# Individualism and Innovation: Unraveling Culture's Influence Across Time*

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**Abstract**

This paper examines the impact of individualism on innovation and economic development over time. I begin by extending the cross-country literature, using the same time-invariant cultural measures but incorporating a longer time horizon and additional control variables. The estimated effects of individualism are inconsistent across specifications and time periods, particularly when I control for institutions. To address the limitations of time-invariant measures, I then turn to a within-U.S. analysis and construct time-varying, ancestry-based measures of individualism. This variation enables the use of fixed effects to capture local institutions and isolate the influence of culture. The results suggest that individualism either has a negative impact or no significant effect on innovation and economic development, in contrast to the prevailing findings in the existing literature.

*Keywords:* culture, innovation, economic development, economic growth

*JEL Classification:* O47 Z13

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# 1 Introduction

Culture is widely recognized as a fundamental driver of economic development. Economists have studied culture's influence on economic development since Max Weber's seminal work, *The Protestant Ethic and the Spirit of Capitalism*. Hofstede et al. (2005) defines culture as the collective mental programming that distinguishes one group from another. This definition implies two primary channels through which culture influences the economy. First, culture shapes individual preferences and incentives. Cultural traits can enter utility functions and affect individual behaviors. For instance, long-term orientation, which could be linked to the discount factor, is associated with higher returns on agricultural investment in preindustrial times and could influence technological adoption, education, and savings in modern societies (Galor and Özak (2016)). Second, because culture is a shared feature within groups, it shapes social norms, collective identity, and social interactions. Trust is a good example to illustrate this case. It reflects individuals' expectations of cooperation and plays a critical role in enhancing investment and growth (Zak and Knack (2001)).

Among cultural traits, individualism is seen as one of the key dimensions of cultural differences among countries (Heine (2010)). As stated by Hofstede et al. (2005), individualism measures the looseness of ties between individuals in societies. A more individualistic society values personal goals and development. Such a society encourages individuals to care for themselves or their families. A more collectivist society, on the contrary, emphasizes harmony and conformity. Individualism is commonly believed to influence both innovation (Gorodnichenko and Roland (2017)) and institutions (Greif (1994)). However, those two channels can interact. Individualism could be stabilized through laws or institutions, such as property rights or patent systems, and influence innovation indirectly. This paper focuses on the direct influence of individualism on innovation and economic development, and attempts to disentangle the role of culture from that of formal institutions.

Like other cultural traits, individualism impacts innovation through motivations and social interactions. In individualistic societies, standing out is valued, and individuals who innovate are often rewarded with higher social status and financial returns (Gorodnichenko and Roland, 2017). These incentives can encourage more innovation and lead to faster economic growth. In contrast, collectivist societies tend to reward individuals who contribute to group goals. While this may reduce personal incentives for innovation, it can increase collaboration by aligning individual efforts with collective goals. However, there is literature suggesting that the probability of entrepreneurship is the highest in an environment that

balances individualism and collectivism (Morris et al., 1993).

To explore the direct influence of individualism on innovation and economic development, I first revisit the cross-country analysis using static individualism measures, extending previous literature with more control variables and a longer time scope. Following prior studies, I use the index constructed by Dutch sociologist Geert Hofstede as the contemporary measure of country-level individualism. It is calculated based on a survey conducted among local employees of IBM in over 100 countries (Hofstede et al., 2005). One potential disadvantage of contemporary measures is that they might lead to reverse causality. Innovation and economic growth could result from one society's values and beliefs, but could also reshape its culture and attitudes. To address this concern, this paper also introduces several historical measures of individualism. The first group of measures indicates pronoun drops based on the main languages spoken in that country. Those measures from Kashima and Kashima (1998) and Davis and Abdurazokzoda (2016) capture whether the primary official language allows the speaker to omit the first- and second-person subject pronouns. The explicit use of pronouns highlights the speaker and the listener and suggests a high level of individualism. In contrast, omitting the pronouns suggests a subtle agreement and closeness between the speaker and listener, thus indicating a lower level of individualism.

The second group of historical measures is based on the prevalence of historical diseases within one country, as reported by Murray and Schaller (2010). It has been shown that a lower prevalence of historical diseases leads to fewer interactions and higher levels of individualism. I use Hofstede's index to run the OLS regressions and employ other historical measures as instruments or proxies. I analyze individualism's influence on log GDP per capita, Total Factor Productivity, and patents. The results demonstrate the inconsistency of individualism's impact after considering controls, especially institutions, and across time. This inconsistency highlights the need to differentiate between the direct impact of individualism and the influence of formal institutions.

To alleviate concerns about omitted variable bias and time inconsistency in the country-level analysis, I explore the impact of individualism on economic development and innovation within the US by constructing time-varying individualism measures. Following the idea that immigrants bring their country's individualism level to the county group, I calculate the individualism level of each county group as the weighted average of the country-level individualism measure, given the ancestries of immigrants as the weight. I employ the ancestry composition data from Fulford et al. (2020).

Compared with the existing literature focusing on modern times at the country level, the analysis within the U.S. can be dated to 1850. The extended time scope of this research could help explore the trend of individualism's influence over time. To see this point more clearly, Figure 1 illustrates the average ratio of important technologies adopted by China and the UK at different times (Comin et al. (2010)). Here, I use technology adoption as a proxy for innovation because it is difficult to determine the origins of technologies in ancient times. In 1000 BC, the technology adoption ratios in China and the UK were identical. In 0 AD, China exhibited a relatively higher technology adoption rate. However, this trend was reversed in 1500 AD. By 2000 AD, the technology adoption gap between China and the UK had widened significantly. Given that the UK is more individualist than China, these variations suggest that the sign and magnitude of individualism's impact on innovation may vary over time. This paper contributes to the literature by exploring the long-term impact of individualism, capturing its time-variant effect on innovation and economic development.

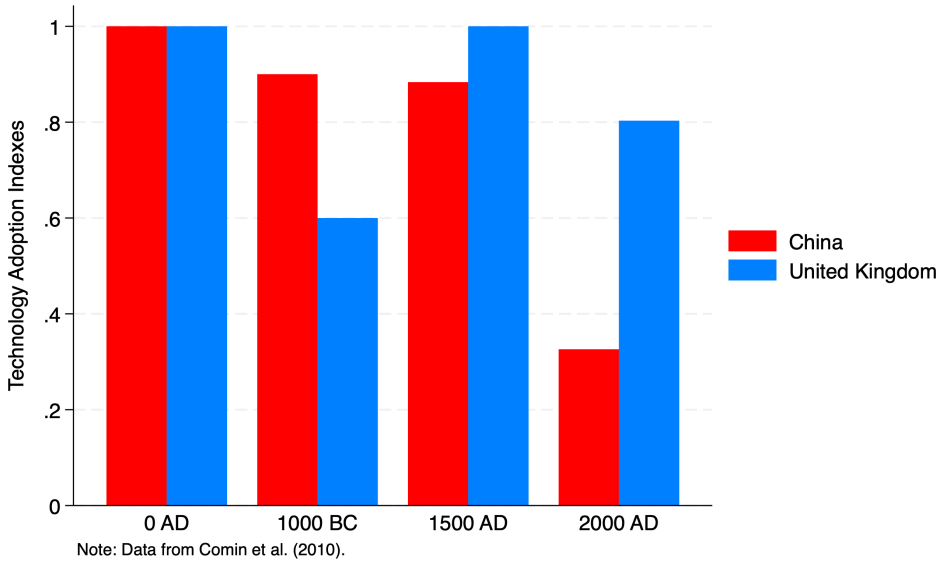



Figure 1: Individualism and Technology Adoption across years

Another limitation in the existing literature stems from the static measures of individualism across countries. While some scholars believe culture remains stable over time, emerging evidence suggests that economic performance can impact culture, leading to changes in values as societies progress through different development stages (Inglehart (2005)). Additionally, invariant individualism measures hinder the integration of country fixed effects. In the current literature, differentiating the impacts of individualism from institutions is mainly

achieved by using country-level controls, such as the institution index. Those methodologies are susceptible to omitted variable bias due to the complexity of institutional dimensions. This paper contributes to the literature by including a within-U.S. analysis with constructed time-changing measures of individualism. Given the U.S.'s history as a nation of immigrants, this study builds an ancestry-weighted individualism measure that varies over time for each country group. This approach allows for the control of institutions not only at the national but also at the local level through the inclusion of local fixed effects and thus alleviates the omitted variable bias and distinguishes the influence of culture from formal institutions.

Apart from the cultural literature, this paper can also be categorized as a study regarding immigrants' influence within the US. Many studies have shown that immigrants can impact local economic development. The question is: which dimension do immigrants bring with them that matters? Is it the skill or the cultural values? This paper contributes to the discussion by studying individualism, a crucial aspect of culture. I construct the individualism measure for each county group as the ancestry-weighted average of the national-level individualism measures. These constructed measures can be viewed not only as indicators of individualism in each place but also as cultural aspects contributed by immigrant groups. Based on the persistent transmission of culture among immigrants across generations (Giavazzi et al. (2019)), ancestry should be a great channel to study how immigrants' cultural values influence American society. This paper contributes to the literature by studying the influence of one particular cultural trait brought by immigrants.

One concern for the within-US analysis is that immigration could correlate with many features of the destination places, such as economic development and education levels. Therefore, I include county group level controls and use instrument variables for ancestry weight and country-level individualism measures. The results indicate that individualism could decrease economic development and innovation, or it may have no significant influence, which is the opposite of the conclusions in the previous literature. Considering that this paper employs IV regressions to deal with endogeneity while using time and local fixed effects to alleviate the omitted variable bias, these results should be more reliable. The contradiction between previous literature and my findings is worth exploring. Possible explanations are not limited to potential bias in prior country-level analysis. The results of this study may only apply to extremely individualistic societies, considering the US as the most individualistic country in the world. A more collectivist culture could enhance collaboration for innovation in an extremely individualist society. We cannot rule out the possibility that the influence of individualism on innovation and economic development varies across societies.

The rest of the paper is structured as follows. In section 2, I review related literature. In Section 3, I revisit the analysis exploring the impact of individualism on economic development, TFP, and innovation across countries with extended data and more controls. In section 4, I explain the analysis within the US. Section 5 concludes.

# 2 Related Literature

This paper contributes to the literature on the influence of culture, particularly individualism, on innovation and economic development across and within countries. Economists have long studied how culture influences economic development and growth. It has been shown that culture impacts both individual motivations and social interactions. For instance, prior research has highlighted the role of cultural values, such as long-term orientation (Dohmen et al., 2015; Galor and Özak, 2016) and religions (Becker and Woessmann, 2009), in shaping individual motivation and behavior. Meanwhile, other papers have examined how cultural traits like family ties (Alesina and Giuliano, 2014; Andersen et al., 2017) and trust (Zak and Knack, 2001) affect social interactions and consequently economic performance. Building on those studies, this paper specifically focuses on individualism and its impact on innovation and economic development. Within the literature focusing on the influence of individualism across countries, the most related work is Gorodnichenko and Roland (2011), which highlights the role of individualism in driving long-term economic growth across countries, compared with other cultural dimensions such as power distance, uncertainty avoidance, and long-term orientation. Their follow-up work, Gorodnichenko and Roland (2017), further studies the influence of individualism on innovation and economic development across countries in the year 2000 using more instruments and controls. In these two papers, the authors use static cross-country culture measures in their regression analysis. Though it is commonly believed that culture is relatively stable over time within one society, people's values and beliefs can evolve due to economic development and cultural communications. Ignoring the evolution of cultural values can lead to inaccurate analysis. Furthermore, applying static culture measures prevents the inclusion of country-level fixed effects, leading to biased estimation. This is particularly problematic when distinguishing between the effects of culture and formal institutions. Many institutional features are stabilized cultural norms, and including fixed effects is a good strategy to control for institutional characteristics. However, country fixed effects cannot be used if culture measures are stable, and control variables may not fully capture all aspects of institutions. My work first contributes to this

area by extending the previous cross-country analysis with more controls and a longer time scope. My paper also extends these studies by conducting a within-U.S. analysis using time-changing ancestry-weighted individualism measures over a longer time, alleviating omitted variable bias. Given that the US is a nation formed of immigrants and cultural traits are often passed down from parents to children through generations (Giavazzi et al. (2019)), the ancestry-based cultural index should provide a reliable measure for the local individualism level across time. This time-changing measure effectively reduces the omitted variable bias by including a local fixed effect. Additionally, my paper extends the investigation back to 1850, providing a more comprehensive view of how individualism influences innovation and economic development across time.

This paper also relates to the literature investigating the influence of individualism at the subnational level, particularly within the US. The most relevant study is Bazzi et al. (2020), which explores the frontier experience as the historical roots of individualism. They first show that longer frontier experiences during early US history could lead to higher levels of individualism in modern times. Additionally, they find that a longer frontier experience would bring stronger opposition to redistribution and regulation. While their paper provides one historical origin of individualism within the US and how it impacts political outcomes, my paper offers a different perspective based on immigration history across time, demonstrating how this inherited individualism influences innovation and economic development. Moreover, the stable nature of frontier experience brought by its construction prevents the analysis from capturing changes in the individualism measure and its influence over time.

Finally, this paper can be categorized as part of studies exploring the influence of immigrants within the US. Sequeira et al. (2020) confirms the positive role of immigrants in advancing economic development and employment at the US county level. More concretely, Fulford et al. (2020) studies the impact of ancestry composition on economic performance, focusing on characteristics brought by immigration from their countries of origin, such as GDP levels, cultural traits that favor cooperation, and the long history of a centralized state. On the other hand, Ottinger (2020) demonstrates how the skills brought by immigrants help shape a stable spatial pattern of manufacturing industries within the US. Due to culture's long-term influence across generations and individualism's impact on innovation and economic development, as studied at the country level, this paper examines how individualism brought by immigrants affects innovation and the economy within the US.

