Patience and The Wealth of Nations*

Thomas Dohmen Benjamin Enke Armin Falk
David Huffman Uwe Sunde

April 20, 2015

Abstract

According to standard dynamic choice theories, patience is a key driving factor behind the accumulation of the proximate determinants of economic development. Using a novel representative data set on time preferences from 80,000 individuals in 76 countries, we investigate the empirical relevance of this hypothesis in the context of a development accounting framework. We find a significant reduced-form relationship between patience and development in terms of contemporary income as well as medium- and long-run growth rates, with patience explaining a substantial fraction of development differences across countries. Consistent with the idea that patience affects national income through accumulation processes, patience also strongly correlates with human and physical capital accumulation, investments into productivity, and institutional quality. Additional results show that the relationship between patience, human capital, and income extends to analyses across regions within countries, and across individuals within regions.

JEL classification: D03, D90, O10, O30, O40
Keywords: Time preference; comparative development; growth; savings; human capital; physical capital; innovation; institutions.

*For valuable comments and discussions we are grateful to Daron Acemoglu, Klaus Desmet, Oded Galor, Luigi Guiso, Robert Hall, Ömer Özak, Felipe Valencia, Nico Voigtländer, Joachim Voth, David Weil, David Yang, Fabrizio Zilibotti as well as seminar audiences at the 2015 NBER Political Economy Meeting, Columbia, IFN Stockholm, Konstanz, Stanford, and UCLA Anderson. Ammar Mahran provided outstanding research assistance. Falk acknowledges financial support from the European Research Council through ERC # 209214. Dohmen, Enke, Falk: University of Bonn, Department of Economics, Adenauerallee 24-42, 53113 Bonn, Germany; tdohmen@uni-bonn.de, benjamin.enke@uni-bonn.de, armin.falk@uni-bonn.de. Huffman: University of Oxford, Manor Road Building, Oxford, OX1 3UQ, United Kingdom; david.huffman@economics.ox.ac.uk. Sunde: University of Munich, Geschwister-Scholl Platz 1, 80333 München, Germany; uwe.sunde@lmu.de.

1 Introduction

The ultimate reason for the substantial variation in living standards around the globe is one of the most vigorously debated research questions in economics. Existing theoretical work on comparative development has emphasized the crucial role of the so-called "proximate determinants" of development, i.e., the accumulation of physical capital, human capital, and productivity. Empirical evidence suggests that the stocks of these productive resources do indeed differ vastly across countries. This observation has shifted attention towards explaining how differences in the stocks of production factors and their productivity arise in the first place, and how the corresponding underlying "deep determinants" of development can be conceptualized. In this vein, a recent empirical literature has highlighted the dependence of economic development on deep-rooted aggregate characteristics such as geography, culture, or anthropological, historical, and institutional factors.

At the level of the individual decision-maker, however, it is ultimately patience that figures prominently as the key primitive in many theories of comparative development and growth. Given that any stock of production factors or knowledge necessarily arises from an accumulation process, a broad class of dynamic models posits that the time preferences of a country's representative agent are intimately linked to national income. Intuitively, this is because higher patience implies higher investments into human and physical capital as well as productivity improvements. At the same time, empirical evidence on the importance of global heterogeneity in time preferences for comparative development is scarce.

This paper fills this gap. Building on a standard development accounting framework, we explore whether – and to what extent – the empirical facts are consistent with the correlations predicted by standard theories of growth and development based on intertemporal choice. Such an empirical analysis requires meaningful, comparable and reliable data on behaviorally relevant heterogeneity in time preference across countries. To this end, we make use of a novel data set, the Global Preference Survey, which contains data on time preferences for more than 80,000 individuals from 76 countries (Falk et al., 2015a). The sample is constructed to provide representative population samples within each country and geographical representativeness in terms of countries covered. The preference measures were selected and tested through a rigorous ex ante experimental validation procedure involving real monetary stakes, so that the survey items have a demonstrated ability to capture actual preferences as measured with financial incentives. For instance, one preference measure has a format similar to the standard procedure of eliciting time preferences in laboratory experiments, i.e., respondents were asked to make a series of hypothetical binary decisions between receiving monetary rewards today or in the future. To ensure comparability of preference measures across countries, the elicitation followed a standardized protocol that was implemented through the professional infrastructure of the Gallup World Poll, monetary stakes involved comparable values in terms of purchasing power across countries, and the survey items were culturally neutral and translated using state-of-the-art procedures. Thus, the data provide an ideal basis for the first systematic analysis of the relationship between patience and comparative development.

Our empirical analysis begins by establishing a strong raw correlation between patience and comparative development as measured by (log) per capita income. In a univariate regression, average patience explains about 40% of the between-country variation in income. This reduced-form relationship is robust across a wide range of regression specifications, which incorporate controls for many of the deep determinants previously identified in the empirical literature, such as geography, climate, the disease environment, or anthropological and cultural factors. The result also holds both within each continent separately, and when employing alternative definitions of development or national welfare. We also take special care in ensuring that the correlation between patience and national income does not arise spuriously as a result of the elicitation procedure in economically and culturally heterogeneous samples. To this end, we show that borrowing constraints, inflation and interest rates, culture-dependent interpretations, and decision heuristics are all unlikely to be driving the results. Finally, we conclude our reduced-form analysis by establishing a significant correlation between patience economic growth. Across a large range of base years, patience explains a considerable fraction of the variation in growth rates both in the medium run (i.e., after World War II), and in the long run over the last 200 years.

Given that theory posits that patience affects development through accumulation processes, we proceed by investigating the relationship between patience and the proximate determinants. Specifically, if the broad dynamic framework of comparative development is correct, patience should predict the stocks of proximate determinants as well as the corresponding accumulation flows. Our analysis establishes coherent support for these predictions. For instance, the results reveal that patience explains large fractions of the cross-country variation in capital stocks, savings rates, educational attainment, education expenditure, research and development expenditure, innovative capacity, and institutional quality. These associations hold for alternative proxies, and are robust to the inclusion of a large and comprehensive vector of controls. Also, consistent with the view that patience is a common factor underlying multiple accumulation processes, we show that each of the proximate determinants and institutions only captures part of the explanatory content of time preferences with respect to national income. In sum, these results are consistent with a conceptual model of patience as a main driver of developmental differences across countries through its impact on accumulation processes.

From the perspective of micro-founded models of intertemporal optimization, there is no a priori reason to expect that the relationship between patience, investment processes, and income should be confined to cross-country analyses. We therefore investigate whether the relationship between patience, human capital, and income extends to lower levels of aggregation. Studying the relation between patience, proximate determinants, and income at the regional and individual level has the additional advantage of enabling us to account for unobserved heterogeneity at the country or region level. The results establish that, within countries, average patience in geographical regions predicts both regional income per capita and average years of education. Analogous results obtain in individual-level analyses, where individual patience predicts both household income and educational attainment within countries and regions. Thus, our subnational results on the interplay between patience, accumulation processes, and income closely mirror those established in cross-country analyses, highlighting that our results are not driven by unobserved country characteristics or survey procedures.

To our knowledge, the present paper presents the first systematic investigation of the hypothesis that cross-country variation in preferences is a decisive factor in determining differential development trajectories. The results establish a coherent pattern of patience being linked to the proximate determinants of development and income, as identified in dynamic theories of economic development. The findings are in line with a rich set of falsifiable ex ante predictions about underlying mechanisms and hence provide insights into the empirical validity of the standard framework of economic development as a whole.

The remainder of the paper proceeds as follows. In the next section, we present the conceptual framework upon which the empirical analysis is based and discuss related literature. The data and their sources are described in Section 3. Section 4 investigates the reduced-form relationship between patience and aggregate development, while Section 5 analyzes the relation between patience and the proximate determinants. Section 6 presents the results at subnational levels, and Section 7 offers a concluding discussion and an interpretation of our results.

2 Conceptual Framework and Related Literature

In order to organize our empirical analysis of the relationship between patience and national income, Figure 1 provides a conceptual framework, which arguably represents the current understanding of the driving forces of comparative development in the literature.

Focusing on the upper (macro-level) part of the figure, the rightmost arrow represents the development accounting framework, which relates national income to human capital, physical capital, and residual factor productivity (e.g., Caselli, 2005; Hsieh and Klenow, 2010).[1] The empirical importance of these "proximate" determinants for comparative development has received considerable attention in the literature (see, e.g., the seminal study of Solow (1957) on the relative importance of productivity improvements and capital accumulation, Caselli and Feyrer (2007) on the importance of physical capital, and Glaeser et al. (2004), Erosa et al. (2010) and Manuelli and Seshadri (2014) for human capital).

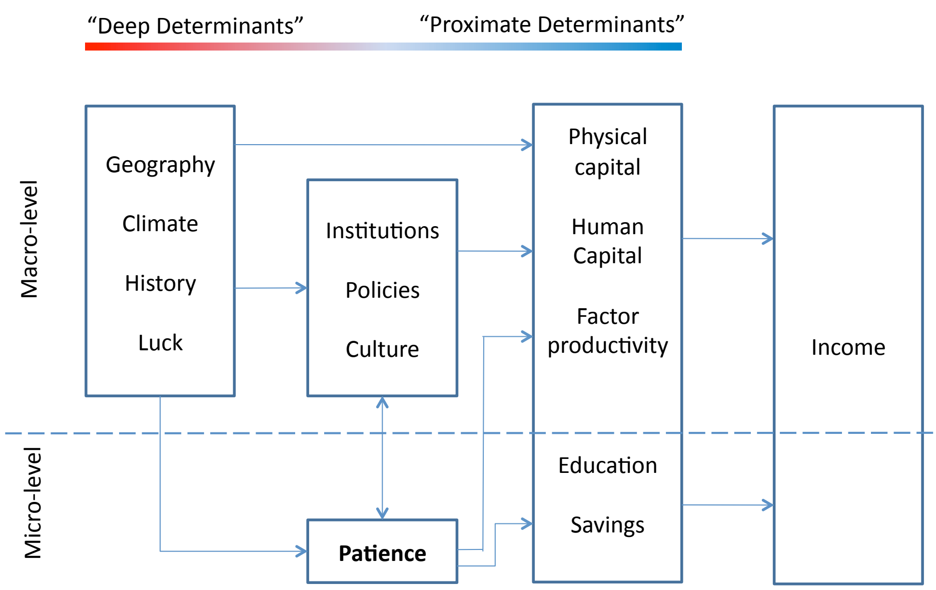

Figure 1: Conceptual Framework

[1]For example, assuming a simple standard aggregate production function approach, income per capita in country i can be expressed as

$$y_i = \frac{Y_i}{N_i} = A_i k_i^{\alpha} (h_i l_i)^{1-\alpha}$$

where $k_i = K_i/N_i$ is real physical capital per capita, h_i is human capital per capita, $l_i = L_i/N_i$ is hours worked per capita, and A_i is residual TFP.

