estimates of the basic specification, with the dependent variables being log income per worker and total factor productivity. The regression coefficient between individualism and income per worker in the first column is 0.016. The specific implication is that for every 1-unit increase in individualism, the log income per worker increase by 1.6 percent. Since this model is estimated from crosssectional data, the R² value is relatively low, which implies that the fit is also low. In the paper on Culture, Institutions And National Wealth Gorodnichenko and Roland (2017), the regression coefficient of individualism on log income per worker is 0.030, which is a more significant effect. The difference in the data may be due to fewer observations in our data, as well as other influencing factors. In contrast to the former, the regression coefficient of individualism on total factor productivity is 0.003, and the coefficient, although positive, is insignificant.

In the second column, power distance has a negative effect on two economic outcomes, income per worker and total factor productivity. The basic implication of the regression coefficient is that for every 1 unit increase in power distance, the log income per worker decreases by 1.7 percent and total factor productivity decreases by 0.4 percent. We can explain this phenomenon by real examples. For instance, countries with lower power distance have less hierarchical differences between people, focus on solidarity and pay more attention to each individual's ability. Conversely, the greater the power distance, the more rigid the hierarchy may be, which can have a negative impact on economic outcomes.

4.3 Patience and Long-Term Orientation

The correlation coefficient between patience and log income per worker in the fourth column is 1.401, and the correlation with total factor productivity is 0.239. This means that for every 1 unit increase in patience, log income per worker increase by 140.1 percent, while at the same time total factor productivity increases by 23.9 percent. This reflects the fact that cultural traits may have a significant impact on economic outcomes, especially qualities like patience that may increase efficiency and reduce mistakes. But

long-term orientations, which are also excellent at improving work precision, don't have as large a positive impact as patience. For each unit increase in the long-term orientation in the third column, the log income per worker increases by 1.4 percent. The effect of long-term orientation on total factor productivity is 0.

4.4 Risk Attitude

In the sixth column, the coefficient on risk-taking is -0.428. It indicates that for every 1 unit increase in risk-taking, the log income per worker decreases by 42.8 percent. In the regression table with total factor productivity as the dependent variable, the coefficient on risk-taking is -0.012, indicating that for every 1 unit increase in risk-taking, total factor productivity decreases by 1.2 percent. Obviously, in countries with risk-taking spirit, in such a social atmosphere, there may be an influx of risk-takers, but this also largely increases the chances of people making mistakes and bad decisions at work, and the probability of making bad economic decisions in the national government sector increases. For example, the Argentine government made it illegal for the Central Bank to print money and had to rely on foreign debt to increase its currency reserves, leading to the devaluation of the Argentine currency. The resulting negative impact is directly reflected in the income level of the population. It also gradually makes the level of output that can be obtained from the input factors of production gradually decrease.

4.5 Social Preference

The trust located in the fifth column increases the log income per worker by 133 percent and total factor productivity by 23.8 percent for every 1 unit increase. This means that the regression coefficients between the independent and dependent variables are 1.330 and 0.238, respectively. The other two social preferences are positive reciprocity and negative reciprocity, which are located in the seventh and eighth columns, respectively. Both of these two preference independent variables have a significant effect on log income and total factor productivity per worker. For each unit increase in positive reciprocity, log income increases by 50.8 percent, and for each unit increase in negative reciprocity, log income increases by 119.1 percent. The effects for total factor productivity are 13.2 percent and 10.3 percent, respectively.

4.6 Robustness of the Findings

This thesis is the result of an in-depth study based on some of the results of previous studies, so it is important to verify the accuracy of the reference

data to ensure the smooth implementation of the next study. In addition, the regression framework of this paper is too simple due to the lack of instrumental and control variables, which also can't guarantee the accuracy of the study results to be very high. The only way to clarify the causal relationship in the experiment is to use control variables to control variables other than the independent variable that can cause changes in the dependent variable. After solving the complex endogeneity problem with instrumental variables, it is possible to make the obtained results as close to the real results as possible. We should control for the different continental geographic locations, cultural differences caused by immigration and differences in preferences used in the papers that are closely followed in this thesis Gorodnichenko and Roland (2017).

We need to control other determinants of economic growth, including institutions, human capital, legal sources, ethnic divisions, gender, age, and so on. Only in this way can the article be more convincing.

5 CONCLUSIONS

Based on the fact that individualism affects income and productivity, we found that individualism, power distance, long-term orientation, patience, trust, and positive/negative reciprocity all positively or negatively affect each worker's income and total factor productivity.