# 3 Cross-country Analysis

In this section, I revisit the cross-country analysis that explores the effect of individualism on economic development, TFP, and innovation. Though I am using stable individualism measures as the previous studies do, this part extends the literature by introducing more controls and dependent variables over a longer period. This section aims to examine the stability of individualism's influence across countries by incorporating more control variables over a longer period. If individualism's impact varies under different specifications, I will explore it within the US, where I can apply time-changing individualism measures over a longer period and use fixed effects to alleviate estimation bias.

## 3.1 Cross-country level data

Scholars have built both contemporary and historical individualism measures across countries. I use the index developed by Dutch sociologist Geert Hofstede, as described in Hofstede et al. (2005), for the contemporary cross-country measure of individualism. The index is derived from a questionnaire survey conducted among employees in the local subsidiaries of IBM in over 100 countries. In the survey, all questions are translated by a team consisting of English and local language speakers to ensure accuracy.

When using contemporary measures, we may face the issue of reverse causality. Culture could influence innovation and economic development, while economic performance could shape cultural values in reverse, potentially leading to biased estimation. In addition, contemporary culture measures could be correlated with many modern time control variables. To address those concerns, I use several historical measures of individualism as instruments and proxies. One such measure is the indicator for pronoun drop, based on the work of Kashima and Kashima (1998) and Davis and Abdurazokzoda (2016), which has been shown in the prior literature to correlate with individualism levels across countries. Those two measures reflect whether the main official language of a country allows the omission of the first- and second-person subject pronouns. For instance, in English, the first-person subject pronoun "I" cannot be omitted, whereas in Japanese, the omission of the first-person subject pronoun is allowed. The explicit use of the first-person and second-person subject pronouns highlights the speaker and listener. On the other hand, omitting the pronouns suggests a closer relationship between the two sides of the conversation. Compared with Kashima and Kashima (1998), the pronoun drop index from Davis and Abdurazokzoda (2016) is calculated based on a better linguistic dataset and contains data for more countries.

Apart from language-based individualism measures, I use the prevalence of historical diseases as another historical measure of individualism. According to Murray and Schaller (2010), regions with a low prevalence of historical infectious diseases tend to have fewer interactions between groups, resulting in higher levels of individualism. Following their paper, I use an index of the prevalence of nine historical diseases (leishmania, schistosomes, trypanosomes, leprosy, malaria, typhus, filariae, dengue, and tuberculosis) and a separate index excluding leprosy and tuberculosis. Compared with the index calculated from nine diseases, the index of seven historical diseases provides data for more countries.

As for dependent variables, following Gorodnichenko and Roland (2017), I use log GDP per capita from Bolt and Van Zanden (2020) and total factor productivity data from Feenstra et al. (2015) to explore the impact of individualism on economic development. To determine whether individualism influences economic development through innovation, I examine its impact on patents using data from WIPO. Control variables include geographic characteristics (longitude, absolute latitude, elevation, and landlock), religions (shares of Christian and Muslim from Zurlo (2025)), legal origins, and institutions (private properties from Coppedge et al. (2025)).

## 3.2 Empirical Methodology

### 3.2.1 OLS regressions

A standard OLS regression model is first applied in the world-level analysis. For each country $i$ at time $t$ located in continent $j$, the regression equation is as follows:

$$Y_{it} = \alpha_0 + \alpha_1 Idv_i + \boldsymbol{\alpha_2 X_{it}} + \gamma_t + \phi_j + \omega_{tj} + \epsilon_{it} \tag{1}$$

$Y_{it}$ represents the dependent variables we are interested in for country $i$ at time $t$, including log GDP per capita, Total Factor Productivity, and log patent per capita. $Idv_i$ stands for the individualism level of country $i$ from Hofstede et al. (2005). Note that the culture measure has no year subscription $t$ since it's stable across time. $\boldsymbol{X_{it}}$ includes control variables consisting of geographical characteristics, religions, legal origins, and institutional controls. Year fixed effect $\gamma_t$, continent fixed effects $\phi_j$ as well as their interaction $\omega_{tj}$, are controlled in the specification.

### 3.2.2 IV regression

We can't rule out the possibility that some variables may correlate with both the dependent variables and individualism. Therefore, I use historical measures based on the pronoun drop and the prevalence of historical diseases as the instrument variables for Hofstede's index. The following two equations can explain the empirical strategy for the Two-Stage Least Squares. In the first stage, for each instrument variable, I regress Hofstede's index on the historical measure and other control variables:

$$Idv_i = \eta_0 + \eta_1 IV_i + \boldsymbol{\eta_2 X_i} + \epsilon_{it} \tag{2}$$

Again, $Idv_i$ indicates Hofstede's index for country $i$. $IV_i$ stands for each of the four historical measures of individualism based on pronoun drops and the prevalence of historical diseases. After the regression, I obtain the estimated value of the individualism index $\widehat{Idv_t}$. In the second stage, I regress log GDP per capita, total factor productivity, or log patent per capita on the predicted value $\widehat{Idv_t}$:

$$Y_{it} = \theta_0 + \theta_1 \widehat{Idv_i} + \gamma_t + \phi_j + \omega_{tj} + \epsilon_{it} \tag{3}$$

Continent and year-fixed effects, as well as their interaction term, are included.

### 3.2.3 Binsreg regression

Next, I divide countries into groups based on the quantiles of their individualism levels and estimate the marginal influence of individualism on the dependent variable.

$$Y_{it} = \kappa_0 + \kappa_1 IDVquant_i + \kappa_2 \boldsymbol{X}_{it} + \gamma_t + \tau_i + \omega_{tj} + \epsilon_{it} \tag{4}$$

$IDVquant_i$ indicates the category of Hofstede's index.

### 3.2.4 Margin-based analysis

The last method measures the marginal impact of individualism's influence across years. To be more specific, the estimate uses the following equation:

$$Y_{it} = \beta_0 + \gamma_t + \beta_1(Year \times IDVquant_i) + \beta_2 \boldsymbol{X}_{it} + \tau_i + \epsilon_{it} \tag{5}$$

$Y_{it}$ is the dependent variable, which can be log GDP per capita, TFP, or log patent per capita. $IDVquant_i$ demonstrates the category variable that divides countries into groups based on quantiles. I also consider country fixed effects in this specification. $\beta_1$ is the coefficient we are interested in. Given that I have controlled for year and country fixed effects, $\beta_2$ should capture the influence of individualism levels across years.

## 3.3 Cross-country level results

### 3.3.1 GDP per capita

Table 1 shows the regression result for log GDP per capita. Panel A lists the results for OLS regressions. Panel B shows the results when using the pronoun drop index from Davis and Abdurazokzoda (2016) as the instrument. Panel C indicates the result when using the pronoun drop index as a proxy. Column (1) shows the results with continent and year effects but without other controls. Columns (2) - (5) add controls regarding geography, religions, legal origins, and property rights, respectively. Column (6) is the result with fixed effects as well as all controls. In Panel A, the influence of individualism on economic development decreases when we add controls. In Panel B, the results are more challenging to interpret. First, the influence of individualism decreases when controlling for legal origins. However, when we add other controls such as geography, religions, and property rights, the influence of individualism increases. This indicates that some controls could be correlated with the instruments and make the estimation biased. So next, I use those historical measures as the proxy instead in Panel C. The magnitude or significance of individualism's impact disappears when considering controls, except for religions. The inconsistency of the coefficients indicates that historical measures might be highly correlated with different control variables. At the country level, it's very hard to distinguish the influence of individualism from other control variables. Results based on other historical measures are listed in the Appendix.

To illustrate the results more intuitively, I also conduct binsreg regressions with and with-

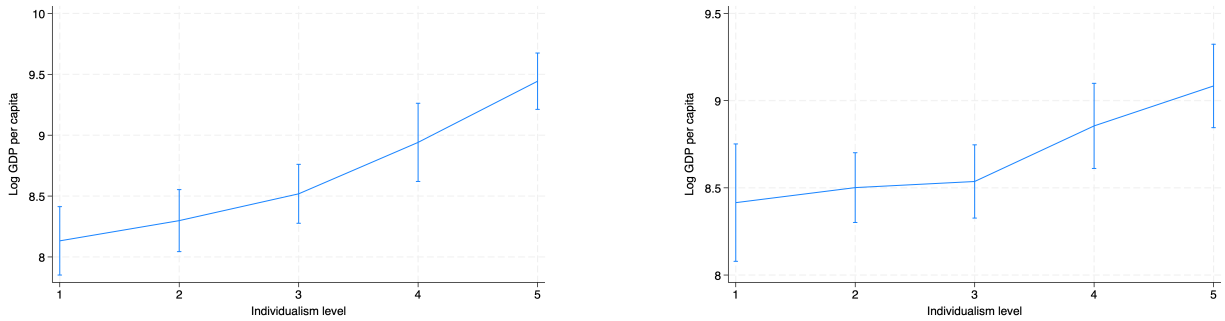
Table 1: Individualism and Economic Development across countries

| | Log GDP per capita | | | | | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| **Panel A: OLS Regression** | | | | | | |
| Individualism | 0.492*** | 0.436*** | 0.491*** | 0.348*** | 0.418*** | 0.242*** |
| | (0.08) | (0.10) | (0.08) | (0.07) | (0.09) | (0.09) |
| Adjusted-$R^2$ | 0.74 | 0.75 | 0.75 | 0.79 | 0.76 | 0.80 |
| Observations | 7199 | 7199 | 7199 | 7199 | 7199 | 7199 |
| **Panel B: IV = DA** | | | | | | |
| Individualism | 0.952*** | 1.059* | 0.980*** | 0.722* | 0.970** | 0.915 |
| | (0.32) | (0.54) | (0.34) | (0.40) | (0.43) | (1.11) |
| Adjusted-$R^2$ | -0.17 | -0.04 | -0.19 | 0.16 | -0.20 | 0.17 |
| 1st Stage F | 5.20 | 3.42 | 5.37 | 1.90 | 3.43 | 0.91 |
| Observations | 6584 | 6584 | 6584 | 6584 | 6584 | 6584 |
| **Panel C: Proxy = DA** | | | | | | |
| Individualism | 0.471*** | 0.367** | 0.506*** | 0.254 | 0.369*** | 0.137 |
| | (0.15) | (0.16) | (0.16) | (0.17) | (0.14) | (0.14) |
| Adjusted-$R^2$ | 0.70 | 0.79 | 0.71 | 0.76 | 0.73 | 0.84 |
| Observations | 7075 | 7075 | 7075 | 7075 | 7075 | 7075 |
| Geo controls | No | Yes | No | No | No | Yes |
| Religions | No | No | Yes | No | No | Yes |
| Legal Origins | No | No | No | Yes | No | Yes |
| Property Right | No | No | No | No | Yes | Yes |
| Continent FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes |

Note: Standard errors are clustered at the country and year level.

out controls. The results are listed in Figure 2. The analysis categorizes the standardized Hofstede's index into five bins. Each point in the picture indicates the estimated log GDP per capita within each group, and the curve demonstrates the quadratic regression estimation across groups. Compared with picture (a), when we add all the controls in picture (b), the relationship between log GDP per capita and individualism becomes flatter, indicating that individualism's influence is inconsistent when considering controls.

Next, I apply the margin-based analysis. Figure 3 shows the results. In the picture, each




(a) without controls (b) with controls

Figure 2: Binsreg Regression for economic development across countries

line indicates the estimated Log GDP per capita based on the interaction of the individualism group and year. In the picture, countries with a medium level of individualism exhibited the highest economic development performance before 1940. However, after that, highly individualistic countries became more advanced in economic development. The margin-based analysis demonstrates that the effect of individualism is time-changing.

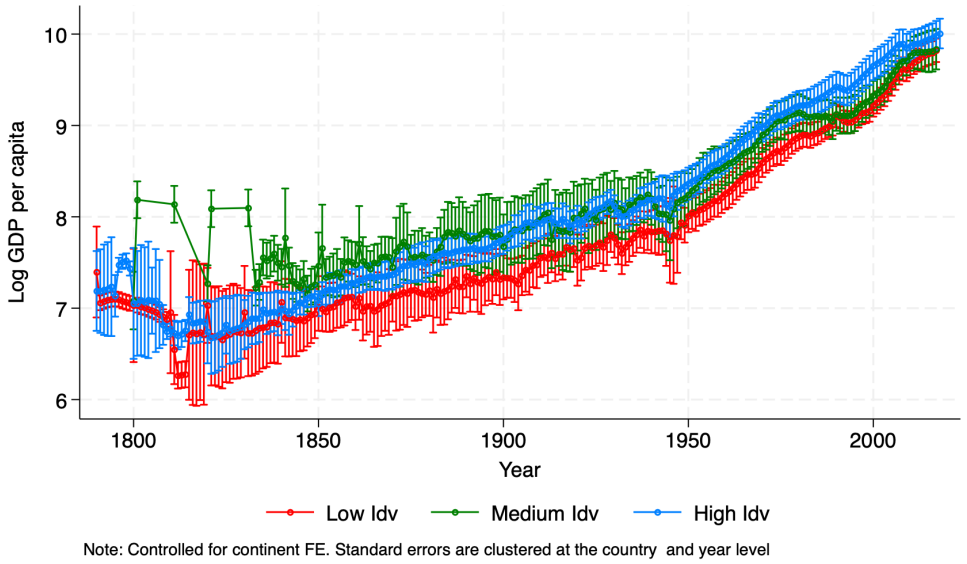



Figure 3: Individualism's impact on economic development across time

### 3.3.2 Total Factor Productivity

Following Gorodnichenko and Roland (2017), I also explore the influence of individualism on Total Factor Productivity. Like Table 1, Table 2 presents the estimation based on OLS, IV,

and the proxy in Panels A, B, and C, respectively. In Panel A, the impact of individualism is significant and positive in the column when we only consider continent and year fixed effects. However, when we add controls from Column (2) to (6), the magnitude or significance drops. Moreover, when using the pronoun drop as the IV or Proxy in Panel B or Panel C, all of the significance disappears. The table shows that the influence of individualism on TFP is inconsistent across different specifications.