However, the development accounting framework leaves open the question of how differences in production factors and productivity arise in the first place, i.e., does not specify what are the ultimate drivers of national income. A recent stream of empirical research addresses this question by investigating the "deep" determinants that account for cross-country differences in factor accumulation or productivity, and ultimately national income. This literature has argued that some of the variation in development can be explained by considering factors such as geography, climate, and diseases (Gallup et al., 1999; Diamond, 2005; Olsson and Hibbs Jr, 2005; Alsan, 2015) or colonial history (Acemoglu et al., 2001; Nunn, 2008). In related work, researchers have emphasized the importance of policies and institutions (e.g., Hall and Jones, 1999; La Porta et al., 1999; Acemoglu et al., 2002, 2005). Related work has focused attention on anthropological factors (Alesina et al., 2003; Ashraf and Galor, 2013), cultural factors such as trust (Knack and Keefer, 1997; Guiso et al., 2009; Tabellini, 2010), diversity (Alesina et al., 2013a), religion (Barro and McCleary, 2003; Campante and Yanagizawa, forthcoming), or cultural distance to the technological frontier (Spolaore and Wacziarg, 2009). This literature, reviewed in Spolaore and Wacziarg (2013), addresses the deep macro-level determinants in the top left part of Figure 1.

Complementing the macro perspective of development, the present paper starts from the observation that a common feature of the proximate determinants is that they result from accumulation processes that are decided upon at the individual level. Such micro-level accumulation decisions, however, are crucially affected by individual time preferences, i.e., the intrinsic propensity to postpone immediate gratification in exchange for larger, but delayed rewards.[2] From the perspective of a broad class of theories, differences in time preferences translate into differences in both factor accumulation and productivity, as is indicated by the bottom part of Figure 1. For example, in a standard Ramsey-Cass-Koopmans model, higher patience implies a higher propensity to save, a higher steady state level of physical capital and income, as well as faster growth along the convergence path towards the steady state. The same is true in a human capital augmented model (Lucas, 1988), where higher patience also implies faster growth on the balanced growth path. Likewise, in the context of human capital theory, patience implies greater incentives to acquire education (Becker, 1962; Ben-Porath, 1967). In terms of residual productivity, endogenous growth theory suggests that higher patience raises the present value of R&D and thus

[2]Indeed, a stream of research in both economics and psychology has provided evidence for the relationship between measures of time preference and income or between patience and future-oriented behaviors (see, e.g., Mischel et al., 1989; Chabris et al., 2008; Tanaka et al., 2010; Sutter et al., 2013; Golsteyn et al., 2014).

research intensity (Romer, 1990; Aghion and Howitt, 1992).[3]

Variation in output and factor accumulation has also been associated with variation in deeper macro-level factors such as institutions, policies and social infrastructure (Hall and Jones, 1999; Acemoglu et al., 2005). In this context, it is conceivable that higher patience leads to the design of better institutions, as shown by the vertical arrow in Figure 1. For example, if people face a tradeoff between creating an institutional environment suitable for sustained development and engaging in short-run rent extraction, time preferences will affect the design of these institutions. This view is consistent with the work of Acemoglu et al. (2001) on the colonial origins of comparative development, which indicates that investing in institutional quality is critically affected by the time horizon of the decision makers, where high settler mortality can be thought of as the conceptual analogue of low patience. On the other hand, institutions and policies, culture and other elements of an individual's environment might affect individual patience, as indicated by the two-way arrow in the conceptual framework.

In sum, the conceptual framework depicted in Figure 1 highlights the important and intricate role of patience in determining income and development. This occurs through the interaction between preferences as central determinants of choice at the individual level and the proximate determinants of development at the macro level. In this paper, we adopt this perspective and seek to understand whether the data are consistent with this framework, which ultimately relates heterogeneous development outcomes to heterogeneity in individual patience. We do so by formulating and testing three ex ante (directed) hypotheses regarding the relation between patience and development. The first hypothesis refers to the reduced-form relation between patience and comparative development:

Hypothesis 1. *At the aggregate level, patience exhibits a positive reduced-form correlation with income levels and income growth.*

According to the conceptual framework, this reduced-form relationship works through multiple accumulation processes into the proximate determinants of development, implying the second hypothesis:

Hypothesis 2. *Patience is correlated with the proximate determinants, in terms of both their levels and corresponding accumulation processes. In addition, none of the proximate determinants alone fully captures the explanatory content of patience with respect to national income.*

[3]See also Acemoglu (2008) for a comprehensive overview of the role of time preferences for growth. The relation between income, income growth and patience is reinforced in a setting in which patience increases with the level of wealth, see, e.g., Strulik (2012).

Note that the underlying heterogeneity in time preferences is, of course, not confined to cross-country variation, but also pertains to differences in patience at the subnational (regional and individual) level. As indicated in Figure 1, individual heterogeneity in patience affects the propensity to invest in physical capital and education. Individual stocks of physical and human capital, aggregated at the regional level, might lead to regional differences in development within countries. The same holds on the level of individuals. This leads to the third testable hypothesis.

Hypothesis 3. *The positive reduced-form relationship between patience and income, and the association between patience and accumulation decisions, extends to disaggregate data at the regional and individual level.*

3 Data on Time Preferences Across Countries

3.1 Survey Procedure

Empirically relating comparative development to patience requires reliable and meaningful data on time preferences from representative population samples in a broad set of countries. Ideally, these data should reflect behaviorally relevant heterogeneity in time preference at the level of the individual. Our data on time preferences around the globe are part of the Global Preference Survey (GPS), a unique data set on economic preferences from representative population samples in 76 countries. In many countries around the world, the Gallup World Poll regularly surveys representative population samples about social and economic issues. In 76 countries, we included as part of the regular 2012 questionnaire a set of survey items which were explicitly designed to measure a respondent's time preferences, risk preferences, social preferences, and trust (for details see Falk et al., 2015a).

Four noteworthy features characterize these data. First, the preference measures have been elicited in a comparable way using a standardized protocol across countries. Second, we use preference measures that have been elicited from representative population samples in each country, in contrast to small- or medium-scale surveys or experiments, which use student or other convenience samples.[4] This allows for inferences about between-country differences in preferences. The median sample size was 1,000 participants per country; in total, we collected preference measures for more than 80,000 participants worldwide.[5] Respondents were selected through probability

[4]See, e.g., Wang et al. (2011), Rieger et al. (forthcoming), Vieider et al. (2015), Vieider et al. (forthcoming).

[5]Notable exceptions include China (2,574 obs.), Haiti (504 obs.), India (2,539 obs.), Iran (2,507 obs.), Russia (1,498 obs.), and Suriname (504 obs.).

sampling and interviewed face-to-face or via telephone by professional interviewers.

A third important feature of the data is geographical representativeness in terms of the countries being covered. The sample of 76 countries is not restricted to Western industrialized nations, but covers all continents and various levels of development. Specifically, our sample includes 15 countries from the Americas, 24 from Europe, 22 from Asia and Pacific, as well as 14 countries in Africa, 11 of which are Sub-Saharan. This set of countries covers about 90% of the world population and of global income.

Fourth and finally, the preference measures are based on experimentally validated survey items for eliciting preferences. In order to ensure behavioral relevance of our measure of time preferences, the underlying survey items were designed, tested, and selected for the purpose of the GPS through a rigorous ex-ante experimental validation procedure (for details see Falk et al., 2015b). In this validation step, subjects participated in choice experiments that measured preferences using real money. They also answered large batteries of survey questions designed to elicit preferences. We then selected the survey items that were (jointly) the best predictors of actual behavior in the experiments, to form the survey module. In order to make these items cross-culturally applicable, (i) all items were translated back and forth by professionals, (ii) monetary values used in the survey were adjusted along the median household income for each country, and (iii) pretests were conducted in 22 countries of various cultural heritage to ensure comparability. See Appendix A and Falk et al. (2015a) for a detailed description of the data set and the data collection procedure.

Our measure of patience is derived from the combination of responses to two survey measures, one with a quantitative and one with a qualitative format. These were the best predictors of behavior in experiments involving incentivized choices between earlier versus later rewards with a time delay of 12 months, thereby capturing annual time discounting. The quantitative survey measure consists of a series of five interdependent hypothetical binary choices between immediate and delayed financial rewards, a format commonly referred to as the "staircase" (or "unfolding brackets") procedure (Cornsweet, 1962). In each of the five questions, participants had to decide between receiving a payment today or larger payments in 12 months. The wording of the question was as follows:

> *Suppose you were given the choice between receiving a payment today or a payment in 12 months. We will now present to you five situations. The payment today is the same in each of these situations. The payment in 12 months is different in every situation. For each of these situations we would like to know which one you would choose. Please assume there*

is no inflation, i.e., future prices are the same as today's prices. Please consider the following: Would you rather receive amount x today or y in 12 months?