Despite these conclusions, there are some shortcomings in the article. Introducing more dependent variables would make the conclusion that cultural characteristics affect economic outcomes more convincing. In addition, the paper doesn't invoke instrumental variables to address the endogeneity between cultural characteristics and dependent variables. Because the relationship between culture and economy is very complex, it is difficult for us to find exogenous variables that affect the endogenous variables. We hope that this paper will lead to a better understanding of the impact of cultural dimensions and preference characteristics on the economy and raise the importance of cultural characteristics when studying economic outcomes.

6 FIGURES AND TABLES

6.1 Heat Map

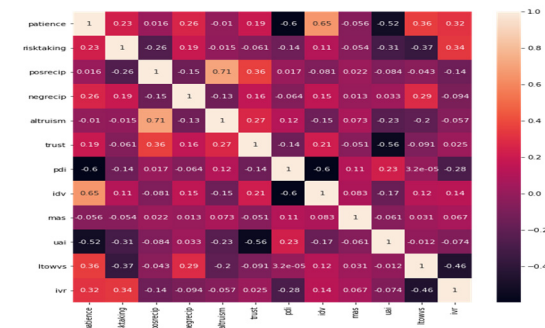
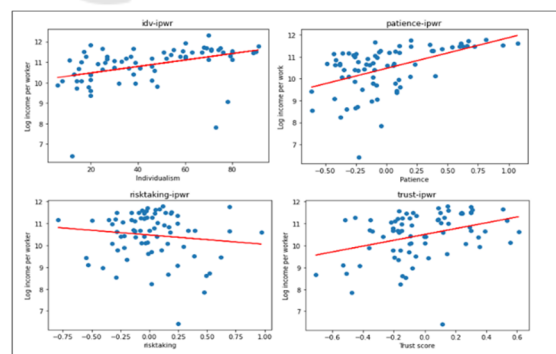


Figure 1: Correlation between different cultural and preference measures

Notes.—Source: cultural economic data comes from Geert Hofstede's Six-dimensional Cultural Index and Global Preferences Survey. Idv is Hofstede's index of Individualism. pdi is Hofstede's index of Power Distance. Ltowvs is Hofstede's index of Long-term Orientation. posrecip is The Global Preference Survey's a preference measure of Positive Reciprocity. negrecip is The Global Preference Survey's a preference measure of Negative Reciprocity. Mas is The Global Preference Survey's a preference measure of Masculinity. uai is The Global Preference Survey's a preference measure of Uncertainty Avoidance. Ivr is The Global Preference Survey's a preference measure of Indulgence vs. Restraint.

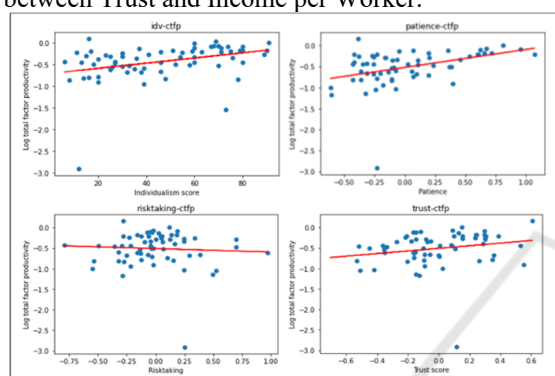
6.2 Scatter Plot



(a) Log Income Per Worker

a. Notes.—Source: cultural economic data comes from Geert Hofstede's Six-dimensional Cultural Index and Global Preferences Survey. idv is Hofstede's

's index of Individualism. patience is The Global Preference Survey's a preference measure of Patience. trust is The Global Preference Survey's a preference measure of Trust. risktaking is The Global Preference Survey's a preference measure of Risk-taking. ipwr is log income per worker in 2019 from the Penn World Tables. idv-ipwr means the relationship between Individualism and Income per Worker. patience-ipwr means the relationship between Patience and Income per Worker. risktaking-ipwr means the relationship between Risk-taking and Income per Worker. trust-ipwr means the relationship between Trust and Income per Worker.



(b) Log Total Factor Productivity

b. Notes.—Source: cultural economic data comes from Geert Hofstede's Six-dimensional Cultural Index and Global Preferences Survey. idv is Hofstede's index of Individualism. patience is The Global Preference Survey's a preference measure of Patience. trust is The Global Preference Survey's a preference measure of Trust. risktaking is The Global Preference Survey's a preference measure of Risk-taking. ctfp is log total factor productivity in 2019 from the Penn World Tables. idv-ipwr means the relationship

between Individualism and Income per Worker. patience-ipwr means the relationship between Patience and Income per Worker. risktaking-ipwr means the relationship between Risk-taking and Income per Worker. trust-ipwr means the relationship between Trust and Income per Worker.