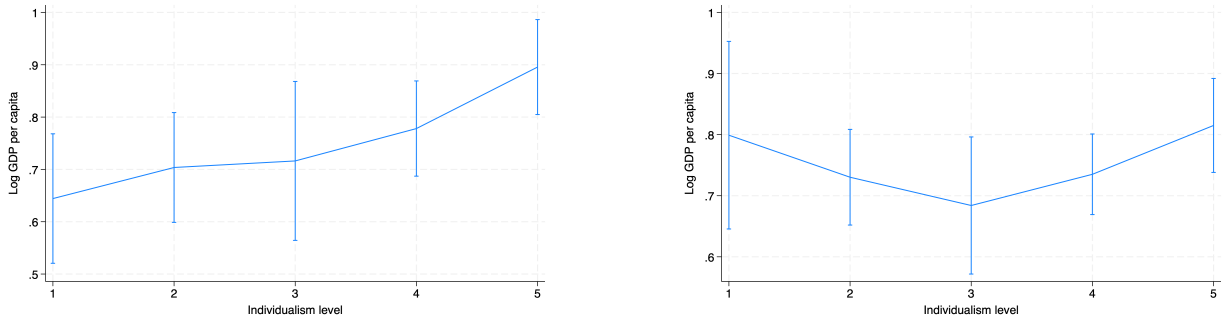
Table 2: Individualism and TFP across countries

| | Total Factor Productivity | | | | | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| **Panel A: OLS Regression** | | | | | | |
| Individualism | 0.088*** | 0.039 | 0.059* | 0.083*** | 0.079** | 0.004 |
| | (0.03) | (0.03) | (0.03) | (0.03) | (0.03) | (0.03) |
| Adjusted-$R^2$ | 0.18 | 0.27 | 0.29 | 0.29 | 0.20 | 0.39 |
| Observations | 3848 | 3848 | 3848 | 3848 | 3848 | 3848 |
| **Panel B: IV = DA** | | | | | | |
| Individualism | 0.133 | 0.075 | 0.186 | 0.153 | 0.117 | 0.186 |
| | (0.11) | (0.15) | (0.15) | (0.11) | (0.11) | (0.27) |
| Adjusted-$R^2$ | 0.01 | 0.26 | 0.02 | 0.11 | 0.04 | 0.22 |
| 1st Stage F | 6.73 | 6.13 | 2.89 | 6.55 | 6.20 | 2.65 |
| Observations | 3602 | 3602 | 3602 | 3602 | 3602 | 3602 |
| **Panel C: Proxy = DA** | | | | | | |
| Individualism | 0.078 | 0.021 | 0.091 | 0.088 | 0.066 | 0.039 |
| | (0.06) | (0.08) | (0.08) | (0.06) | (0.06) | (0.07) |
| Adjusted-$R^2$ | 0.15 | 0.38 | 0.26 | 0.27 | 0.17 | 0.43 |
| Observations | 3958 | 3958 | 3958 | 3958 | 3958 | 3958 |
| Geo controls | No | Yes | No | No | No | Yes |
| Legal Origins | No | No | Yes | No | No | Yes |
| Institutions | No | No | No | No | Yes | Yes |
| Religions | No | No | No | Yes | No | Yes |
| Continent FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes |

Note: Standard errors are clustered at the country and year level.

Figure 4 demonstrates the binsreg estimation results with and without controls. In Fig-

ure (a), where we don't include any controls, countries with higher individualism levels tend to have higher TFP levels. However, when we add control variables, individualism and TFP exhibit a U-shaped relationship.




(a) without controls (b) with controls

Figure 4: Binsreg Regression for TFP across countries

Next, Figure 5 shows the result for the margin-based analysis for TFP across time. Before 1980, there wasn't much difference across different individualism groups according to the confidence interval. After 1980, more individualistic societies show higher TFP levels.

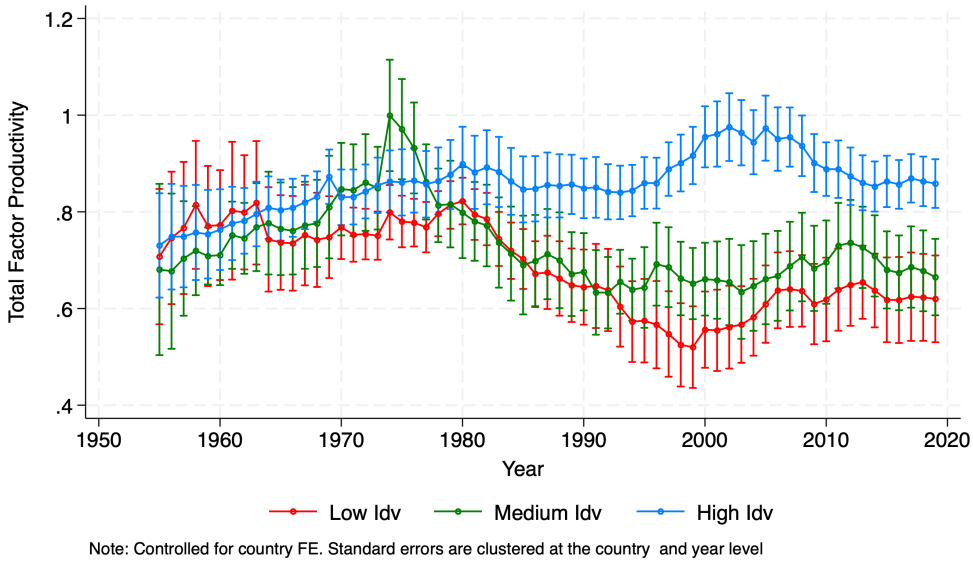
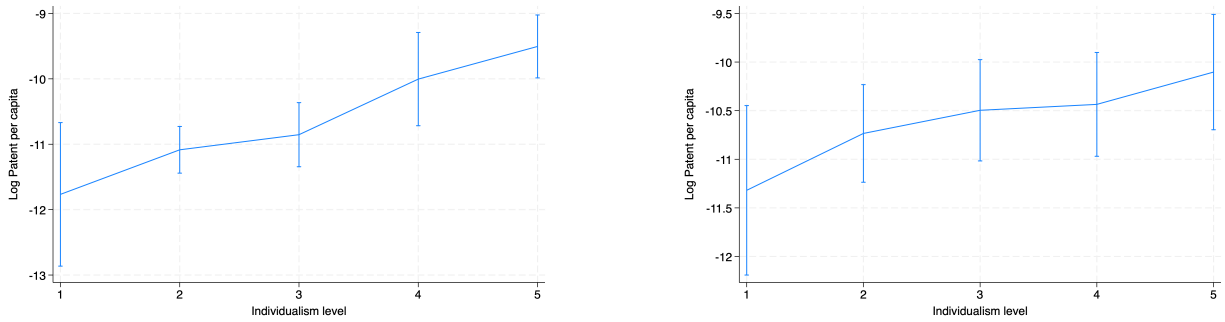



Figure 5: Individualism's impact on TFP across time

### 3.3.3 Patent

To further study whether individualism impacts economic development through innovation, I examine individualism's impact on the log patent per capita in this part. Table 3 shows the results. In Panel A, when we include control variables, the impact of individualism decreases except for legal origins. This confirms our concern that individualism could be correlated with institutions. In Panel B, when we use the pronoun drop as the instrument, the influence of individualism decreases except when controlling for geographic factors. In Panel C, when we use the pronoun drop as the proxy for Hofstede's index, the effect of individualism decreases when considering different control variables. Above all, the influence of individualism on innovation is unstable across different specifications at the country level.

Figure 6 shows the binsreg results with and without control variables. Compared with (a), the gaps between different individualism groups shrink when we consider controls in (b).




(a) without controls (b) with controls

Figure 6: Binsreg Regression for patents across countries

The results for the margin-based analysis are shown in Figure 7. Before 1990, individualism's influence on patents was similar across different groups. After 1990, the groups of low and medium individualism exhibited higher innovation. This picture shows the inconsistency of individualism's impact on innovation over time.

## 3.4 Cross-country level Summary

In this section, I revisit the analysis of individualism's influence across countries and include more control variables and data over a longer period. I use OLS regression, IV regression, and the historical measure as a proxy. Moreover, I also examine individualism's impact

Table 3: Individualism and Patents across countries

| | Log Patent per capita | | | | | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| **Panel A: OLS Regression** | | | | | | |
| Individualism | 0.862*** | 0.717*** | 0.888*** | 0.819*** | 0.807*** | 0.525*** |
| | (0.18) | (0.18) | (0.20) | (0.16) | (0.19) | (0.18) |
| Adjusted-$R^2$ | 0.53 | 0.60 | 0.64 | 0.57 | 0.54 | 0.70 |
| Observations | 2917 | 2917 | 2917 | 2917 | 2917 | 2917 |
| **Panel B: IV = DA** | | | | | | |
| Individualism | 1.663*** | 1.981** | 1.374 | 1.506*** | 1.539*** | 1.335 |
| | (0.48) | (0.75) | (0.82) | (0.46) | (0.50) | (1.05) |
| Adjusted-$R^2$ | 0.07 | 0.16 | 0.33 | 0.17 | 0.12 | 0.45 |
| 1st Stage F | 9.93 | 7.53 | 3.57 | 9.51 | 9.33 | 3.47 |
| Observations | 2584 | 2584 | 2584 | 2584 | 2584 | 2584 |
| **Panel C: Proxy = DA** | | | | | | |
| Individualism | 1.202*** | 1.109** | 0.788 | 1.087*** | 1.080** | 0.516 |
| | (0.43) | (0.42) | (0.57) | (0.39) | (0.44) | (0.39) |
| Adjusted-$R^2$ | 0.52 | 0.62 | 0.61 | 0.56 | 0.54 | 0.71 |
| Observations | 2696 | 2696 | 2696 | 2696 | 2696 | 2696 |
| Geo controls | No | Yes | No | No | No | Yes |
| Legal Origins | No | No | Yes | No | No | Yes |
| Institutions | No | No | No | No | Yes | Yes |
| Religions | No | No | No | Yes | No | Yes |
| Continent FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes |

Note: Standard errors are clustered at the country and year level.

across time. The results indicate that individualism's impact is inconsistent when considering different controls under different specifications and is unstable across time. In the next section, I will examine this relationship within the US over a longer period and mitigate the omitted variable bias by introducing fixed effects.

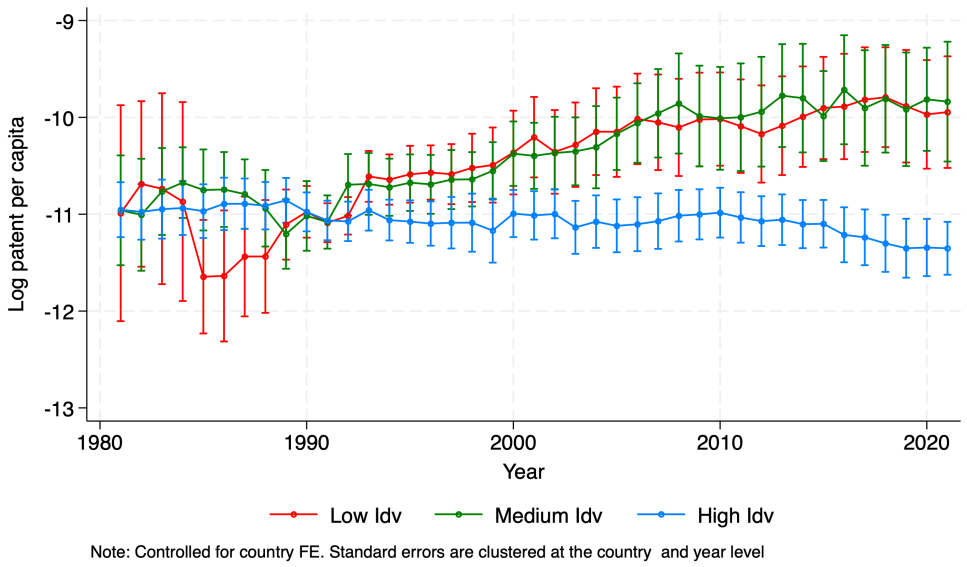



Figure 7: Individualism's impact on patents across time

# 4 Within-US Analysis

In this section, I first explain the construction of ancestry-weighted individualism measures. This is followed by introducing instruments and results based on different empirical strategies.