For example, in the German sample, in the first choice, the immediate payment x was 100 euros and the delayed payment y was 154 euros. The immediate payment x remained constant in all subsequent four questions, but the delayed payment y was increased or decreased depending on previous choices. To illustrate, suppose the respondent chose the immediate payment (the delayed payment) in the first decision. Then the delayed payment in the second decision was increased (decreased) to 185 (125) euros (see Appendix A for an exposition of the entire sequence of binary decisions). In essence, by adjusting the delayed payment according to previous choices, the questions "zoom in" around the respondent's point of indifference between the smaller immediate and the larger delayed payment and make efficient use of limited and costly survey time. In addition, the sequence of questions has 32 possible ordered outcomes which partition the real line from 100 euros to 218 euros into roughly evenly spaced intervals. Thus, a respondent's point of indifference can in principle be pinned down to a range of roughly 3% of the immediate payment x. In the international survey, monetary amounts x and y were expressed in the respective local currency, scaled relative to median monthly household income in the given country.

The qualitative measure of patience is given by the respondents' self assessment regarding their willingness to wait on an 11-point Likert scale. The wording of the question was as follows:

We now ask for your willingness to act in a certain way. Please indicate your answer on a scale from 0 to 10, where 0 means you are "completely unwilling to do so" and a 10 means you are "very willing to do so". How willing are you to give up something that is beneficial for you today in order to benefit more from that in the future?

Our patience measure is a linear combination of the quantitative and qualitative survey items, using the weights obtained from the experimental validation procedure.[6] As described in detail in Falk et al. (2015b), the survey items are strongly

[6] Specifically, responses to both items were standardized at the individual level and then aggregated using the following formula:

$$\text{Patience } = 0.7115185 \cdot \text{ Staircase measure } + 0.2884815 \cdot \text{ Qualitative measure.}$$

These weights are based on OLS estimates of a regression of observed behavior in financially incentivized laboratory experiments on the two survey measures. See Falk et al. (2015a) and Falk et al. (2015b) for details.

and significantly correlated with preference measures obtained from standard incentivized intertemporal choice experiments. The raw correlation between experimental choices and the two survey items are 0.53 and 0.39, respectively, and both items jointly explain more than 50% of the variation in the experimental choices.[7] Moreover, the measures predict experimental behavior out of sample. As established in Falk et al. (2015a), our patience measure also correlates with individual-level characteristics (such as cognitive skills) in a manner that is very similar to the correlations reported in data sets that use financially incentivized procedures. Arguably, the ex-ante validation of survey items constitutes a significant methodological advance over the often ad-hoc selection of questions for surveys based on introspective arguments of plausibility or relevance. Additionally, the quantitative staircase measure not only resembles standard experimental procedures of eliciting time preferences, but it is also relatively context neutral and precisely defined, arguably making it less prone to culture-dependent interpretations. This makes the patience measure particularly well-suited for a multinational study like the present one.

3.2 Summary Statistics

We compute individual-level patience measures and standardize the resulting data at the individual level, i.e., compute z-scores. We then calculate a country's patience by averaging responses using the sampling weights provided by Gallup, see Appendix A. Figure 2 depicts the resulting distribution of time preferences across countries, relative to the world's average individual level, colored in white. Darker red colors and darker blue colors indicate less and more patience, respectively, where differences are measured in terms of standard deviations from the world's average individual.[8] Visual inspection of the world map of time preferences already suggests the presence of noteable geographic and economic patterns. In particular, countries in North America and Western Europe appear considerably more patient than their South American or African counterparts. The map also illustrates the existence of considerable between-country differences in patience. The range of the country-averages is 1.7, implying that average patience varies by 1.7 of a standard deviation (in terms of the total individual-level variation).

[7]The benchmark for this comparison is the explanatory power of a test-retest correlation between two incentivized elicitations.

[8]Appendix A provides histograms of both average patience across countries and individual level patience.

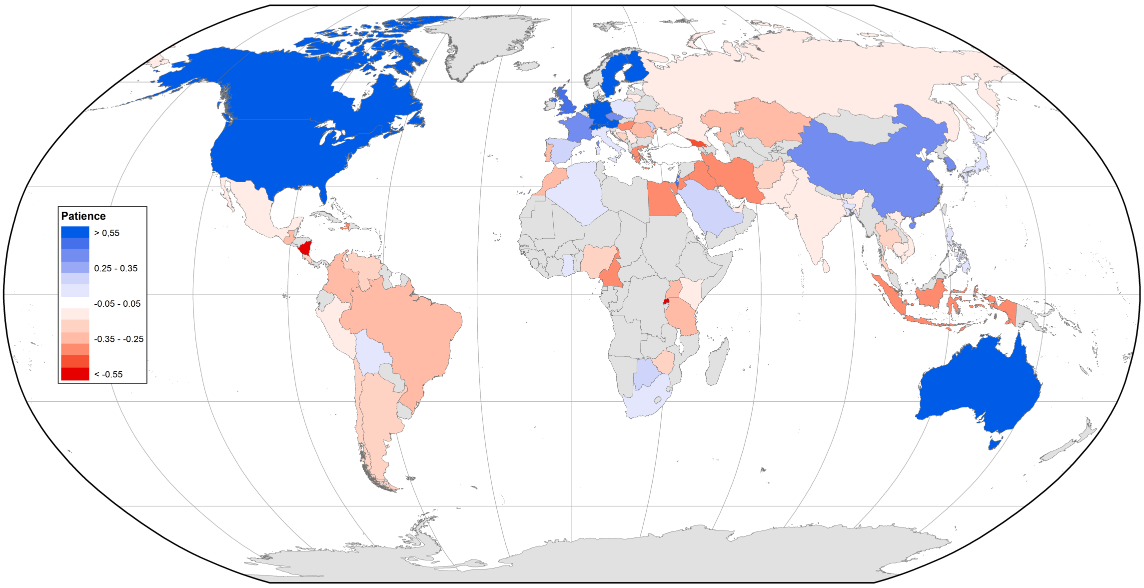

Figure 2: Distribution of Patience Across Countries

3.3 Further Variables of Interest

The GPS data also include measures of other characteristics that may be relevant for economic development. In particular, previous research has argued for the importance of (Knack and Keefer, 1997; Algan and Cahuc, 2010) and the GPS includes a measure of trust that asks for respondents' self-assessment regarding the following statement on an 11 point scale: "I assume that people have only the best intentions." As an alternative measure of trust, we also use the standard variable from the World Values Survey (e.g., Knack and Keefer, 1997), in which respondents are asked "Generally speaking, would you say that most people can be trusted, or that you can't be too careful in dealing with people?".

The empirical analysis also incorporates other variables from a variety of data sources, replicating measures that have been used in various contributions to the literature. In particular, the analysis makes use of macroeconomic variables that are taken mostly from the World Bank's World Development Indicators or the Penn World Tables. Whenever feasible, we use ten-year-averages from 2001 to 2010 to smooth the data and eliminate variation due to measurement error or random fluctuations. Appendix I contains information on the construction and sources of all variables used in the empirical analysis.

4 Patience and Comparative Development: Reduced-Form Evidence

We begin our empirical analysis by providing evidence for a reduced-form relationship between patience and cross-country development. In section 4.1, we document a correlation between patience and income per capita, as well as alternative measures of contemporary development. In Section 4.2, we describe the pattern linking patience to income dynamics in terms of growth.

4.1 Patience and Contemporary Income

4.1.1 Baseline Results

The left panel of Figure 3 provides a graphical illustration of the reduced-form relationship between comparative development and patience. The raw correlation between the log of GDP per capita (measured by averages over the period 2001-2010) and the patience measure is 0.63, implying that patience alone explains about 40% of the variation in log income per capita. To appreciate the quantitative magnitude of this relationship, note that the size of the standardized beta (63%) that corresponds to the regression line in the figure implies that an increase in patience by one standard deviation is associated with an increase of almost two-thirds of a standard deviation in (log) GDP, which is roughly equivalent to the income difference between Peru and the United States.[9]

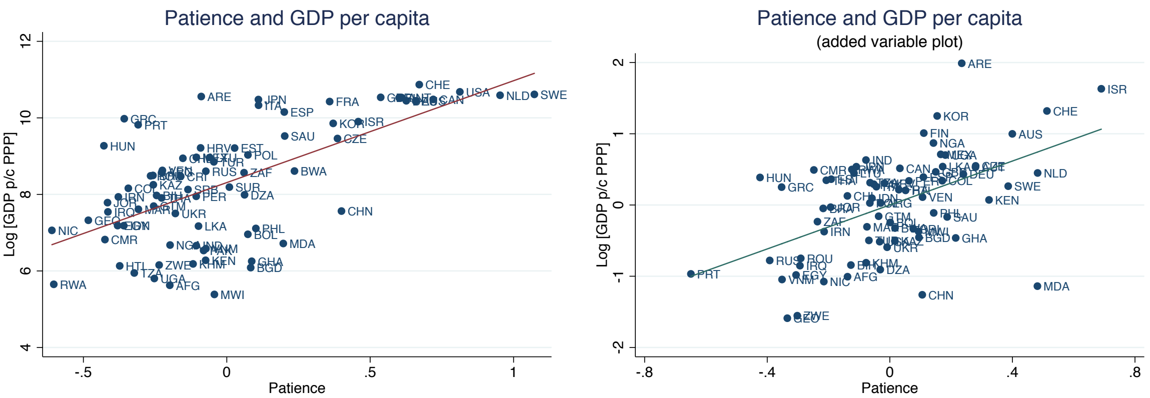

Figure 3: Patience and national income. The left panel depicts the raw correlation between log GDP per capita (purchasing-power parity) and patience ($\rho = 0.63$), while the right panel contains a plot conditional on the full set of baseline covariates in column (7) of Table 1 (partial $\rho = 0.52$, semi-partial $\rho = 0.24$).