6.3 Table

Table 1: Cultural/preferential characteristics and log income per worker.

	Dependent variable: ipwr							
	Individualism	Power distance	Long-time orientation	patience	trust	Risk-taking	Positive reciprocity	Negative reciprocity
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Intercept	10.152*** (0.216)	11.856*** (0.305)	10.073*** (0.209)	10.473*** (0.107)	10.507*** (0.116)	10.477*** (0.122)	10.481*** (0.122)	10.460*** (0.117)
idv	0.016*** (0.004)							
ltowvs			0.014*** (0.004)					
negrecip								1.101*** (0.427)
patience				1.401*** (0.291)				
pdi		-0.017*** (0.005)						
posrecip							0.508 (0.158)	
rtsk						-0.428 (0.405)		
trust					1.330*** (0.420)			
Observations	72	72	94	75	75	75	75	75
R ²	0.163	0.148	0.116	0.241	0.121	0.015	0.027	0.096
Adjusted R ²	0.152	0.136	0.107	0.231	0.109	0.002	0.014	0.084
Residual								
Std. Error	0.868 (df=70)	0.876 (df=70)	0.915 (df=92)	0.929 (df=73)	1.000 (df=73)	1.058 (df=73)	1.052 (df=73)	1.014 (df=73)
F Statistic	13.679*** (df=1, 70)	12.199*** (df=1, 70)	12.114*** (df=1, 92)	23.210*** (df=1, 73)	10.011*** (df=1, 73)	1.114 (df=1, 73)	2.017 (df=1, 73)	7.724*** (df=1, 73)

Note: *p<0.1; **p<0.05; ***p<0.01

Notes.—Source: The dependent variable is log income per worker in 2019 from the Penn World Tables. idv is Hofstede's index of Individualism. pdi is Hofstede's index of Power Distance. ltowvs is Hofstede's index of Long-term Orientation. patience is a preference measure collected by The Global Preference Survey. Trust is a preference measure collected by The Global Preference Survey. rtsk is The Global Preference Survey's a preference measure of Risk-taking. posrecip is The Global Preference Survey's a preference measure of Positive Reciprocity. negrecip is The Global Preference Survey's a preference measure of Negative Reciprocity.

Table 2: cultural/preferential characteristics and log total factor productivity

	Dependent variable: ctfp							
	Individualism	Power distance	Long-time orientation	patience	trust	Risk-taking	Positive reciprocity	Negative reciprocity
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Intercept	0.536*** (0.048)	0.946*** (0.061)	0.685*** (0.055)	0.637*** (0.023)	0.643*** (0.024)	0.642*** (0.026)	0.646*** (0.025)	0.641*** (0.026)
idv	0.003*** (0.001)							
ltowvs			-0.000 (0.001)					
negrecip								0.103
patience				0.230*** (0.058)				
pdi		-0.004*** (0.001)						
posrecip							0.132* (0.073)	
rtsk						-0.012 (0.084)		
trust					0.238** (0.091)			
Observations	66	66	78	62	62	62	62	62
R ²	0.167	0.242	0.000	0.222	0.103	0.000	0.051	0.021
Adjusted R ²	0.154	0.230	-0.013	0.209	0.088	-0.016	0.035	0.005
Residual								
Std. Error	0.181 (df=64)	0.172 (df=64)	0.221 (df=76)	0.179 (df=60)	0.192 (df=60)	0.203 (df=60)	0.198 (df=60)	0.201 (df=60)
F Statistic	12.834*** (df=1, 64)	20.417*** (df=1, 64)	0.003*** (df=1, 76)	17.121*** (df=1, 60)	6.889*** (df=1, 60)	0.022 (df=1, 60)	3.237* (df=1, 60)	1.209*** (df=1, 60)

Note: *p<0.1; **p<0.05; ***p<0.01

b.Notes.—Source: The dependent variable is log total factor productivity in 2019 from the Penn World Tables. *idv* is Hofstede's index of Individualism. *pdi* is Hofstede's index of Power Distance. *ltowvs* is Hofstede's index of Long-term Orientation. *patience* is a preference measure collected by The Global Preference Survey. *Trust* is a preference measure collected by The Global Preference Survey. *rksk* is The Global Preference Survey's a preference measure of Risk-taking. *posrecip* is The Global Preference Survey's a preference measure of Positive Reciprocity. *negrecip* is The Global Preference Survey's a preference measure of Negative Reciprocity.

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