## 4.1 Ancestry-based individualism measure

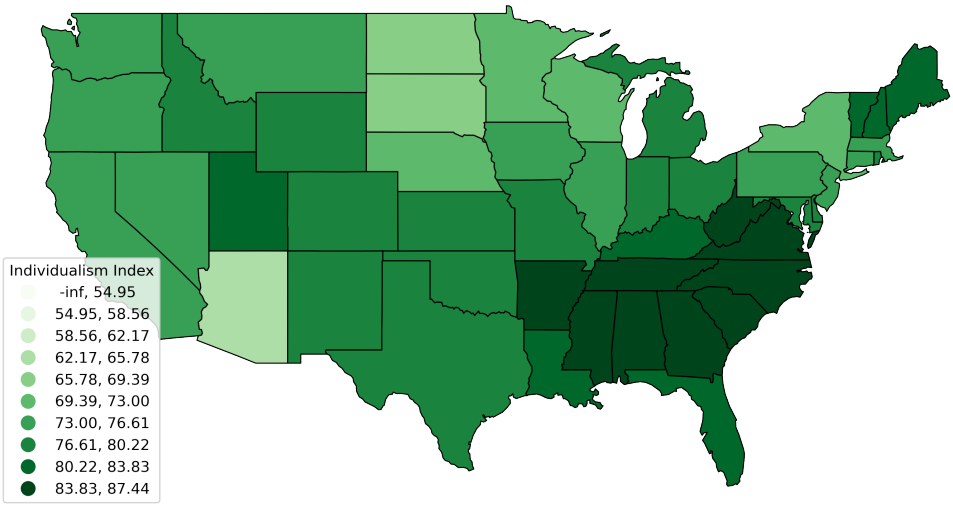
Ethnic identity could be seen as a strong indicator of cultural values (Desmet et al. (2017)). Given that the US is an immigration country, I build an individualism index at the county group level by calculating the weighted averages of the country-level individualism measures using ancestry data from Fulford et al. (2020) as the weight. The following equation illustrates the procedure mathematically. For each county group $j$ at time $t$ with ancestry $i$:

$$\text{Individualism}_{jt} = \sum_{\text{Ancestry } i} \text{Ancestry Ratio}_{ijt} \times \text{Individualism}_i \tag{6}$$

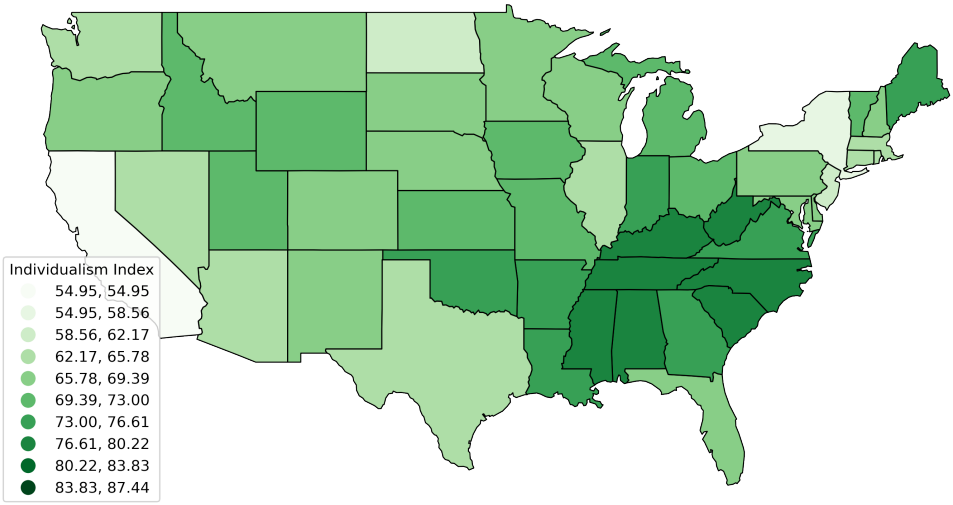
$\text{Individualism}_i$ is the country-level individualism measure of ancestry $i$. $\text{Ancestry Ratio}_{ijt}$ is the ancestry ratio of country $i$ in county group $j$ at time $t$.

The constructed measure of individualism is time-variant. Figure 8 shows the constructed

individualism measures aggregated at the state level in 1900 and 2000, given Hofstede's index as the country measure. From 1900 to 2000, the US became less individualistic. Compared with previous country-level analyses where the individualism measure is stable, we can include county group or state fixed effects to alleviate the omitted variables bias.




a Individualism in 1900




b Individualism in 2000

Figure 8: Individualism within the US

## 4.2 Instruments

To address the endogeneity problem, we construct instruments for the country-level individualism measure and county group level ancestry ratio data. Similar to the analysis at the country level, we use historical measures of individualism based on the pronoun drop and historical diseases as the instrument for Hofstede's index. As for the ancestry ratio, we adopt two instruments from Fulford et al. (2020).

The first instrument is calculated based on the share of the ancestry in the county group in the past and the growth rate of that ancestry nationally in the US, excluding the county group's state. This instrument can help us get rid of the endogeneity stemming from the county-ancestry specific pull factors.

The second instrument comes from the interaction of immigrant arrival times and the transportation networks of railroad and highway. The construction of this instrument is based on the idea that immigrants who arrived at different times are exposed to various transportation networks, which could influence their destinations.

The final instruments for the county group level individualism measure are calculated using the instruments for the country level individualism measure, ancestry ratio, or both, based on equation (6)

## 4.3 US county group level result

### 4.3.1 Log GDP per capita

Following the analysis at the world level, I first explore individualism's influence on log GDP per capita within the US. The data for GDP per capita is from Fulford et al. (2020). Columns (1) and (2) in Table 4 present the OLS regression result without and with the control of population density in the previous decade, respectively. Column (3) lists the result when we use the instrument using estimated ancestry based on the past stock and growth, while still using Hofstede's individualism index. In Column (4), we use the instrument calculated from the estimated ancestry based on immigrant arrival time and transportation network while using Hofstede's individualism measure. In Column (5), we build the instrument using the ancestry estimated from transportation and the historical measure of individualism based on the pronoun drop from Davis and Abdurazokzoda (2016). Column (6) lists the result for IV regression when we use transportation-based ancestry and the index of 9 historical diseases to generate the instrument. In Panel (A), we consider county group fixed effect, year fixed

effect, and the interaction of year and state fixed effect. The estimated coefficients in Panel A columns (1), (2), and (3) are not significant. For all the other IV regressions in columns (4), (5), and (6), we notice that individualism influences economic development negatively. In Panel B, we include the state fixed effect but not the county group fixed effect since it's possible that our constructed IV could be correlated with some county group level variables. All of the results show a significant and negative influence of individualism on economic development within the US. Results based on other instruments are listed in the Appendix.

Table 4: Individualism and Log GDP per capita within the US

| | Log GDP per capita (1850-2010) | | | | | |
|---|---|---|---|---|---|---|
| | OLS | | IV: Stock | IV: Trans. | IV: Trans. × DA | IV: Trans. × IHD9 |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| **Panel A: With County Group FE** | | | | | | |
| Individualism | 0.001 | -0.001 | 0.008 | -0.059*** | -0.046*** | -0.045*** |
| | (.) | (0.00) | (0.01) | (0.01) | (0.01) | (0.01) |
| Pop Density | No | Yes | Yes | Yes | Yes | Yes |
| County Group FE | No | No | No | No | No | No |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Year × State FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Adjusted-$R^2$ | 0.97 | 0.97 | -0.00 | -0.45 | -0.26 | -0.26 |
| 1st Stage F | | | 5.97 | 50.79 | 17.32 | 33.85 |
| Observations | 17631 | 17631 | 17631 | 17631 | 17631 | 17631 |
| **Panel B: Without County Group FE** | | | | | | |
| Individualism | -0.016*** | -0.014*** | -0.014*** | -0.059*** | -0.054** | -0.055*** |
| | (0.00) | (0.00) | (0.00) | (0.02) | (0.02) | (0.02) |
| Pop Density | No | Yes | Yes | Yes | Yes | Yes |
| County Group FE | No | No | No | No | No | No |
| State FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Adjusted-$R^2$ | 0.91 | 0.91 | 0.06 | -0.35 | -0.27 | -0.28 |
| 1st Stage F | | | 9.17 | 17.81 | 14.61 | 18.56 |
| Observations | 17631 | 17631 | 17631 | 17631 | 17631 | 17631 |

Note: Standard errors are clustered at the county group and year level. "

To test whether individualism could influence economic development nonlinearly, we also include the square of individualism in the regression, and the results are listed in Table 5. The table structure is very similar to Table 4. Panel A considers the case with fixed effects regarding county group, year, and the interaction between year and state. We notice that

the coefficient for the quadratic term is negative, while the coefficient for individualism is positive. The turning points for all specifications are around 65, meaning that when the individualism level is low, log GDP per capita is increasing in individualism. However, when the individualism level is high enough, economic development decreases in individualism. The results demonstrate that neither extreme is optimal, and it's best to balance individualism and collectivism. In Panel B, we include state-level fixed effects instead to eliminate the bias brought by the correlation between our constructed individualism measure and county group fixed effects. We get results similar to those of Panel A for the first three specifications. We get insignificant results for the remaining three IV regressions, showing that individualism does not significantly influence economic development.

To better understand the relationship between Table 4 and Table 5, Figure 9 shows the binsreg result for individualism's impact on economic development within the US. In the picture, the red line links the predicted value based on the regression and appears nonlinear. In the background, we have the histogram graph. When the individualism level is relatively low, log GDP per capita increases with individualism. When the individualism level is high, economic development decreases with individualism. From this picture, we can infer that the negative relationship in Table 4 is due to the fact that most US county groups are highly individualistic, and economic development decreases in individualism when the county group's individualism level is high.

Next, I want to explore the time trend of individualism's influence on economic development. Using margin-based analysis, Figure 10 demonstrates individualism's influence on economic development over time. In this investigation, we divide county groups into three categories. Before 1950, the low individualism group tended to have a higher GDP. After 1950, the high individualism group tends to exhibit higher economic development. This picture shows that the influence of individualism is time-varying within the US.

One potential concern in Figure 10 is that county groups may change their category of individualism over time. To address this problem, we fix the category of each county group based on its classification in 1900 and list the results for regression after 1900 in Figure 11. Combined with Figure 10, the results in Figure 11 show that the high individualism group is catching up in economic development and eventually becomes the group with the highest log GDP per capita, even though it exhibited the lowest level of log GDP per capita in the beginning.

Table 5: Individualism and Log GDP per capita within the US

| | Log GDP per capita (1850-2010) | | | | | |
|---|---|---|---|---|---|---|
| | OLS | | IV: Stock | IV: Trans. | IV: Trans. × DA | IV: Trans. × IHD9 |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| **Panel A: With County Group FE** | | | | | | |
| Individualism | 0.085*** | 0.078*** | 0.190* | 0.237*** | 0.384*** | 0.284*** |
| | (0.01) | (0.02) | (0.11) | (0.05) | (0.08) | (0.05) |
| Individualism Square | -0.001*** | -0.001*** | -0.001* | -0.002*** | -0.003*** | -0.002*** |
| | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) |
| Pop Density | No | Yes | Yes | Yes | Yes | Yes |
| Turning Point | 66.52 | 65.76 | 67.51 | 63.66 | 67.60 | 67.30 |
| County Group FE | No | No | No | No | No | No |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Year × State FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Adjusted-$R^2$ | 0.97 | 0.97 | -0.01 | -0.08 | -0.29 | -0.11 |
| 1st Stage F | | | 2 | 1 | 3 | 17 |
| Observations | 17631 | 17631 | 17631 | 17631 | 17631 | 17631 |
| **Panel B: Without County Group FE** | | | | | | |
| Individualism | 0.188*** | 0.195*** | 0.249*** | 0.088 | -0.375 | 2.763 |
| | (0.02) | (0.02) | (0.04) | (0.82) | (1.73) | (25.61) |
| Individualism Square | -0.002*** | -0.002*** | -0.002*** | -0.001 | 0.002 | -0.020 |
| | (0.00) | (0.00) | (0.00) | (0.01) | (0.01) | (0.18) |
| Pop Density | No | Yes | Yes | Yes | Yes | Yes |
| Turning Point | 62.10 | 62.92 | 64.01 | 44.12 | 82.47 | 70.84 |
| County Group FE | No | No | No | No | No | No |
| State FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Adjusted-$R^2$ | 0.93 | 0.93 | 0.19 | -0.03 | -1.27 | -22.67 |
| 1st Stage F | | | 2 | 0 | 0 | 0 |
| Observations | 17631 | 17631 | 17631 | 17631 | 17631 | 17631 |

Note: Standard errors are clustered at the county group and year level.

Figure 11, 13, and 14 show the binsreg results based on the fixed individualism categories in 1900, 1950, and 2000, respectively. For each picture, the regression only includes the sample after the year when the individualism categories are generated. All three pictures show that the overall influence of individualism on economic development is negative.

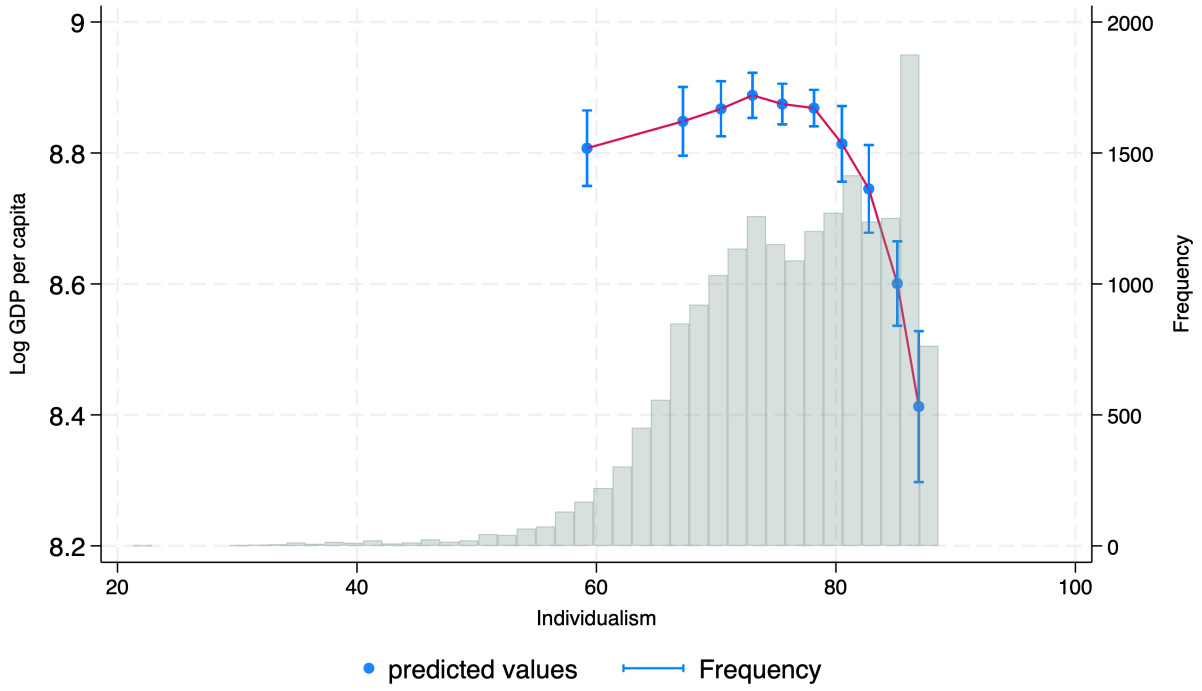



Figure 9: Individualism's impact on economic development within the US

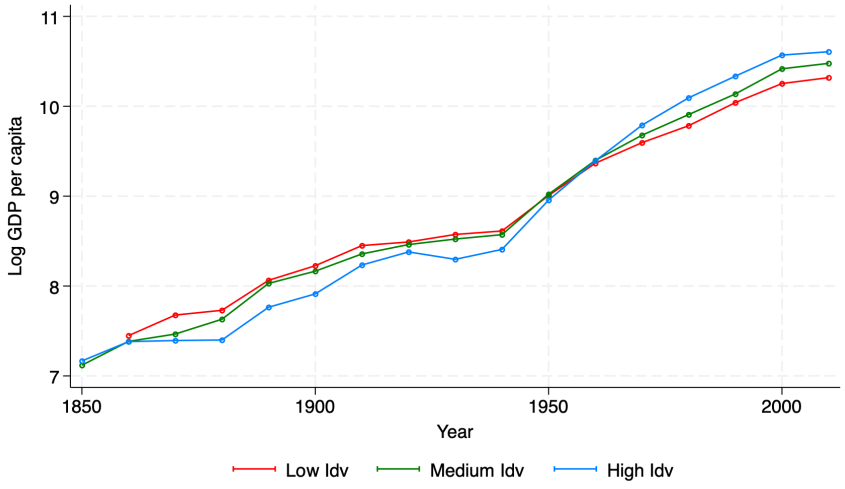



Figure 10: Individualism's Influence on Economic Development within the US over time