[9]The standardized beta measures the change in the dependent variable in % of a standard deviation given a one standard deviation increase in the independent variable.

To investigate the statistical significance and robustness of this relationship, we turn to multivariate regression analysis.[10] Table 1 presents the reduced-form relationship between comparative development and patience accounting for different sets of covariates. Column (1) documents the existence of a significant unconditional relationship between (log) GDP per capita and patience as depicted in the left panel of Figure 3. This raw relationship is statistically highly significant with a t-statistic larger than 10.

The conceptual framework summarized in Figure 1 and the underlying literature suggest an important role of deep-rooted geographic, climatic, and historical factors in determining cross-country income differences, besides patience. Thus, we proceed by investigating the robustness of the relation between patience and income to including various variables corresponding to these deep-rooted factors. Columns (2) through (4) successively add a large and comprehensive set of geographic and climatic covariates. Column (2) contains a set of continent fixed effects as well as a binary indicator for whether the country has ever been colonized in the past.[11] Column (3) contains additional controls for absolute latitude, longitude, the fraction of arable land, land suitability for agriculture, and the timing of the Neolithic transition. Column (4) adds average precipitation and temperature as well as the fractions of the population that live in the (sub-) tropics or in areas with the risk of contracting malaria. While the inclusion of this large vector of covariates reduces the point estimate of the coefficient of patience by about 30%, the coefficient remains statistically significant and quantitatively large, with a standardized beta of 38%.

In recent years, the literature on comparative development has argued that deep-rooted cross-country differences in the diversity of a population – such as genetic, ethnic, linguistic, or religious diversity – are partly responsible for differences in income (Alesina et al., 2003; Ashraf and Galor, 2013; Ashraf et al., 2014). In order to ensure that patience does not merely pick up deep-rooted cross-country differences in the diversity of a population, column (5) additionally controls for genetic diversity and its square, as well as for ethnic fractionalization. While the results for these variables by and large replicate those of the earlier literature, adding these covariates has little, if any, effect on the coefficient on patience.

Taken together, the results in columns (2) through (5) indicate that the relation-

[10]Note that the reduced-form correlation between patience and per capita income obtained from these regressions is similar to the fit of simulating a structural model of comparative development in which patience is the only source of heterogeneity in production factors and productivity across countries, as long as the non-linearities in such a model are moderate.

[11]Following the World Bank terminology, continents are defined as North America, Central and South America, Europe and Central Asia, East Asia and Pacific, South Asia, Middle East and North Africa, and South Africa.

ship between patience and national income is unlikely to merely reflect the effect of other "deep" causes of comparative development that have received attention in the literature. At the same time, the results are consistent with the view that part of the effect of the deep determinants on comparative development works through variation in patience across countries.[12] The most extensive specification with patience and geographic, climatic, colonial, and diversity covariates explains more than 80% of the variation in per capita income, but patience continues to have strong explanatory power for cross-country income differences, with a partial R^2 associated with patience of 27%.[13]

While the theoretical literature emphasizes the importance of patience for accumulation processes, and ultimately development, it is possible that other preferences or cultural beliefs are also important determinants of national income. For instance, at least since Knack and Keefer (1997), it has been argued that social capital, measured in terms of interpersonal trust, is related to GDP. Column (6) presents the results of a regression of income on trust as explanatory variable. Consistent with previous findings in the literature based on the trust measure from the World Values Survey, we find that the GPS trust measure is significantly related to national income. Once we add patience and other controls in column (7), however, trust is no longer significant, while the relationship between patience and GDP remains strong. Virtually identical results obtain if we capture this cultural trait using the standard trust measure from the World Values Survey. The right-hand panel of Figure 3 illustrates the conditional relationship of column (7). Additional robustness checks show that controlling for average risk aversion (measured similarly to patience, see Falk et al., 2015a), legal origin dummies, religious and linguistic fractionalization, major religion shares, the fraction of European descent, the genetic distance to the US, and other geographical variables, does not affect our main result.[14]

In sum, Table 1 establishes a strong and robust relationship between income per capita and patience, conditional on continent fixed effects as well as an extensive set of deep determinants of development. Throughout the remainder of this paper, we will employ the specification in column (7) as the baseline set of control variables.

[12]In particular, unreported results show that the coefficients of some of the deep determinant variables that are significant in specifications without patience become smaller in size and lose significance once patience is included in the specification. Details are available upon request.

[13]The semi-partial R^2 is 6%.

[14]See Table 23 in Appendix G for details.

Table 1: Patience and national income

	Dependent variable: Log [GDP p/c PPP]						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Patience	2.66***	2.06***	1.78***	1.61***	1.58***		1.54***
	(0.26)	(0.32)	(0.40)	(0.37)	(0.41)		(0.41)
1 if colonized		-0.30	-0.22	-0.44*	-0.31		-0.37
		(0.32)	(0.34)	(0.24)	(0.24)		(0.23)
Distance to equator			0.021	0.017	-0.014		-0.011
			(0.02)	(0.02)	(0.02)		(0.02)
Longitude			-0.0027	0.0043	0.0055		0.0055
			(0.01)	(0.01)	(0.01)		(0.01)
Percentage of arable land			-0.027**	-0.016	-0.014		-0.015
			(0.01)	(0.01)	(0.01)		(0.01)
Land suitability for agriculture			0.81	0.12	0.12		-0.055
			(0.70)	(0.59)	(0.58)		(0.59)
Log [Timing neolithic revolution]			0.46	0.094	0.22		0.33
			(0.49)	(0.36)	(0.41)		(0.41)
Average precipitation				0.0072	0.0023		0.0021
				(0.00)	(0.00)		(0.00)
Average temperature				0.077**	0.051		0.056
				(0.03)	(0.03)		(0.03)
% living in (sub-)tropical zones				-1.53**	-1.31*		-1.16*
				(0.69)	(0.69)		(0.64)
% at risk of malaria				-1.46***	-1.45***		-1.49***
				(0.49)	(0.54)		(0.51)
Predicted genetic diversity					430.2**		444.9**
					(181.70)		(170.62)
Predicted genetic diversity sqr.					-308.7**		-319.2**
					(132.16)		(124.23)
Ethnic fractionalization					-0.89		-0.88
					(0.61)		(0.60)
Trust						1.53**	-0.50
						(0.69)	(0.50)
Constant	8.31***	9.30***	4.10	5.74*	-143.4**	8.33***	-149.5**
	(0.14)	(0.47)	(3.99)	(3.37)	(62.76)	(0.17)	(58.69)
Continent FE	No	Yes	Yes	Yes	Yes	No	Yes
Observations	76	76	74	74	74	76	74
R^2	0.397	0.691	0.730	0.819	0.845	0.073	0.849
Adjusted R^2	0.389	0.654	0.671	0.764	0.787	0.061	0.788

OLS estimates, robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

4.1.2 Robustness: Patience and Income in Sub-Samples

The differences in national income per capita are largest between countries on different continents, raising the question whether the relationship between patience and development might just reflect differences in continent characteristics. This is partly addressed by the inclusion of continent fixed effects in the previous analysis, but in Table 2, columns (1) through (4) analyze whether the relationship between patience and income also prevails within each continent separately. In columns (5) through (8), we split the sample of countries by the level of development into OECD and non-OECD countries, and by historical legacy into former colonies and countries that have never been colonized. The relationship between income and patience is always positive and statistically significant, within continents, within OECD versus non-OECD, and regardless of colonial history, despite the rather small sample sizes. Across the different samples, patience tends to explain roughly 40% of the variation in GDP per capita within geographical units.

Table 2: Patience and national income in sub-samples

	Dependent variable: Log [GDP p/c PPP] in...							
	Africa & Middle East (1)	Europe & C. Asia (2)	SE Asia & Pacific (3)	Americas (4)	OECD (5)	Non-OECD (6)	Colonized (7)	Not colonized (8)
Patience	2.83***	1.82***	3.76***	2.42***	1.02***	1.43**	2.54***	2.23***
	(0.76)	(0.33)	(1.04)	(0.32)	(0.21)	(0.65)	(0.36)	(0.51)
Constant	7.84***	9.09***	7.40***	8.55***	9.75***	7.77***	8.10***	8.87***
	(0.34)	(0.19)	(0.33)	(0.20)	(0.15)	(0.20)	(0.16)	(0.30)
Observations	20	27	14	15	22	54	54	22
R^2	0.274	0.448	0.430	0.592	0.498	0.073	0.313	0.434
Adjusted R^2	0.234	0.426	0.383	0.560	0.473	0.055	0.300	0.406

OLS estimates, robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. In the first column, the sample includes Africa and the Middle East, in the second column Europe and Central Asia, in the third South-East Asia and Pacific, in the fourth the Americas, in the fifth (sixth) all (non-) OECD members, and the seventh (eigth) all formerly colonized (never colonized) countries. The regional groups follow the World Bank definitions.

4.1.3 Robustness: Alternative Measures of Development

Next, we explore whether the finding that patience is predictive of a country's level of development is limited to GDP per capita, or whether it extends to other measures of material and non-material well-being. We employ three alternative measures of development. The first of these measures is GDP per worker, which is frequently used in growth empirics as a more useful measure of output than GDP per capita. Instead of confining comparative development to differences in income or consumption, we also employ two broader measures of well-being, namely (i) the United Nations Human Development Index, which combines GDP, years of schooling, and life expectancy, and (ii) subjective statements about well-being in terms of happiness.

Table 3 reports the results of regressions of these three conceptually different dependent variables on our patience variable. Columns (1), (3) and (5) document that each of the alternative measures of economic development exhibits a strong positive unconditional correlation with patience. The results in columns (2), (4), and (6) show that these positive relationships also hold conditional on the baseline set of control variables in column (7) of Table 1. Hence, the robust reduced-form relationship between patience and development is not restricted to GDP per capita as a measure of development.