### 4.3.2 Patent

Next, I want to check whether individualism influences economic development through innovation within the US. Table 6 shows the results based on OLS and IV regressions. When considering county group fixed effects, individualism's influence on economic development is

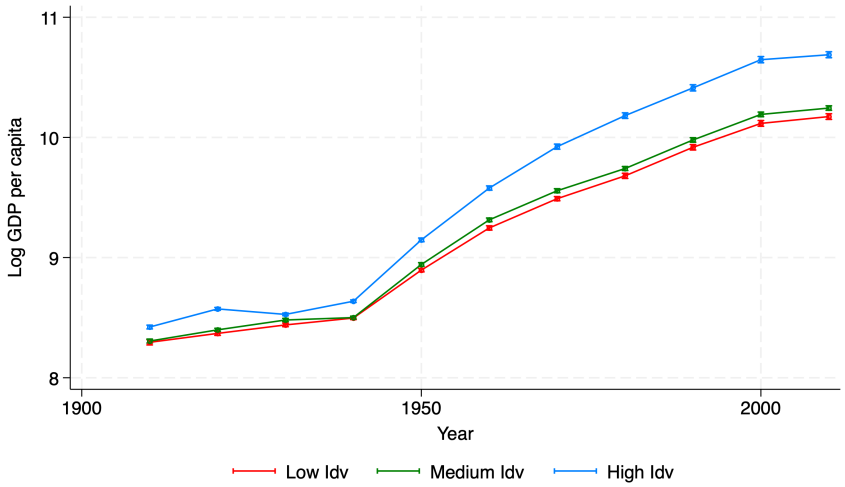



Figure 11: Individualism's Influence on Economic Development within the US over time (Category Fixed at 1900)

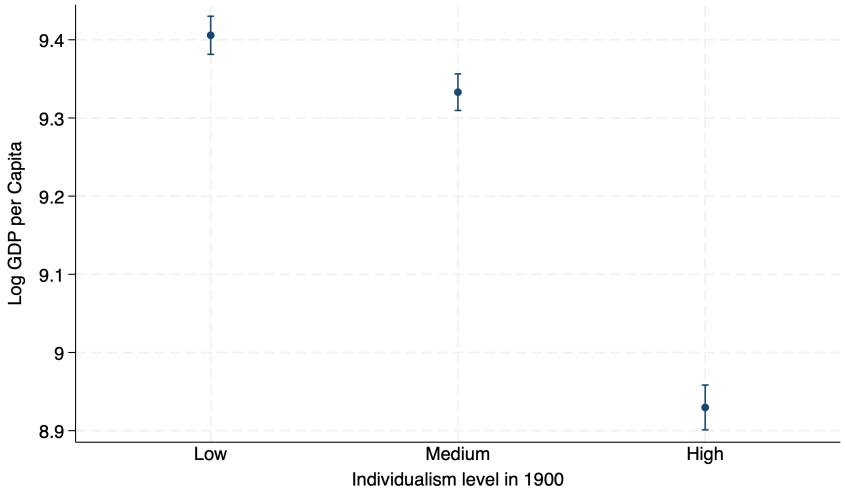



Figure 12: Individualism's Influence on Economic Development within the US over time (Category Fixed at 1900)

either negative or insignificant. In Panel B, when we include state fixed effects instead of county group fixed effects to eliminate their correlation with the constructed individualism measure, the influence of individualism on patents becomes negative and significant.

Next, in Table 7, I consider the nonlinear relationship between individualism and patents by including the square of individualism in the regression. Again, in Panel A, when I include county group fixed effects, we see inconsistent results across different specifications. We see a U-shaped relationship between individualism and patents when using the IV based on the

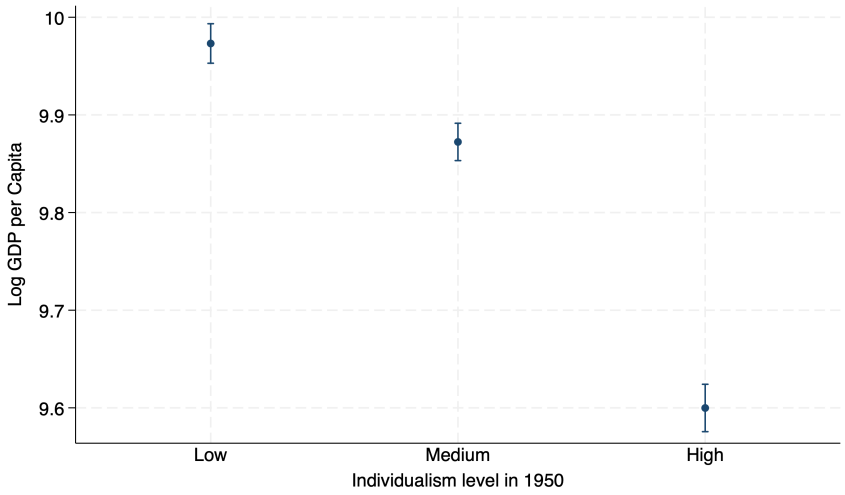



Figure 13: Individualism's Influence on Economic Development within the US over time (Category Fixed at 1950)

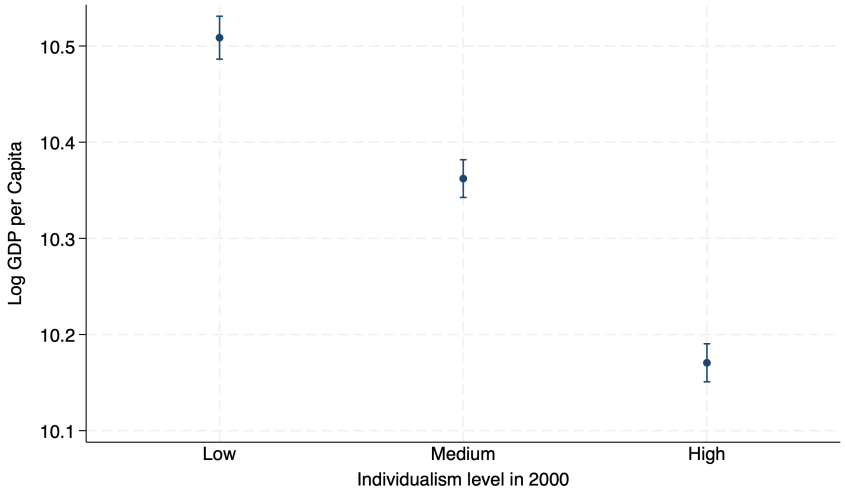



Figure 14: Individualism's Influence on Economic Development within the US over time (Category Fixed at 2000)

ancestry stock. When I use the instruments estimated from the transportation network, all the significance disappears. In Panel B, where I use state fixed effects instead of county group fixed effects, we notice significant results for OLS regressions. However, for all four IV regressions, all the significance disappears.

To understand the reason behind the different results from linear and quadratic regressions, Figure 15 presents the binsreg results with the histogram graph of the county groups' individualism level in the background. The line links the estimated patent level from binsreg

Table 6: Individualism and Log Patent per capita within the US

| | Log Patent per 1000 people (1850-2010) | | | | | |
|---|---|---|---|---|---|---|
| | OLS | | IV: Stock | IV: Trans. | IV: Trans. × DA | IV: Trans. × IHD9 |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| **Panel A: With County Group FE** | | | | | | |
| Individualism | -0.006 | -0.007 | -0.168** | -0.085 | -0.131* | -0.083 |
| | (.) | (0.01) | (0.06) | (0.06) | (0.07) | (0.05) |
| Pop Density | No | Yes | Yes | Yes | Yes | Yes |
| County Group FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Year × State FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Adjusted-$R^2$ | 0.83 | 0.83 | -0.41 | -0.10 | -0.24 | -0.09 |
| 1st Stage F | | | 6.90 | 14.76 | 14.19 | 34.64 |
| Observations | 12591 | 12591 | 12591 | 12591 | 12591 | 12591 |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| **Panel B: Without County Group FE** | | | | | | |
| Individualism | -0.045*** | -0.046*** | -0.071*** | -0.180* | -0.191* | -0.166** |
| | (0.01) | (0.01) | (0.02) | (0.09) | (0.10) | (0.07) |
| Pop Density | No | Yes | Yes | Yes | Yes | Yes |
| County Group FE | No | No | No | No | No | No |
| State FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Adjusted-$R^2$ | 0.37 | 0.37 | 0.03 | -0.31 | -0.36 | -0.24 |
| 1st Stage F | | | 8.42 | 6.32 | 5.31 | 8.15 |
| Observations | 12591 | 12591 | 12591 | 12591 | 12591 | 12591 |

Note: Standard errors are clustered at the county group and year level.

regression. We can tell from the picture that individualism negatively influences innovation, unlike the log GDP per capita results. However, the magnitude of influence is larger when the individualism level is high.

Next, I explore individualism's influence on innovation within the US over time. Figure 15 reports the time-changing influence of individualism according to margin-based estimation. Before 1890, the low individualism group tended to have a higher level of innovation. However, after 1890, the innovation gap between groups shrinks until 1950. Between 1950 and 2000, high individualism exhibited a higher innovation level. After 2000, the low individualism group exceeded other groups again. From this picture, we can see that individualism's influence on innovation is not time-consistent.

Table 7: Individualism and Log Patent per capita within the US

| | Log Patent per 1000 people (1850-2010) | | | | | |
|---|---|---|---|---|---|---|
| | OLS | | IV: Stock | IV: Trans. | IV: Trans. × DA | IV: Trans. × IHD9 |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| **Panel A: With County Group FE** | | | | | | |
| Individualism | 0.125*** | 0.121*** | -2.267** | 0.238 | 0.648 | 0.320 |
| | (0.03) | (0.03) | (1.05) | (0.19) | (0.50) | (0.30) |
| Individualism Square | -0.001*** | -0.001*** | 0.016** | -0.002 | -0.005 | -0.003 |
| | (0.00) | (0.00) | (0.01) | (0.00) | (0.00) | (0.00) |
| Pop Density | No | Yes | Yes | Yes | Yes | Yes |
| Turning Point | 64.49 | 63.88 | 71.52 | 56.72 | 61.50 | 59.62 |
| County Group FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Year × State FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Adjusted-$R^2$ | 0.82 | 0.83 | -2.18 | -0.03 | -0.18 | -0.03 |
| 1st Stage F | | | 3 | 0 | 1 | 3 |
| Observations | 13131 | 12591 | 12591 | 12591 | 12591 | 12591 |
| **Panel B: Without County Group FE** | | | | | | |
| Individualism | 0.423*** | 0.423*** | -0.180 | -0.561 | -1.578 | -6.135 |
| | (0.06) | (0.07) | (0.36) | (2.50) | (3.88) | (30.86) |
| Individualism Square | -0.003*** | -0.003*** | 0.001 | 0.003 | 0.010 | 0.042 |
| | (0.00) | (0.00) | (0.00) | (0.02) | (0.03) | (0.22) |
| Pop Density | No | Yes | Yes | Yes | Yes | Yes |
| TurningPoint | 60.74 | 60.82 | 111.11 | 109.60 | 80.84 | 73.85 |
| County Group FE | No | No | No | No | No | No |
| State FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Adjusted-$R^2$ | 0.42 | 0.41 | -0.00 | -0.63 | -1.68 | -14.77 |
| 1st Stage F | | | 2 | 1 | 1 | 0 |
| Observations | 13131 | 12591 | 12591 | 12591 | 12591 | 12591 |

Note: Standard errors are clustered at the county group and year level. "

The county groups' category of individualism levels may change over time. For a robustness check, I keep county groups' individualism categories according to their position in 1900 and estimate their influence on patents after 1900. The results are shown in Figure 17. The low individualism group exhibited a higher increase in innovation before 1930. After 1930, the high individualism group caught up with a higher increasing rate but fell after 2000.