Table 3: Patience and alternative development measures

	Dependent variable:					
	Log [GDP per worker PPP]		Human Development Index		Subjective happiness	
	(1)	(2)	(3)	(4)	(5)	(6)
Patience	1.59***	0.66***	0.23***	0.13***	0.13***	0.21***
	(0.21)	(0.24)	(0.03)	(0.03)	(0.03)	(0.04)
Constant	9.84***	-61.2*	0.70***	-11.5**	0.72***	-11.4**
	(0.11)	(30.63)	(0.01)	(5.05)	(0.01)	(5.47)
Additional controls	No	Yes	No	Yes	No	Yes
Observations	71	69	76	74	76	74
R^2	0.309	0.896	0.335	0.881	0.140	0.741
Adjusted R^2	0.299	0.849	0.326	0.833	0.129	0.637

OLS estimates, robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. See column (7) of Table 1 for a complete list of the additional controls.

4.1.4 Robustness: Measuring (Revealed) Preferences

A different kind of concern arises if responses to the survey measures of patience capture some additional factors besides just the time preference parameter of interest.[15] Several types of potential confounds can be distinguished that might conceivably affect variation in responses across individuals and countries: (i) Differences in the financial environment in terms of inflation or interest rates; (ii) differences in borrowing constraints; (iii) context- or culture-specific interpretations of the survey items; (iv) differential reliance on systematic shortcuts in decision making ("heuristics"); (v) measurement error resulting from a censored measure; (vi) and correlation with long-term orientation, a cultural trait that is broader than just time preferences. To

[15]See the discussion on elicitation of attitudes by Dohmen et al. (2011) and Dohmen et al. (2014), or Dean and Sautmann (2014) for a theoretical and empirical analysis of the elicitation of time preferences.

ensure that the results are not spurious and merely reflect the impact of unobserved factors that confound the elicitation procedure, we ran various robustness checks, which we summarize in the following and describe in detail in Appendix B.

If some respondents expect higher levels of inflation than others, or live in an environment with higher nominal interest rates, they might appear more impatient in their survey responses, even if they have the same time preference. Note, however, that the survey question explicitly asked people to imagine that there was zero inflation. Also, previous research has shown that differences in interest rates are unlikely to drive choices in experimental environments, see, e.g., Dohmen et al. (2010). Empirically, we check robustness to this concern by explicitly controlling for inflation (in terms of the consumer price index, or the GDP deflator) and deposit interest rates. We find that the reduced-form coefficient of patience remains quantitatively large and highly statistically significant after controlling for these factors.

One might argue that respondents are more likely to opt for immediate payments in experimental choice situations if they face upward sloping income profiles and are borrowing constrained. If such constraints are more likely to be observed in poorer countries, measured patience would be higher in richer countries. To address this issue, we first establish that the correlation between patience and income is robust to controlling for covariates that capture different dimensions of the level of financial development or borrowing constraints of a given country. Specifically, we employ the ratio of external finance to GDP, where external finance is defined as the sum of private credit, private bond market capitalization, and stock market capitalization (Rajan and Zingales, 1998; Buera et al., 2011), as well as the (log) number of Automated Teller Machines (ATMs). In addition, we exploit the idea that borrowing constraints (if present) are likely to be less binding for relatively rich people. Instead of using the simple average patience in a given country, we hence employ the average patience of each country's top income quintile as explanatory variable. Again, the reduced-form relationship remains strong and significant, indicating that borrowing constraints are unlikely to drive our results.

Respondents from culturally heterogeneous backgrounds might interpret survey items, especially qualitative ones, in different ways. Note, however, that our quantitative staircase measure is arguably less prone to culture-dependent interpretations because it is context-neutral and asks for choices over precisely defined monetary rewards and time frames, which are identical across countries and do not require respondents to imagine alternative choice scenarios. In fact, we obtain even stronger results if we only use responses to the staircase measure, suggesting that systematic differences in interpreting survey questions is not a concern.[16]

The quantitative measure of patience requires respondents to think through a sequence of abstract choice problems, which might be unfamiliar and cognitively challenging for some participants. This could induce people to decide based on intuitive and simple heuristics, e.g., “always choose money today”, thereby introducing measurement error in the measure of time preference. Indeed, in our data, about half of individuals do opt for the immediate payment in all five questions of the quantitative measure. To bias our results, the prevalence of heuristics would have to vary by country; this could potentially happen due to differences in education. Accordingly, we implement robustness checks in which we weight average patience levels by country-level-data on average years of schooling or cognitive skills, thereby putting lower weight on responses of less educated populations; this does not affect the results. As we show in Section 5, the correlation between patience and per capita income is also robust to controlling for average years of schooling. Thus, we find little evidence that the relationship between patience and income just reflects differences in the use of cognitive shortcuts.

A related concern is that the quantitative time preference measure could suffer from measurement error arising from censoring. Specifically, for individuals who choose the immediate payment in all five questions of the decision sequence, the elicitation procedure only allows putting a lower bound on impatience. We check in various ways whether the results could hinge on particular assumptions about the level of impatience assigned to these censored individuals. First, we directly manipulate the quantitative value assigned to censored individuals, and find that the results are robust to using a wide range of different values, see Appendix B for details. Second, we sidestep the issue of bias in quantitative interpretation by taking an approach that avoids assigning a quantitative meaning: We collapse the patience measure into an (ordinal) binary indicator for whether an individual's patience exceeds some patience threshold or not, so that a country's average patience corresponds to the fraction of the population that exceeds a given patience level. Across different patience thresholds, countries with a higher proportion of impatient individuals have lower per capita income. Third, even when we drop all censored respondents from the analysis, average patience in a country (i.e., average patience of the uncensored population) still predicts national income. In a final set of robustness checks, we make use of the idea that the median staircase patience is unaffected

[16]In contrast, the correlation of the qualitative item alone with national income is rather weak, suggesting that culture-dependent interpretations might indeed be an issue regarding this particular qualitative self-assessment of patience. Note that the quantitative measure also turns out to be a much better predictor of financially incentivized behavior in the validation experiments as compared to the qualitative survey item, see Falk et al. (2015b) for details.

by censoring concerns, as long as the median individual in a country is not censored. Thus, we exclude countries from the sample in which the median individual is censored, and re-estimate the relationship between GDP and patience for the remaining set of uncensored countries. The significant and negative relationship between impatience and GDP remains, and patience explains about 50% of the variation in national income.[17] Thus, we conclude that measurement error arising from censoring is unlikely to drive the results.[18]

Finally, it is conceivable that our survey measure is related to GDP not due to time preference, but rather because it is correlated with a broader cultural trait. Specifically, Hofstede (2001) developed a qualitative long-term orientation variable that is occasionally used in the literature (e.g., Galor and Özak, 2014), and our patience measure is in fact correlated with the long-term orientation variable at the country level ($\rho = 0.25$, $p = 0.05$). As Hofstede (2001) notes, "Long Term Orientation stands for the fostering of virtues oriented towards future rewards, in particular perseverance and thrift. It's opposite pole, Short Term Orientation, stands for the fostering of virtues related to the past and present, in particular, respect for tradition, preservation of 'face' and fulfilling social obligations." Thus, by construction, the long-term orientation variable is intended to capture elements of economists' notion of time preference, but also dimensions which lack a clear association with tradeoffs between utility flows at different points in time. This measure is based on a composite of responses to qualitative items that were chosen based on an ad hoc procedure.[19] In contrast, our patience measure is based on a rigorous experimental validation procedure, and captures economically meaningful tradeoffs between immediate and delayed monetary rewards, so that it appears more appropriate as measure of time preferences in economically relevant domains. Consistent with this view, it turns out that our patience measure has substantially more predictive power for national income than the Hofstede measure of long-term orientation in terms of variance explained. In addition, once both measures are included in the empirical specification, the coefficient on long-term orientation ceases to be significant, while patience continues to be a significant predictor of GDP.[20]

[17] As we discuss in detail in Appendices B and C, all other findings in the paper, for example concerning the relationships of patience to development at the regional and individual levels, also stand up to robustness checks about censoring.

[18] In addition, our robustness checks regarding the censored variable show that decision heuristics (which may be a cause of censoring) are unlikely to spuriously generate our results.

[19] Some of the underlying items ask respondents to assess the statements "We should honour our heroes from the past." or "Are you the same person at work (or at school if you're a student) and at home?", see Hofstede's Values Survey Module Manual at `http://www.geerthofstede.nl/vsm-08`.

[20] Our patience measure has substantially higher explanatory power than long-term orientation in virtually all analyses, including those pertaining to investments into the proximate determinants.

4.2 Patience and Growth

From a theoretical perspective, greater patience does not only imply greater steady state levels of income, but also faster growth along the balanced growth path (see, e.g., Lucas, 1988).[21] We therefore investigate the relationship between time preferences and growth rates over the past 200 years, and compute the (geometric) average annual growth rate in per capita GDP from different base years, 1820, 1870, 1925, 1950, and 1975, respectively, until 2010.[22]

Table 4 presents the results of OLS regressions of annual growth rates computed for each of these base years on patience. We report results from two specifications each. The first of the respective columns shows the unconditional correlation between growth and patience, while the second column includes controls for log per capita income in the respective base year to capture convergence dynamics, and continent fixed effects. For base years after 1950, the larger number of observations enables us to present a third specification in which we additionally condition on the baseline control variables from column (7) in Table 1. Across base years, greater patience is significantly associated with higher growth rates.[23] This pattern obtains for both very long-run growth rates and medium-run growth after World War II. In terms of quantitative significance, the (unconditional) point estimates suggest that a one-standard deviation increase in patience is associated with an increase in annual growth rates by $0.5 - 1.1$ percentage points.[24]

In sum, patience correlates not only with contemporary development, but also with income growth over the last 200 years. Given this pattern, an immediate question is whether the relationship between patience and income levels was already present in the (potentially distant) past. In Appendix D, we investigate this issue by relating past development (both in pre- and post-industrial times) to today's patience. While these analyses naturally rest on the assumption that the distribution of patience across countries remained relatively stable over time, the corresponding results reveal strong relationships between patience and historical income per capita in the 19th and early 20th century as well as with economic development in 1500.