To understand the overall influence of individualism across time, Figure 18, Figure 19, and Figure 20 keep the county groups' individualism category in the particular year and cal-

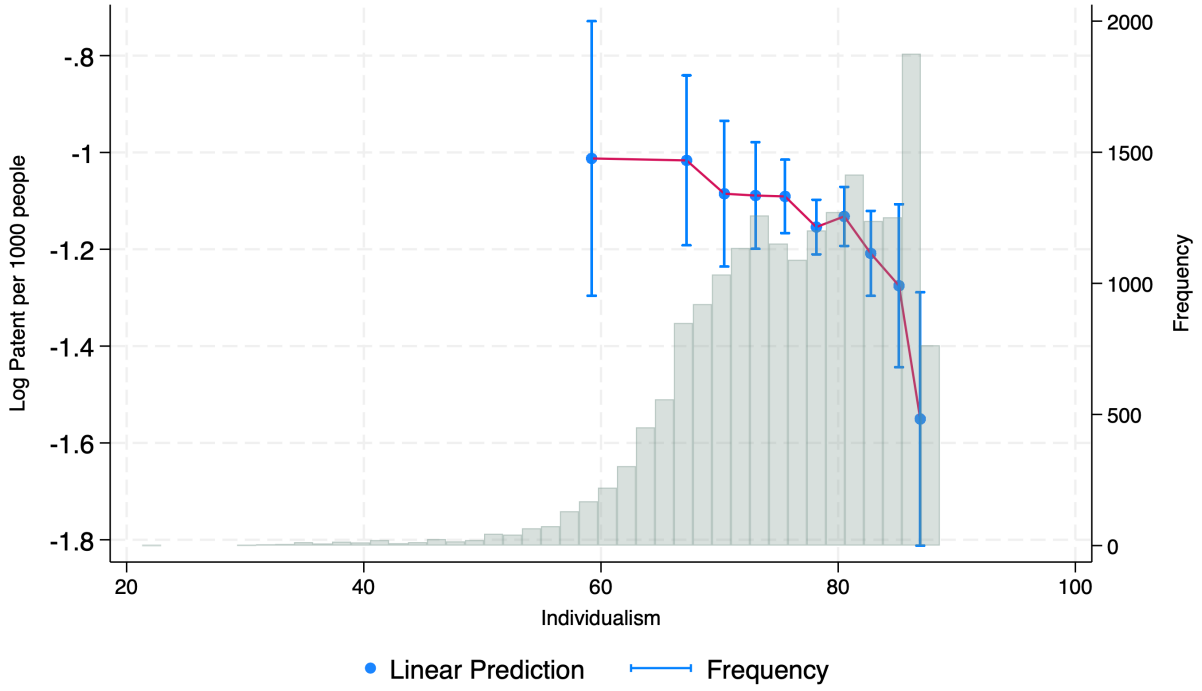



Figure 15: Individualism's impact on patents within the US

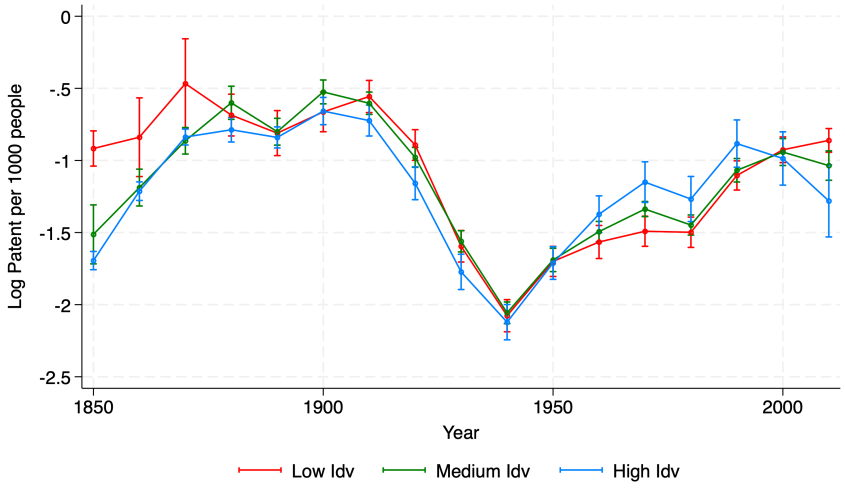



Figure 16: Individualism's Influence on Patents within the US over time

culate the estimated innovation level based on binned regression after that given year. For all three pictures, we see that the high individualism group has the highest level of patents, and the innovation level decreases with individualism.

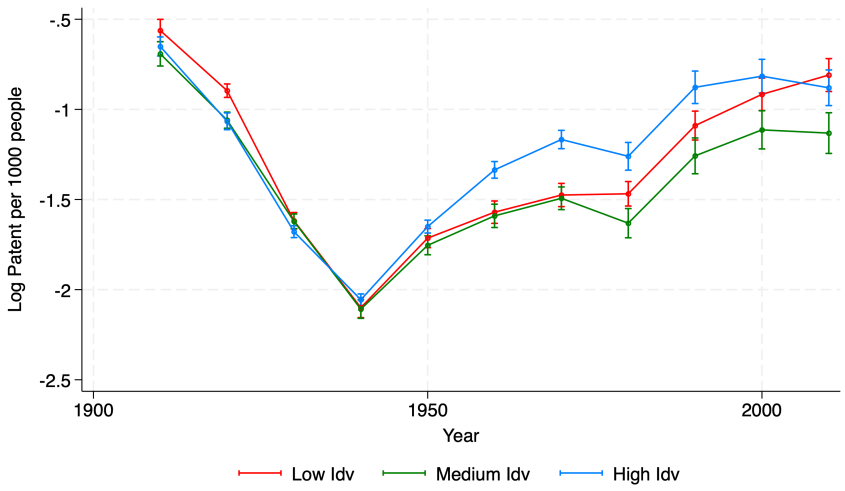



Figure 17: Individualism's Influence on Economic Development within the US over time (Category fixed at 1900)

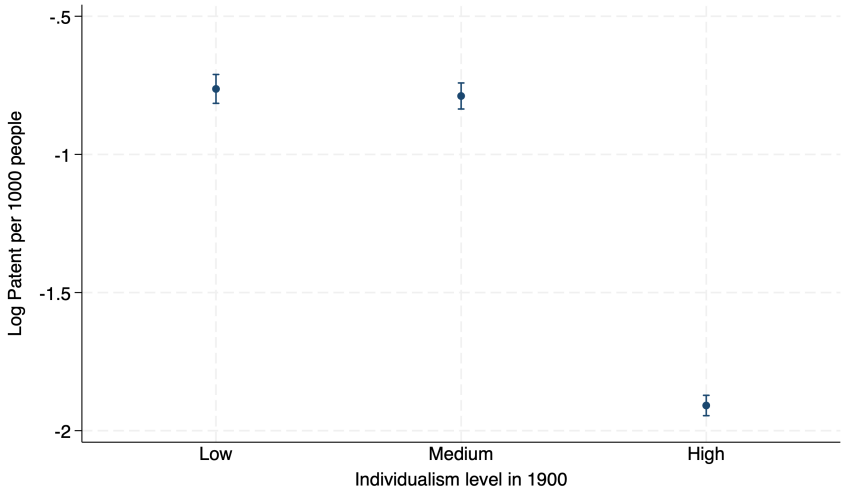



Figure 18: Individualism's Influence on Patents within the US over time (Category Fixed at 1900)

## 4.4 Within-US analysis summary

In this section, I examine the influence of individualism on economic development and innovation within the US. I first try regressions with different instruments and fixed effects. I also consider the nonlinear relationship between individualism and economic development or innovation. Finally, I take a look at the time trend of individualism's influence. Overall, individualism's influence on economic development and innovation is either negative or insignificant.

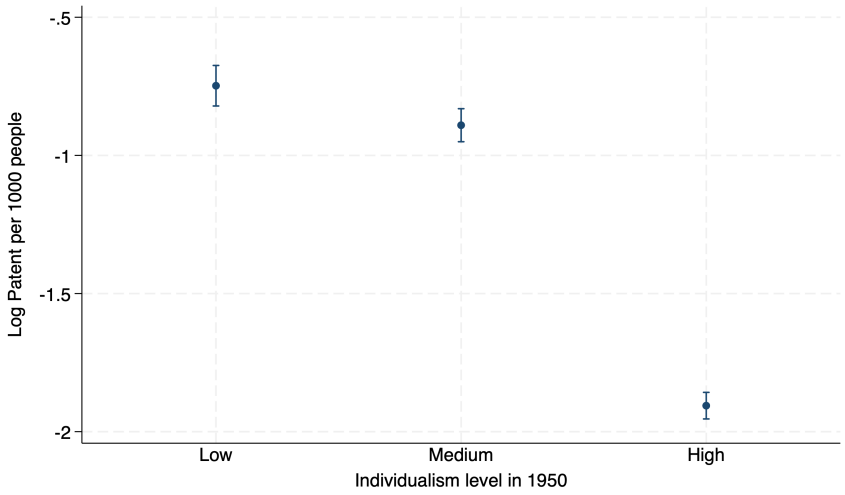



Figure 19: Individualism's Influence on Patents within the US over time (Category Fixed at 1950)

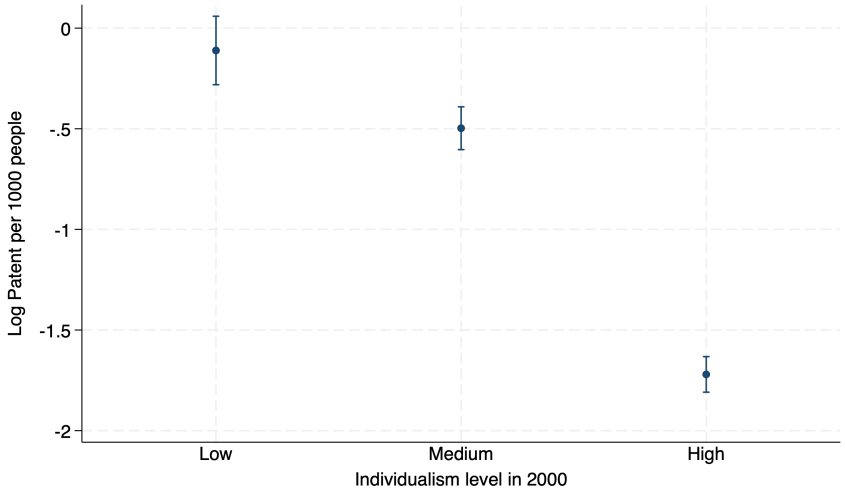



Figure 20: Individualism's Influence on Patents within the US over time (Category Fixed at 2000)

# 5 Conclusion

This paper explores the impact of individualism on innovation and economic development. I first revisit the cross-country study of individualism's influence over time. The results remain unstable after accounting for controls or time trends, indicating potential estimation bias in the country-level analysis in the previous literature. To address the concerns of omitted variable bias and time inconsistency, this paper further explores individualism's impacts on economic development and innovation within the US across county groups over time. The

nature of the within-country analysis keeps the social environment stable at the national level. The construction of time-varying ancestry-weighted individualism measures makes county group and state fixed effects possible, further controlling for local institutions. Analysis within the US finds a negative or nonsignificant impact of individualism on innovation and economic development after addressing the endogeneity, contrasting with the findings in previous literature focusing on cross-country investigations.

How we should interpret the results matters. Though the within-US analysis could alleviate some of the bias arising in the cross-country analysis, the estimation might be country-specific. I can conclude here that individualism has a negative or nonsignificant influence on innovation and economic development within the US across county groups over time. Since the US is the most individualistic country in the world, higher levels of collectivism could enhance cooperation in such an environment. I cannot rule out the possibility that the within-US conclusion observed in this paper may differ in other countries and societies. From this perspective, it would be interesting to examine the effect of individualism in other countries over time and explore how individualism interacts with other social environments.

Additionally, future studies can examine individualism's effect on the quality of innovation. This paper solely focuses on the quantity of innovation, which does not fully capture technological progress. Studies exploring the relationship between individualism and the quality of innovation could provide a more comprehensive understanding of how individualism influences the advancement of technologies.

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# A Country-level results

This section lists all the country-level results not shown in the paper.

## A.1 Log GDP per capita

Table A1 shows the regression results for individualism's impact on economic development across countries using the pronoun drop from Kashima and Kashima (1998) as the instrument or proxy. The results in Panel A are the same as those in the paper. We put it here just for reference. When we use the pronoun drop as the instrument, we notice that the coefficient drops when we include legal origins and property rights. When we consider geographic variables and religions, the coefficient increases. These inconsistent results indicate that individualism could correlate with different controls, leading to biased results in the country-level analysis. In Panel C, when we use the pronoun drop as the proxy, we see similar results as those in Panel B.

Table A2 and Table A3 show individualism's influence on economic development across countries using the indexes of 9 and 7 historical diseases, respectively. In Table A2, the IV regression results show that the influence of individualism vanishes or drops when we consider geographic controls, legal origins, and property rights. When we consider religions, the coefficient increases. In Panel C, when we use the index of 9 historical diseases as the proxy, we notice the influence of individualism drops in every column. In Table A3, we apply the index of 7 historical diseases as the instrument or the proxy. In Panel B, the coefficient decreases when we include legal origins. However, we see an increase in influence for all other controls. In Panel C, we notice a drop in the influence except for controlling legal origins.

## A.2 Total Factor Productivity

Table A4 indicates the regression results based on the pronoun drop from Kashima and Kashima (1998) for TFP. When we use the pronoun drop as the instrument, the significance of the coefficients disappears for most of the controls, except for religions. When we use the pronoun drop as the proxy instead, we only get significance when we consider legal origins.

Table A5 lists the regression results for TFP using the index of 9 historical diseases as the instrument or the proxy. The magnitude or significance of coefficients in both panels drops, except for the case when considering legal origins. This indicates that individualism might be highly correlated with legal origins. Similarly, Table A6 shows the influence of individualism on TFP when we use the index of 7 historical diseases as the instrument or the proxy. We notice the same pattern for those in Table A5 .

Table A1: Individualism and Economic Development across countries

| | Log GDP per capita | | | | | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| **Panel A: OLS Regression** | | | | | | |
| Individualism | 0.492*** | 0.436*** | 0.348*** | 0.491*** | 0.418*** | 0.242*** |
| | (0.08) | (0.10) | (0.07) | (0.08) | (0.09) | (0.09) |
| Adjusted-$R^2$ | 0.74 | 0.75 | 0.79 | 0.75 | 0.76 | 0.80 |
| Observations | 7199 | 7199 | 7199 | 7199 | 7199 | 7199 |
| **Panel B: IV = KK** | | | | | | |
| Individualism | 0.767*** | 1.020*** | 0.482*** | 0.779*** | 0.724*** | 1.136* |
| | (0.16) | (0.27) | (0.13) | (0.16) | (0.18) | (0.65) |
| Adjusted-$R^2$ | 0.14 | 0.23 | 0.40 | 0.14 | 0.18 | 0.24 |
| 1st Stage F | 16.26 | 7.43 | 10.53 | 16.04 | 10.49 | 2.13 |
| Observations | 5938 | 5938 | 5938 | 5938 | 5938 | 5938 |
| **Panel C: Proxy = KK** | | | | | | |
| kkquants | 0.765*** | 0.810*** | 0.462*** | 0.811*** | 0.666*** | 0.561*** |
| | (0.18) | (0.18) | (0.14) | (0.18) | (0.18) | (0.16) |
| Adjusted-$R^2$ | 0.73 | 0.83 | 0.77 | 0.74 | 0.73 | 0.86 |
| Observations | 6190 | 6190 | 6190 | 6190 | 6190 | 6190 |
| Geo controls | No | Yes | No | No | No | Yes |
| Legal Origins | No | No | Yes | No | No | Yes |
| Property Rights | No | No | No | No | Yes | Yes |
| Religions | No | No | No | Yes | No | Yes |
| Continent FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes |

Note: Standard errors are clustered at the country and year level.

## A.3 Patents

Finally, we check the influence of individualism on innovation using different instruments and proxies. In Table A7, we use the pronoun drop from Kashima and Kashima (1998) as the instrument and the proxy. For both panels, except when we include geographic characteristics as the control, the magnitude or the significance of individualism's impact decreases. In Table A8, we use the index of nine historical diseases. For Panel A and Panel B, the magnitude and significance drop except for the case when including religions. Table A9 shows the results using the index of 7 historical diseases. We see similar results to those in Table A8.

Table A2: Individualism and Economic Development across countries

| | Log GDP per capita | | | | | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| **Panel A: OLS Regression** | | | | | | |
| Individualism | 0.492*** | 0.436*** | 0.348*** | 0.491*** | 0.418*** | 0.242*** |
| | (0.08) | (0.10) | (0.07) | (0.08) | (0.09) | (0.09) |
| Adjusted-$R^2$ | 0.74 | 0.75 | 0.79 | 0.75 | 0.76 | 0.80 |
| Observations | 7199 | 7199 | 7199 | 7199 | 7199 | 7199 |
| **Panel B: IV = Index of 9 diseases** | | | | | | |
| Individualism | 1.176** | 3.360 | 1.089** | 1.209** | 1.215** | 5.685 |
| | (0.46) | (5.27) | (0.52) | (0.51) | (0.54) | (15.27) |
| Adjusted-$R^2$ | -0.25 | -6.29 | -0.10 | -0.28 | -0.30 | -15.87 |
| 1st Stage F | 5.30 | 0.35 | 3.98 | 4.78 | 4.75 | 0.13 |
| Observations | 7123 | 7123 | 7123 | 7123 | 7123 | 7123 |
| **Panel C: Proxy = Index of 9 diseases** | | | | | | |
| Individualism | 0.519*** | 0.442*** | 0.458*** | 0.474*** | 0.492*** | 0.358*** |
| | (0.09) | (0.10) | (0.07) | (0.08) | (0.08) | (0.08) |
| djusted-$R^2$ | 0.66 | 0.72 | 0.73 | 0.67 | 0.70 | 0.79 |
| Observations | 10245 | 10245 | 10245 | 10245 | 10245 | 10245 |
| Geo controls | No | Yes | No | No | No | Yes |
| Legal Origins | No | No | Yes | No | No | Yes |
| Property rights | No | No | No | No | Yes | Yes |
| Religions | No | No | No | Yes | No | Yes |
| AContinent FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes |

Note: Standard errors are clustered at the country and year level.

# B Within-US results

This section lists the results using instruments based on the index of pronoun drop from Kashima and Kashima (1998) and the index of 7 diseases.

Table A3: Individualism and Economic Development across countries

| | Log GDP per capita | | | | | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| **Panel A: OLS Regression** | | | | | | |
| Individualism | 0.492*** | 0.436*** | 0.348*** | 0.491*** | 0.418*** | 0.242*** |
| | (0.08) | (0.10) | (0.07) | (0.08) | (0.09) | (0.09) |
| Adjusted-$R^2$ | 0.74 | 0.75 | 0.79 | 0.75 | 0.76 | 0.80 |
| Observations | 7199 | 7199 | 7199 | 7199 | 7199 | 7199 |
| **Panel B: IV = Index of 7 diseases** | | | | | | |
| Individualism | 1.153* | 5.637 | 1.046* | 1.197* | 1.187* | -13.205 |
| | (0.60) | (22.91) | (0.59) | (0.67) | (0.71) | (128.89) |
| Adjusted-$R^2$ | -0.23 | -21.93 | -0.05 | -0.27 | -0.27 | -103.34 |
| 1st Stage F | 3.09 | 0.05 | 2.82 | 2.82 | 2.69 | 0.01 |
| Observations | 7171 | 7171 | 7171 | 7171 | 7171 | 7171 |
| **Panel C: Proxy = Index of 7 diseases** | | | | | | |
| Individualism | 0.319*** | 0.273*** | 0.335*** | 0.280*** | 0.311*** | 0.219*** |
| | (0.08) | (0.09) | (0.08) | (0.08) | (0.08) | (0.07) |
| Adjusted-$R^2$ | 0.58 | 0.66 | 0.67 | 0.59 | 0.62 | 0.75 |
| Observations | 10993 | 10993 | 10993 | 10993 | 10993 | 10993 |
| Geo controls | No | Yes | No | No | No | Yes |
| Legal Origins | No | No | Yes | No | No | Yes |
| Institutions | No | No | No | No | Yes | Yes |
| Religions | No | No | No | Yes | No | Yes |
| Continent FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes |

Note: Standard errors are clustered at the country and year level.

## B.1 Log GDP per capita

Table A10 shows the results for individualism's influence on economic development within the US. When we control for county group fixed effects, individualism's impact on GDP is not significant when we use OLS regressions and use the instrument estimated based on the ancestry stock. However, when we use the instrument estimated based on the transportation network, individualism's effect on economic development becomes negative and significant. In Panel B, all the coefficients are negative and significant when we use state fixed effects instead of county group fixed effects.

Table A4: Individualism and TFP across countries

| | Total Factor Productivity | | | | | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| **Panel A: OLS Regression** | | | | | | |
| Individualism | 0.088*** | 0.039 | 0.059* | 0.083*** | 0.079** | 0.004 |
| | (0.03) | (0.03) | (0.03) | (0.03) | (0.03) | (0.03) |
| Adjusted-$R^2$ | 0.18 | 0.27 | 0.29 | 0.29 | 0.20 | 0.39 |
| Observations | 3848 | 3848 | 3848 | 3848 | 3848 | 3848 |
| **Panel B: IV = KK** | | | | | | |
| Individualism | 0.070 | 0.026 | 0.079 | 0.089* | 0.054 | 0.114* |
| | (0.06) | (0.06) | (0.06) | (0.05) | (0.06) | (0.06) |
| Adjusted-$R^2$ | 0.07 | 0.39 | 0.18 | 0.19 | 0.08 | 0.52 |
| 1st Stage F | 18.44 | 11.19 | 15.15 | 18.18 | 16.48 | 8.53 |
| Observations | 3179 | 3179 | 3179 | 3179 | 3179 | 3179 |
| **Panel C: Proxy = KK** | | | | | | |
| Individualism | 0.093 | 0.023 | 0.116* | 0.111 | 0.071 | 0.103 |
| | (0.07) | (0.07) | (0.07) | (0.07) | (0.07) | (0.06) |
| Adjusted-$R^2$ | 0.18 | 0.50 | 0.30 | 0.32 | 0.20 | 0.58 |
| Observations | 3291 | 3291 | 3291 | 3291 | 3291 | 3291 |
| Geo controls | No | Yes | No | No | No | Yes |
| Legal Origins | No | No | Yes | No | No | Yes |
| Institutions | No | No | No | No | Yes | Yes |
| Religions | No | No | No | Yes | No | Yes |
| Continent FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes |

Note: Standard errors are clustered at the country and year level.

Table A11 considers the nonlinear relationship between individualism and economic development by including the square of the individualism level. We see similar patterns to the results in the paper. The relationship between individualism and economic development is either hump-shape or insignificant.

Table A5: Individualism and TFP across countries

| | Total Factor Productivity | | | | | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| **Panel A: OLS Regression** | | | | | | |
| Individualism | 0.088*** | 0.039 | 0.059* | 0.083*** | 0.079** | 0.004 |
| | (0.03) | (0.03) | (0.03) | (0.03) | (0.03) | (0.03) |
| Adjusted-$R^2$ | 0.18 | 0.27 | 0.29 | 0.29 | 0.20 | 0.39 |
| Observations | 3848 | 3848 | 3848 | 3848 | 3848 | 3848 |
| **Panel B: IV = Index of 9 diseases** | | | | | | |
| Individualism | 0.293** | 0.530 | 0.324** | 0.253** | 0.289** | 0.900 |
| | (0.12) | (0.44) | (0.13) | (0.11) | (0.13) | (1.18) |
| Adjusted-$R^2$ | -0.30 | -1.19 | -0.31 | -0.07 | -0.28 | -2.99 |
| 1st Stage F | 7.92 | 1.69 | 6.78 | 7.67 | 7.13 | 0.62 |
| Observations | 3776 | 3776 | 3776 | 3776 | 3776 | 3776 |
| **Panel C: Proxy = Index of 9 diseases** | | | | | | |
| Individualism | 0.142*** | 0.107*** | 0.147*** | 0.126*** | 0.136*** | 0.104*** |
| | (0.03) | (0.03) | (0.03) | (0.03) | (0.03) | (0.03) |
| Adjusted-$R^2$ | 0.28 | 0.41 | 0.37 | 0.34 | 0.30 | 0.45 |
| Observations | 5179 | 5179 | 5179 | 5179 | 5179 | 5179 |
| Geo controls | No | Yes | No | No | No | Yes |
| Legal Origins | No | No | Yes | No | No | Yes |
| Institutions | No | No | No | No | Yes | Yes |
| Religions | No | No | No | Yes | No | Yes |
| Continent FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes |

Note: Standard errors are clustered at the country and year level.

## B.2 Patents

Table A12 shows the results for individualism's influence on patent using the instruments generated from the pronoun drop from Kashima and Kashima (1998) and the index of 7 historical diseases. We can infer from the table that individualism either negatively influences innovation or has no significant impact.

Table A13 considers the nonlinear relationship between individualism and patents. Here we see the same pattern as the table in the paper. The only special case is in Panel A

Table A6: Individualism and TFP across countries

| | Total Factor Productivity | | | | | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| **Panel A: OLS Regression** | | | | | | |
| Individualism | 0.088*** | 0.039 | 0.059* | 0.083*** | 0.079** | 0.004 |
| | (0.03) | (0.03) | (0.03) | (0.03) | (0.03) | (0.03) |
| Adjusted-$R^2$ | 0.18 | 0.27 | 0.29 | 0.29 | 0.20 | 0.39 |
| Observations | 3848 | 3848 | 3848 | 3848 | 3848 | 3848 |
| **Panel B: IV = Index of 7 diseases** | | | | | | |
| Individualism | 0.185* | 0.358 | 0.246** | 0.174* | 0.178 | 0.820 |
| | (0.11) | (0.40) | (0.12) | (0.10) | (0.11) | (1.73) |
| Adjusted-$R^2$ | -0.02 | -0.36 | -0.06 | 0.11 | 0.01 | -2.47 |
| 1st Stage F | 4.99 | 0.95 | 5.33 | 4.95 | 4.48 | 0.24 |
| Observations | 3822 | 3822 | 3822 | 3822 | 3822 | 3822 |
| **Panel C: Proxy = Index of 7 diseases** | | | | | | |
| Individualism | 0.087*** | 0.074** | 0.117*** | 0.083*** | 0.082*** | 0.081** |
| | (0.03) | (0.03) | (0.03) | (0.03) | (0.03) | (0.03) |
| Adjusted-$R^2$ | 0.19 | 0.36 | 0.32 | 0.25 | 0.23 | 0.41 |
| Observations | 5569 | 5569 | 5569 | 5569 | 5569 | 5569 |
| Geo controls | No | Yes | No | No | No | Yes |
| Legal Origins | No | No | Yes | No | No | Yes |
| Institutions | No | No | No | No | Yes | Yes |
| Religions | No | No | No | Yes | No | Yes |
| Continent FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes |

Note: Standard errors are clustered at the country and year level.

when we use the instrument estimated from the ancestry stock and the relationship between individualism and patents is U-shape. For all other specifications, the relationship is either hump-shape or insignificant.