---

[21]Patience also affects growth off the balanced growth path, including cases in which patience increases in income or wealth, see, e.g., Drugeon (1996), Das (2003), and Strulik (2012).

[22]For Afghanistan, Botswana, Nicaragua, and Rwanda, GDP in 2010 is not available in the Maddison data set on historical GDP. For these countries, we compute the annual growth rate until 2008 instead. None of the results change if we exclude these countries from the estimations.

[23]Figure 9 in the Appendix presents a graphical illustration of both the unconditional and the conditional regression results for base year 1950.

[24]The positive relationship between patience and growth in combination with the correlation between patience and past income might suggest the existence of a "divergence" pattern, i.e., relatively rich patient countries grow faster than relatively poor impatient ones. Note, however, that this is counteracted by the standard convergence result in the literature, i.e., that growth rates are negatively related to income in the base year, see Table 4.

Table 4: Patience and economic growth

	Dependent variable: Annual growth rate in GDP p/c (in %) since...											
	1820		1870		1925		1950			1975		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Patience	0.49***	0.45**	0.38***	0.51**	0.51*	0.97**	1.04***	1.29**	1.39***	1.09**	1.81***	1.81**
	(0.10)	(0.18)	(0.12)	(0.19)	(0.26)	(0.38)	(0.35)	(0.49)	(0.51)	(0.50)	(0.57)	(0.81)
Log [GDP p/c base year]		-0.63***		-0.44***		-0.91***		-0.84***	-1.15***		-1.08***	-1.32***
		(0.17)		(0.15)		(0.26)		(0.21)	(0.24)		(0.22)	(0.40)
Constant	1.35***	5.22***	1.62***	4.83***	1.89***	9.04***	2.09***	8.64***	-230.1***	1.61***	10.7***	-232.0
	(0.06)	(1.06)	(0.06)	(1.05)	(0.12)	(2.07)	(0.14)	(1.63)	(83.27)	(0.20)	(1.91)	(145.26)
Continent FE	No	Yes	No	Yes	No	Yes	No	Yes	Yes	No	Yes	Yes
Additionals controls	No	No	No	No	No	No	No	No	Yes	No	No	Yes
Observations	29	29	40	40	31	31	60	60	60	63	63	62
R^2	0.348	0.637	0.140	0.487	0.107	0.506	0.112	0.555	0.725	0.061	0.541	0.665
Adjusted R^2	0.324	0.492	0.117	0.355	0.077	0.356	0.097	0.486	0.562	0.045	0.473	0.475

OLS estimates, robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Due to the lower number of observations, in columns (1)-(6) we only control for continent fixed effects. See column (7) of Table 1 for a complete list of the additional controls.

5 Proximate Determinants: Patience and Future-Oriented Macroeconomic Choices

As discussed in Section 2, the development accounting approach suggests that the reduced-form relationship between patience and development works through accumulation processes. In this section, we further investigate whether the data are consistent with patience affecting income through the "channels" of human and physical capital as well as (residual) factor productivity. We first explore the association of patience with these proximate determinants (and the corresponding investment decisions). Whenever feasible, in these analyses, we consider both stocks and flows as dependent variables, i.e., we analyze whether patience predicts the levels of production factors and productivity as well as corresponding accumulation flows. Then, we test whether any single proximate determinant can fully account for the reduced-form relationship between patience and national income, or whether patience underlies multiple accumulation processes, as suggested by the conceptual framework.

5.1 Patience and Factor Accumulation

5.1.1 Physical Capital

We start by regressing the stock of physical capital on patience. Columns (1) and (2) of Table 5 present OLS estimates of the unconditional relationship and of the relationship conditional on the extensive set of baseline covariates from column (7) in Table 1. In line with a standard Ramsey-Cass-Koopmans model, the estimates reveal a significant positive relationship between patience and the stock of capital per capita. Patience alone explains about a third of the variation in capital.

The relationship between patience and physical capital accumulation can also be investigated by looking at flows. Columns (3) to (8) of Table 5 present the respective results for gross national savings rates, net adjusted national savings rates, as well as household savings rates as dependent variables. The definitions of the first two variables follow the World Bank terminology, according to which gross savings rates are given by gross national income net of consumption, plus net transfers, as a share of gross national income. Net adjusted savings rates correspond to gross savings net of depreciation, adding education expenditures and deducting estimates for the depletion of energy, minerals and forests, as well as damages from carbon dioxide emissions. Household savings rates are measured as household savings relative to household disposable income. These data are based on surveys and are only available for OECD countries. Throughout, the results reveal a significant positive relationship between patience and savings. In terms of size and statistical significance, the effect is largest for household savings and net adjusted savings, which includes education expenditures, and thus incorporates the accumulation of physical and human capital.[25] The finding that patience is related to household savings rates even within OECD countries is also noteworthy, given the similarity of this subset of countries in terms of economic development and other characteristics.[26]

Table 5: Patience, physical capital, and savings

	Dependent variable:							
	Log [Capital stock p/c]		Gross sav. (% GNI)		Net adj. sav. (% GNI)		HH savings rate	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Patience	2.04***	0.99***	6.85***	7.33*	7.89***	8.97***	6.21**	7.08**
	(0.28)	(0.32)	(2.18)	(3.96)	(2.16)	(3.13)	(2.70)	(3.13)
Constant	9.97***	-147.5***	21.8***	-1446.3**	10.0***	484.8	3.27**	2.86*
	(0.13)	(42.84)	(1.16)	(566.05)	(1.06)	(773.44)	(1.50)	(1.63)
Continent FE	No	Yes	No	Yes	No	Yes	No	Yes
Additional controls	No	Yes	No	Yes	No	Yes	No	No
Observations	71	69	73	71	68	68	21	21
R^2	0.328	0.863	0.064	0.461	0.108	0.522	0.231	0.272
Adjusted R^2	0.319	0.801	0.050	0.230	0.094	0.304	0.191	0.144

OLS estimates, robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Gross savings and net adjusted savings are national savings as % of GNI. Household savings as % of household disposable income. Household savings rates are only available for OECD countries. Due to the small number of observations, in column (8) the controls are restricted to continent dummies only. See column (7) of Table 1 for a complete list of the additional controls.

5.1.2 Human Capital

As measures of human capital, we consider proxies for both the quantity and quality of schooling, as well as investments into education. Specifically, following the literature, we use average years of schooling as the baseline measure of education. However, since years of schooling does not account for quality differences across countries, we also use alternative measures. First, we take the human capital index provided by the Penn World Tables, which aims to provide a quality-adjusted index by combining years of schooling with returns to schooling. As a second alternative measure of quality-adjusted human capital, we employ a measure of cross-country differences in cognitive skills derived from educational achievement tests (Hanushek and Woessmann, 2012). Finally, we use education expenditures as percentage of gross national income as a measure of the input into the human capital formation process.

[25] Unreported results show that patience is also significantly correlated with net FDI outflows (as % of GDP).

[26] Figure 12 in the Appendix presents a graphical illustration of this result.

Table 6 summarizes our corresponding findings. Columns (1) and (2) reveal a positive relation between patience and average years of schooling. The explained variation of roughly 40% indicates a strong unconditional relationship, which holds up when controlling for the baseline set of covariates.[27] Columns (3) through (8) present the analogous results for the three alternative measures of human capital. We find a significant positive relationship of patience with all human capital proxies, both stocks and flows. Overall, these findings are consistent with the hypothesis that greater patience is systematically related to the accumulation of higher levels of human capital.

Table 6: Patience and human capital

	Dependent variable:							
	Years of schooling		Human capital index		Cognitive skills		Educ. exp. (% GNI)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Patience	4.70***	3.60***	0.77***	0.42**	0.81***	0.36*	1.46***	1.43***
	(0.53)	(0.84)	(0.11)	(0.16)	(0.13)	(0.21)	(0.31)	(0.52)
Constant	5.38***	-88.5	2.60***	-29.7	4.39***	-15.2	4.22***	-54.0
	(0.24)	(128.34)	(0.05)	(35.47)	(0.08)	(65.39)	(0.16)	(113.95)
Additional controls	No	Yes	No	Yes	No	Yes	No	Yes
Observations	71	70	67	66	49	48	71	70
R^2	0.438	0.800	0.331	0.717	0.283	0.757	0.150	0.588
Adjusted R^2	0.430	0.712	0.320	0.582	0.268	0.561	0.138	0.408

OLS estimates, robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. See column (7) of Table 1 for a complete list of the additional controls.

5.2 Patience, Productivity, and Institutions

The empirical literature has documented the importance of differences in residual factor productivity for comparative development. Based on our conceptual framework, we complete the investigation of the role of patience for the proximate determinants by presenting evidence regarding the relationship between patience and different measures of factor productivity. In light of the literature that, at least since Hall and Jones (1999), has emphasized the role of institutions and social infrastructure for explaining cross-country productivity and income differences, we also consider institutions as a deeper determinant of productivity differences across countries.

5.2.1 TFP, R&D, and Innovation

We investigate the association between patience and productivity using a standard measure of total factor productivity (TFP) as well as three alternative measures that

[27]Figure 13 in the Appendix graphically illustrates these regression results.

capture differences in productivity related to innovation, consistent with standard theories of endogenous growth. These measures are the share of GDP made up by R&D expenditures, the number of researchers in R&D (per 1,000 population), and the Global Innovation Index. This index is a summary statistic of innovative capacity, and hence productivity, that consists of over 80 qualitative and quantitative items, including measures of institutions, human capital and research, infrastructure, market sophistication, business sophistication, knowledge and technology outputs, and creative outputs.