Table A7: Individualism and Patents across countries

| | Log Patent per capita | | | | | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| **Panel A: OLS Regression** | | | | | | |
| Individualism | 0.862*** | 0.717*** | 0.888*** | 0.819*** | 0.807*** | 0.525*** |
| | (0.18) | (0.18) | (0.20) | (0.16) | (0.19) | (0.18) |
| Adjusted-$R^2$ | 0.53 | 0.60 | 0.64 | 0.57 | 0.54 | 0.70 |
| Observations | 2917 | 2917 | 2917 | 2917 | 2917 | 2917 |
| **Panel B: IV = KK** | | | | | | |
| Individualism | 1.145*** | 1.450*** | 0.658* | 1.049*** | 1.067*** | 0.894** |
| | (0.24) | (0.36) | (0.33) | (0.24) | (0.26) | (0.41) |
| Adjusted-$R^2$ | 0.17 | 0.37 | 0.39 | 0.30 | 0.19 | 0.61 |
| 1st Stage F | 37.50 | 21.18 | 35.09 | 36.45 | 35.28 | 12.57 |
| Observations | 2137 | 2137 | 2137 | 2137 | 2137 | 2137 |
| **Panel C: Proxy = KK** | | | | | | |
| Individualism | 1.509*** | 1.638*** | 0.924* | 1.381*** | 1.358*** | 0.920* |
| | (0.32) | (0.40) | (0.49) | (0.33) | (0.35) | (0.48) |
| Adjusted-$R^2$ | 0.53 | 0.67 | 0.62 | 0.60 | 0.55 | 0.75 |
| Observations | 2186 | 2186 | 2186 | 2186 | 2186 | 2186 |
| Geo controls | No | Yes | No | No | No | Yes |
| Legal Origins | No | No | Yes | No | No | Yes |
| Institutions | No | No | No | No | Yes | Yes |
| Religions | No | No | No | Yes | No | Yes |
| Continent FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Continent × Year FE | Yes | Yes | Yes | Yes | Yes | Yes |

Note: Standard errors are clustered at the country and year level.

Table A8: Individualism and Patents across countries

| | Log Patent per capita | | | | | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| **Panel A: OLS Regression** | | | | | | |
| Individualism | 0.862*** | 0.717*** | 0.888*** | 0.819*** | 0.807*** | 0.525*** |
| | (0.18) | (0.18) | (0.20) | (0.16) | (0.19) | (0.18) |
| Adjusted-$R^2$ | 0.53 | 0.60 | 0.64 | 0.57 | 0.54 | 0.70 |
| Observations | 2917 | 2917 | 2917 | 2917 | 2917 | 2917 |
| **Panel B: IV = Index of 9 diseases** | | | | | | |
| Individualism | 1.715*** | 1.648 | 1.071** | 1.871*** | 1.679*** | 1.343 |
| | (0.59) | (1.09) | (0.42) | (0.60) | (0.59) | (0.80) |
| Adjusted-$R^2$ | 0.02 | 0.24 | 0.35 | 0.03 | 0.04 | 0.43 |
| 1st Stage F | 12.85 | 3.14 | 9.74 | 13.81 | 11.62 | 2.94 |
| Observations | 2838 | 2838 | 2838 | 2838 | 2838 | 2838 |
| **Panel C: Proxy = Index of 9 diseases** | | | | | | |
| Individualism | 0.800*** | 0.404 | 0.477** | 0.946*** | 0.774*** | 0.229 |
| | (0.25) | (0.33) | (0.23) | (0.23) | (0.25) | (0.28) |
| Adjusted-$R^2$ | 0.52 | 0.60 | 0.60 | 0.56 | 0.54 | 0.69 |
| Observations | 3261 | 3261 | 3261 | 3261 | 3261 | 3261 |
| Geo controls | No | Yes | No | No | No | Yes |
| Legal Origins | No | No | Yes | No | No | Yes |
| Institutions | No | No | No | No | Yes | Yes |
| Religions | No | No | No | Yes | No | Yes |
| Continent FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Continent × Year FE | Yes | Yes | Yes | Yes | Yes | Yes |

Note: Standard errors are clustered at the country and year level.

Table A9: Individualism and Patents across countries

| | Log Patent per capita | | | | | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| **Panel A: OLS Regression** | | | | | | |
| Individualism | 0.862*** | 0.717*** | 0.888*** | 0.819*** | 0.807*** | 0.525*** |
| | (0.18) | (0.18) | (0.20) | (0.16) | (0.19) | (0.18) |
| Adjusted-$R^2$ | 0.53 | 0.60 | 0.64 | 0.57 | 0.54 | 0.70 |
| Observations | 2917 | 2917 | 2917 | 2917 | 2917 | 2917 |
| **Panel B: IV = Index of 7 diseases** | | | | | | |
| Individualism | 2.215** | 1.675 | 1.174** | 2.239** | 2.186** | 0.988 |
| | (0.93) | (1.54) | (0.56) | (0.90) | (0.93) | (1.17) |
| Adjusted-$R^2$ | -0.21 | 0.18 | 0.33 | -0.17 | -0.19 | 0.45 |
| 1st Stage F | 8.04 | 1.69 | 7.31 | 8.31 | 6.95 | 1.50 |
| Observations | 2887 | 2887 | 2887 | 2887 | 2887 | 2887 |
| **Panel C: Proxy = Index of 7 diseases** | | | | | | |
| Individualism_stand | 0.672*** | 0.183 | 0.368 | 0.678*** | 0.648*** | -0.029 |
| | (0.22) | (0.29) | (0.23) | (0.20) | (0.22) | (0.24) |
| Adjusted-$R^2$ | 0.52 | 0.59 | 0.58 | 0.54 | 0.53 | 0.68 |
| Observations | 3517 | 3517 | 3517 | 3517 | 3517 | 3517 |
| Geo controls | No | Yes | No | No | No | Yes |
| Legal Origins | No | No | Yes | No | No | Yes |
| Institutions | No | No | No | No | Yes | Yes |
| Religions | No | No | No | Yes | No | Yes |
| Continent FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Continent × Year FE | Yes | Yes | Yes | Yes | Yes | Yes |

Note: Standard errors are clustered at the country and year level.

Table A10: Individualism and Log GDP per capita within the US

| | Log GDP per capita (1850-2010) | | | | | |
|---|---|---|---|---|---|---|
| | OLS | | IV: Stock | IV: Trans. | IV: Trans. × KK | IV: Trans. × IHD7 |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| **Panel A: With County Group FE** | | | | | | |
| Individualism | 0.001 | -0.001 | 0.008 | -0.059*** | -0.041*** | -0.038*** |
| | (.) | (0.00) | (0.01) | (0.01) | (0.01) | (0.01) |
| Pop Density | No | Yes | Yes | Yes | Yes | Yes |
| County Group FE | No | No | No | No | No | No |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Year × State FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Adjusted-$R^2$ | 0.97 | 0.97 | -0.00 | -0.45 | -0.22 | -0.18 |
| 1st Stage F | | | 5.97 | 50.79 | 17.36 | 34.49 |
| Observations | 17631 | 17631 | 17631 | 17631 | 17631 | 17631 |
| **Panel B: Without County Group FE** | | | | | | |
| Individualism | -0.016*** | -0.014*** | -0.014*** | -0.059*** | -0.053** | -0.049*** |
| | (0.00) | (0.00) | (0.00) | (0.02) | (0.02) | (0.01) |
| Pop Density | No | Yes | Yes | Yes | Yes | Yes |
| County Group FE | No | No | No | No | No | No |
| State FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Adjusted-$R^2$ | 0.91 | 0.91 | 0.06 | -0.35 | -0.25 | -0.20 |
| 1st Stage F | | | 9.17 | 17.81 | 13.10 | 17.75 |
| Observations | 17631 | 17631 | 17631 | 17631 | 17631 | 17631 |

Note: Standard errors are clustered at the county group and year level.

Table A11: Individualism and Log GDP per capita within the US

| | Log GDP per capita (1850-2010) | | | | | |
|---|---|---|---|---|---|---|
| | OLS | | IV: Stock | IV: Trans. | IV: Trans. × KK | IV: Trans. × IHD7 |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| **Panel A: With County Group FE** | | | | | | |
| Individualism | 0.086*** | 0.078*** | 0.190* | 0.237*** | 0.384*** | 0.283*** |
| | (0.01) | (0.02) | (0.11) | (0.05) | (0.09) | (0.05) |
| Individualism Square | -0.001*** | -0.001*** | -0.001* | -0.002*** | -0.003*** | -0.002*** |
| | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) |
| Pop Density | No | Yes | Yes | Yes | Yes | Yes |
| Turning Point | 66.01 | 65.76 | 67.51 | 63.66 | 68.20 | 68.22 |
| County Group FE | No | No | No | No | No | No |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Year × State FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Adjusted-$R^2$ | 0.97 | 0.97 | -0.01 | -0.08 | -0.29 | -0.12 |
| 1st Stage F | | | 2 | 1 | 3 | 24 |
| Observations | 18439 | 17631 | 17631 | 17631 | 17631 | 17631 |
| **Panel B: Without County Group FE** | | | | | | |
| Individualism | 0.188*** | 0.195*** | 0.249*** | 0.088 | -0.071 | 0.602 |
| | (0.02) | (0.02) | (0.04) | (0.82) | (0.60) | (0.40) |
| Individualism Square | -0.002*** | -0.002*** | -0.002*** | -0.001 | 0.000 | -0.005 |
| | (0.00) | (0.00) | (0.00) | (0.01) | (0.00) | (0.00) |
| Pop Density | No | Yes | Yes | Yes | Yes | Yes |
| Turning Point | 62.10 | 62.92 | 64.01 | 44.12 | 280.74 | 65.52 |
| County Group FE | No | No | No | No | No | No |
| State FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Adjusted-$R^2$ | 0.93 | 0.93 | 0.19 | -0.03 | -0.29 | -0.33 |
| 1st Stage F | | | 2 | 0 | 1 | 0 |
| Observations | 18439 | 17631 | 17631 | 17631 | 17631 | 17631 |

Note: Standard errors are clustered at the county group and year level.

Table A12: Individualism and Log Patent per capita within the US

| | Log Patent per 1000 people (1850-2010) | | | | | |
|---|---|---|---|---|---|---|
| | OLS | | IV: Stock | IV: Trans. | IV: Trans. × KK | IV: Trans. × IHD7 |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| **Panel A: With County Group FE** | | | | | | |
| Individualism | -0.006 | -0.007 | -0.168** | -0.085 | -0.132* | -0.087* |
| | (.) | (0.01) | (0.06) | (0.06) | (0.07) | (0.05) |
| Pop Density | No | Yes | Yes | Yes | Yes | Yes |
| County Group FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Year × State FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Adjusted-$R^2$ | 0.83 | 0.83 | -0.41 | -0.10 | -0.25 | -0.10 |
| 1st Stage F | | | 6.90 | 14.76 | 13.54 | 42.69 |
| Observations | 12591 | 12591 | 12591 | 12591 | 12591 | 12591 |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| **Panel B: Without County Group FE** | | | | | | |
| Individualism | -0.045*** | -0.046*** | -0.071*** | -0.180* | -0.179 | -0.146** |
| | (0.01) | (0.01) | (0.02) | (0.09) | (0.11) | (0.06) |
| Pop Density | No | Yes | Yes | Yes | Yes | Yes |
| County Group FE | No | No | No | No | No | No |
| State FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Adjusted-$R^2$ | 0.37 | 0.37 | 0.03 | -0.31 | -0.30 | -0.15 |
| 1st Stage F | | | 8.42 | 6.32 | 4.53 | 8.65 |
| Observations | 12591 | 12591 | 12591 | 12591 | 12591 | 12591 |

Note: Standard errors are clustered at the county group and year level.

Table A13: Individualism and Log Patent per capita within the US

| | Log Patent per 1000 people (1850-2010) | | | | | |
|---|---|---|---|---|---|---|
| | OLS | | IV: Stock | IV: Trans. | IV: Trans. × DA | IV: Trans. × IHD9 |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| **Panel A: With County Group FE** | | | | | | |
| Individualism | 0.125*** | 0.121*** | -2.267** | 0.238 | 0.648 | 0.320 |
| | (0.03) | (0.03) | (1.05) | (0.19) | (0.50) | (0.30) |
| Individualism Square | -0.001*** | -0.001*** | 0.016** | -0.002 | -0.005 | -0.003 |
| | (0.00) | (0.00) | (0.01) | (0.00) | (0.00) | (0.00) |
| Pop Density | No | Yes | Yes | Yes | Yes | Yes |
| Turning Point | 64.49 | 63.88 | 71.52 | 56.72 | 61.50 | 59.62 |
| County Group FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Year × State FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Adjusted-$R^2$ | 0.82 | 0.83 | -2.18 | -0.03 | -0.18 | -0.03 |
| 1st Stage F | | | 3 | 0 | 1 | 3 |
| Observations | 13131 | 12591 | 12591 | 12591 | 12591 | 12591 |
| **Panel B: Without County Group FE** | | | | | | |
| Individualism | 0.423*** | 0.423*** | -0.180 | -0.561 | -1.578 | -6.135 |
| | (0.06) | (0.07) | (0.36) | (2.50) | (3.88) | (30.86) |
| Individualism Square | -0.003*** | -0.003*** | 0.001 | 0.003 | 0.010 | 0.042 |
| | (0.00) | (0.00) | (0.00) | (0.02) | (0.03) | (0.22) |
| Pop Density | No | Yes | Yes | Yes | Yes | Yes |
| TurningPoint | 60.74 | 60.82 | 111.11 | 109.60 | 80.84 | 73.85 |
| County Group FE | No | No | No | No | No | No |
| State FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Adjusted-$R^2$ | 0.42 | 0.41 | -0.00 | -0.63 | -1.68 | -14.77 |
| 1st Stage F | | | 2 | 1 | 1 | 0 |
| Observations | 13131 | 12591 | 12591 | 12591 | 12591 | 12591 |

Note: Standard errors are clustered at the county group and year level.