Table 7 contains the respective estimation results. Using the standard TFP measure, we find a positive relation between patience and productivity conditional on the same country-specific characteristics as in the baseline specification (columns (1)-(2)). As shown in columns (3)-(6), we also find strong and significant associations with patience when using R&D expenditure or the number of researchers in R&D as dependent variable. Note that patience also explains a substantially larger fraction of these R&D-related variables (roughly 60%) than it does for TFP. In columns (7) and (8), we employ the global innovation index as dependent variable. The relationship between patience and factor productivity measured in terms of this index is similarly strong as the one with R&D expenditure, and again remains significant when controlling for all baseline covariates.[28] The estimation results jointly support the hypothesis that average patience is relevant not only for the accumulation of production factors, but also for the accumulation of knowledge and productivity.

Table 7: Patience, productivity and innovation

	Dependent variable:							
	TFP		R&D exp. (% GDP)		# Researchers in R&D		Innovation Index	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Patience	0.38***	0.15*	2.07***	1.83***	3.31***	1.40***	23.6***	18.1***
	(0.05)	(0.09)	(0.22)	(0.60)	(0.41)	(0.46)	(1.70)	(2.91)
Constant	0.62***	2.41	0.92***	15.6	1.40***	-5.16	39.1***	-119.3
	(0.03)	(14.49)	(0.08)	(54.67)	(0.15)	(74.30)	(0.82)	(458.69)
Additional controls	No	Yes	No	Yes	No	Yes	No	Yes
Observations	60	59	66	65	61	60	72	71
R^2	0.368	0.765	0.583	0.716	0.531	0.828	0.619	0.825
Adjusted R^2	0.357	0.632	0.576	0.577	0.523	0.733	0.613	0.750

OLS estimates, robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Number of researchers in R&D are per 1,000 population. See column (7) of Table 1 for a complete list of the additional controls.

[28]Figures 14 and 15 in the Appendix show the raw and conditional correlations between patience and R&D expenditures, and between patience and the global innovation index, respectively.

5.2.2 Institutions and Social Infrastructure

A broader interpretation of productivity differences refers to the quality of the institutional environment. As discussed in Section 2, higher patience might lead to the design of higher-quality institutions if more patient decision-makers opt for creating institutions that support sustainable development rather than short-run rent extraction. We consider an index of democratic quality, an index of property rights as well as a social infrastructure index (Hall and Jones, 1999) as measures of institutional quality. Finally, as a proxy for the quality of the financial institutional environment, we employ Standard & Poor's long-term credit rating, which arguably captures the structural institutional reliability of a country in fulfilling its financial obligations. The regression results are presented in Table 8. For each institutional proxy, we again report estimation results for two different specifications, one with and one without controls. The estimates indicate a strong relationship between patience and institutions, confirming the hypothesis that patience is a significant correlate of democracy, property rights, social infrastructure, and long-term credit ratings.[29]

In sum, patience predicts both the stocks of and investments into physical capital, human capital, and productivity. In Appendix G, we present extended specifications for all dependent variables in which we additionally condition on income per capita. Although controlling for GDP is likely to produce an underestimate of the relationship between patience and the respective proximate determinant, we report these specifications to illustrate that the consistent pattern linking time preferences to accumulation processes does not arise as a mere artefact of the correlations between national income on the one hand and proximate determinants on the other hand.

Table 8: Patience, institutions and social infrastructure

	Dependent variable:							
	Democracy		Property rights		Social infrastructure		S&P credit rating	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Patience	4.53***	3.36*	47.2***	37.8***	0.43***	0.17**	10.7***	9.03***
	(0.85)	(1.68)	(4.32)	(8.16)	(0.05)	(0.07)	(0.82)	(1.35)
Constant	6.48***	225.5	48.5***	-85.5	0.50***	13.2	14.5***	-270.5
	(0.37)	(224.44)	(1.89)	(1217.66)	(0.02)	(12.57)	(0.42)	(299.17)
Additional controls	No	Yes	No	Yes	No	Yes	No	Yes
Observations	72	70	75	73	61	60	64	62
R^2	0.218	0.702	0.536	0.647	0.461	0.793	0.607	0.768
Adjusted R^2	0.207	0.572	0.529	0.502	0.451	0.679	0.601	0.647

OLS estimates, robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. See column (7) of Table 1 for a complete list of the additional controls.

[29]Figure 16 in the Appendix depicts the relationship between patience and property rights.

5.3 Patience, Comparative Development, and Proximate Determinants

If patience has a causal effect on national income through its impact on the accumulation of proximate determinants, the reduced-form relationship between patience and national income should substantially weaken once we condition on human and physical capital or productivity.[30] As a final consistency check, Table 9 presents the results of OLS regressions in which we successively include proxies for human capital, physical capital, residual productivity, and institutions. As expected, the inclusion of each proximate determinant causes a substantial drop in the coefficient on patience. Notably, however, patience remains a significant predictor of per capita income in all columns, suggesting that none of the proximate determinants alone fully accounts for the explanatory content of patience with respect to national income. This is consistent with patience being a central determinant of accumulation processes in multiple dimensions.

Table 9: Patience, proximate determinants, and national income

	Dependent variable: Log [GDP p/c PPP]				
	(1)	(2)	(3)	(4)	(5)
Patience	2.66***	0.82***	0.58***	1.07***	0.71**
	(0.26)	(0.31)	(0.18)	(0.40)	(0.35)
Average years of schooling		0.40***			
		(0.05)			
Log [Capital stock p/c]			1.00***		
			(0.07)		
Total factor productivity				3.71***	
				(0.66)	
Property rights					0.037***
					(0.01)
Democracy					0.053
					(0.05)
Constant	8.31***	6.20***	-1.68**	6.29***	6.18***
	(0.14)	(0.32)	(0.68)	(0.36)	(0.34)
Observations	76	71	71	60	72
R^2	0.397	0.662	0.908	0.750	0.602
Adjusted R^2	0.389	0.652	0.905	0.741	0.584

OLS estimates, robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

[30] With our conceptual framework in mind, it makes little sense to "control" for human and physical capital or productivity if one is interested in the reduced-form relationship between patience and income, since patience is hypothesized to affect income through the process of factor accumulation.

6 Patience and Development Within Countries

The conceptual framework illustrated in Figure 1 emphasizes the crucial role of individual-level heterogeneity in time preferences for differential development trajectories. Thus, the relationship between patience, proximate determinants, and income should also pertain to lower levels of aggregation than cross-country analyses. This section investigates our third hypothesis stated in Section 2 by exploring the relationship between patience, human capital, and income at the subnational level.

We begin our sub-national analysis by considering the role of patience in explaining differences in regional development. Since our individual-level data contain regional identifiers (usually at the state or province level), we can relate the average level of patience in a region to the level of regional GDP per capita and the average years of education in a given region from data constructed by Gennaioli et al. (2013).[31] In total, we were able to match 710 regions from 55 countries across the two data sets, providing us with substantial statistical power to exploit within-country variation in regional income, education, and patience.[32]

Relating regional income and human capital to patience has the important advantage that it allows us to rule out unobserved heterogeneity at the country-level. For example, potential concerns about the role of languages, institutions, and culture for survey responses are less relevant in within-country analyses. The benefits of considering regional data naturally come at the cost of losing representativeness, since the sampling scheme was constructed to achieve representativeness at the country level. Given a median sample size of 1,000 respondents per country, in some regions, we observe only a relatively small number of respondents. In consequence, average regional time preference is estimated less precisely for some regions. We explicitly take into account the differential precision with which patience is measured across regions by estimating weighted OLS regressions of regional (log) GDP per capita or average years of education on regional patience, in which each observation is weighted by the number of respondents in the respective region. This procedure ensures that regions with only a small number of respondents receive less weight in the estimations, as should be the case if more observations imply more precision.[33]

[31] A full replication of our cross-country analysis would include an analysis of the relationship between patience and physical capital, productivity, and institutions at the regional level. However, the data collected by Gennaioli et al. (2013) do not include information on regional capital stocks or productivity. The data contain information on local institutional quality, but unlike with regional human capital, the number of observations is too small to allow for meaningful analyses.

[32] See Appendix E for an overview of the number of regions per country.

[33] An alternative route is to restrict the sample to regions for which the number of respondents exceeds a particular threshold. As Table 28 in Appendix G shows, once the sample is restricted by eliminating regions with ten or less observations, the results are very similar to those established in the main text.

Table 10 reports estimates of these regressions of average education and average per capita income at the regional level on patience. For both dependent variables, we estimate a specification without country fixed effects, one with country fixed effects, and one with additional regional-level covariates provided by Gennaioli et al. (2013). The results mirror those established in the cross-country analysis. We find significant relationships between patience and income, as well as between patience and human capital. These results are consistent with the hypothesis that the effect of patience on income extends to sub-national levels, as well as with the conjecture that the reduced-form effect of patience works partly through the proximate determinant of education.

As highlighted in the conceptual framework in Section 2, ultimately, the accumulation decisions underlying the proximate determinants are made by individuals. To close the circle of the argument, we therefore conclude our empirical analysis by assessing whether the relationship between patience, proximate determinants, and income also holds at the individual level. To this end, we make use of our individual-level data on household income, educational attainment, and patience. Table 11 reports the results of regressions of respondents' household income per capita or educational attainment on their patience. For both dependent variables, the first column presents raw correlations, while the second column conditions on country fixed effects. The results document that, within countries, more patient people tend to be richer and have higher educational attainment (also see Falk et al., 2015a). Further specifications show that this pattern is virtually unchanged when adding region fixed effects or sociodemographics.

In sum, the subnational analysis reveals that the relationship between patience, proximate determinants, and income holds across regions within countries, and across individuals within regions. These findings lend further support to the internal consistency of a dynamic development framework in which time preferences play a critical role. In addition, they also allow us to rule out that unobserved heterogeneity (either at the country or at the regional level) spuriously drives our results.[34]

[34]For example, to the extent that institutional conditions are identical for individuals within regions, our results show that the variation in patience and its relationship with income is not only a consequence of well-designed institutions fostering future-oriented investments, as argued by, e.g., Acemoglu (2008). At the same time, the quantitative estimates of the coefficient of individual-level patience are substantially smaller once country fixed effects are accounted for. Similarly, in the individual-level regressions, the coefficient is considerably smaller compared to the cross-country analyses. This pattern of results is suggestive of the existence of externalities of patience endowments at the aggregate level, for instance through the implementation of more long-run oriented institutions or policies, public savings or R&D expenditure, or through complementarities in the accumulation of different proximate determinants that play out at the country level. Such aggregation effects appear much more moderate at the region than at the country level. Thus, the mechanics of a potential causal effect of patience might differ across different aggregation levels.

Table 10: Regional patience, human capital, and income

	Dependent variable:					
	Log [Regional GDP p/c]			Avg. years of education		
	(1)	(2)	(3)	(4)	(5)	(6)
Patience	1.37***	0.20***	0.15**	3.31***	0.40**	0.30**
	(0.23)	(0.07)	(0.07)	(0.55)	(0.17)	(0.14)
Temperature			-0.012			-0.050***
			(0.01)			(0.02)
Inverse distance to coast			0.75*			1.37**
			(0.38)			(0.54)
Log [Oil production p/c]			0.19***			-0.13
			(0.04)			(0.12)
# Ethnic groups			-0.15**			-0.39**
			(0.06)			(0.15)
Log [Population density]			0.086*			0.22**
			(0.05)			(0.10)
Constant	8.75***	9.25***	8.58***	7.17***	7.21***	6.41***
	(0.18)	(0.02)	(0.29)	(0.35)	(0.04)	(0.70)
Country FE	No	Yes	Yes	No	Yes	Yes
Observations	710	710	693	699	699	682
R^2	0.181	0.937	0.952	0.249	0.935	0.957
Adjusted R^2	0.179	0.932	0.947	0.248	0.929	0.953

Weighted least squares estimates, observations weighted by number of respondents in region. Standard errors (clustered at country level) in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 11: Individual patience, human capital, and income

	Dependent variable:							
	Log [Household income p/c]				Education level			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Patience	0.35***	0.053***	0.046***	0.047***	0.20***	0.13***	0.14***	0.097***
	(0.05)	(0.01)	(0.01)	(0.01)	(0.03)	(0.01)	(0.01)	(0.01)
Age				0.0052***				0.020***
				(0.00)				(0.01)
Age squared				-0.000037*				-0.00040***
				(0.00)				(0.00)
1 if female				-0.094***				-0.13***
				(0.02)				(0.03)
Constant	7.88***	6.35***	5.93***	5.87***	1.00***	2.27***	3.06***	3.30***
	(0.13)	(0.00)	(0.00)	(0.03)	(0.05)	(0.04)	(0.05)	(0.14)
Country FE	No	Yes	No	No	No	Yes	No	No
Regional FE	No	No	Yes	Yes	No	No	Yes	Yes
Observations	79267	79267	79239	78984	79357	79357	79334	79125
R^2	0.053	0.601	0.634	0.636	0.015	0.116	0.149	0.176
Adjusted R^2	0.053	0.601	0.629	0.631				

Columns (1)-(4) contain OLS and columns (5)-(8) ordered probit estimates. Standard errors (clustered at country level) in parentheses. The dependent variable in (5)-(8) is educational attainment as a three-step category. Here, the R^2 is a Pseudo-R^2. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

7 Discussion and Concluding Remarks

Using a unique novel data set, this paper provides the first systematic investigation of the relationship between patience and economic development. We show that a comprehensive pattern of conditional correlations – both at the aggregate and disaggregate level – is consistent with a conceptual framework according to which patience is a key factor behind the accumulation of the proximate determinants of development. The analysis could have falsified any one of a rich set of ex ante predictions about the relationship of patience to development and proximate determinants, but instead generates findings consistent with these predictions. These results are thus informative regarding the validity of the the conceptual framework of comparative development and its consistency with empirical evidence. While the results are consistent with theory, they are not based on exogenous variation to identify causality. A causal interpretation of the results is subject to two main concerns. The first concern is the existence of third factors that might render the effect of patience spurious. Note that such a third factor would have to exhibit several features. First, it should be omitted from our extensive cross-country analyses, which replicate and extend those commonly used in the literature. Second, even if omitted factors existed, they would have to explain a sufficient amount of variation in income so that the coefficient of patience becomes insignificant.[35] Third, such a variable would have to drive not only the relationship between patience and income, but also between patience and various investment decisions. Fourth, it must correlate with the proximate determinants in a manner that also produces the result that the correlation between patience and income becomes successively weaker once the proximate determinants are accounted for, but that none of the proximate determinants alone captures the explanatory content of patience. Finally, the variable would also have to explain the within-country relationships between patience, human capital, and income. On the whole, it appears unlikely that a variable that satisfies all these conditions exists, mitigating concerns that third factors are generating a spurious result.

The second potential concern is that the conditional correlations are entirely due to reverse causality, in the sense that economic development might affect (individual or aggregate) patience. Thus, an interesting question is how cross-country variation in time preferences arises in the first place. Broadly speaking, one part of the literature argues that the distribution of time preferences across populations is rather stable over time and may have deep cultural or environmental origins. Among the determinants of time preferences that have been proposed are religion (Weber, 1930),

[35] For instance, in Table 1, the omitted factor would have to explain about 1.5 times the variation explained by all deep determinants in specification (7).

cultural legacy as manifested in very old linguistic features (Chen, 2013) as well as historical agricultural productivity and crop yield (Galor and Özak, 2014). Provided that time preferences are fairly stable over time and with respect to contemporary changes in environmental conditions, as suggested by the aforementioned contributions, the proposed correlation between patience and income is unlikely to be driven by causality operating from income to patience. On the other hand, patience might be endogenous to the more recent environment. For instance, well-designed institutions might induce individuals to develop (revealed) patience because they provide an environment that is conducive to the incentives for factor accumulation (Acemoglu, 2008). Likewise, authors have emphasized the existence of two-way links between patience and human capital or income (Becker and Mulligan, 1997; Shah et al., 2012; Doepke and Zilibotti, 2008, 2013). However, recall that, in our cross-country analyses, neither accounting for institutions nor for human capital alone eliminated the relationship between patience and national income. Finally, even if there is a channel through which development affects patience, this does not preclude the existence of a causal link from patience to the proximate determinants and development.

Nevertheless, given the strong and robust correlations we find, it would be desirable to develop more direct approaches to identify a causal effect, e.g., by finding a suitable instrument for patience. In Appendix F, we take a first step by exploring such an avenue. Specifically, we exploit the so-called "Weber-hypothesis" (Weber, 1930), according to which protestantism attributes particular importance to faith, virtue, and patience, which made protestant ethics distinct in terms of its focus on worldliness, and favorable for economic development. Indeed, in our data, patience is strongly correlated with the share of protestants in a given country.[36] When we estimate IV regressions of per capita income on patience, instrumented by the share of protestants, the second stage results are consistent with the main findings in the paper, providing additional suggestive evidence in support of the conceptual causal link between patience and development.

[36] As we show in Table 23 in Appendix G, controlling for protestantism does not affect the relationship between patience and national income.

References

Acemoglu, Daron, *Introduction to Modern Economic Growth*, Princeton University Press, 2008.

_ **, Simon Johnson, and James A. Robinson**, "The Colonial Origins of Comparative Development: An Empirical Investigation," *American Economic Review*, 2001, *91* (5), 1369–1401.

_ **,** _ **, and** _ , "Reversal of Fortune: Geography and Institutions in the Making of the Modern World Income Distribution," *Quarterly Journal of Economics*, 2002, pp. 1231–1294.

_ **,** _ **, and** _ , "Institutions as a Fundamental Cause of Long-Run Growth," *Handbook of Economic Growth*, 2005, *1*, 385–472.

Aghion, Philippe and Peter Howitt, "A Model of Growth through Creative Destruction," *Econometrica*, 1992, *60* (2), 323–351.

Alesina, Alberto, Arnaud Devleeschauwer, William Easterly, Sergio Kurlat, and Romain Wacziarg, "Fractionalization," *Journal of Economic Growth*, 2003, *8* (2), 155–194.

_ **, Johann Harnoss, and Hillel Rapoport**, "Birthplace Diversity and Economic Prosperity," *NBER Working Paper*, 2013, *18699.*

_ **, Paola Giuliano, and Nathan Nunn**, "On the Origins of Gender Roles: Women and the Plough," *Quarterly Journal of Economics*, 2013, *128* (2), 469–530.

Algan, Yann and Pierre Cahuc, "Inherited Trust and Growth," *American Economic Review*, 2010, pp. 2060–2092.

Alsan, Marcella, "The Effect of the TseTse Fly on African Development," *American Economic Review*, 2015, *105* (1), 382–410.

Ashraf, Quamrul and Oded Galor, "Dynamics and Stagnation in the Malthusian Epoch," *American Economic Review*, 2011, *101* (5), 2003–2014.

_ **and** _ , "The Out of Africa Hypothesis, Human Genetic Diversity, and Comparative Economic Development," *American Economic Review*, 2013, *103* (1), 1–46.

_ **,** _ **, and Marc P. Klemp**, "The Out of Africa Hypothesis of Comparative Development Reflected by Nighttime Light Intensity," *Working Paper*, 2014.

Barro, Robert, "Religion Adherence Data," http://scholar.harvard.edu/barro/publications/religion-adherence-data 2003.

Barro, Robert J. and Jong-Wha Lee, "A New Data Set of Educational Attainment in the World, 1950–2010," *Journal of Development Economics*, 2012.

_ **and Rachel M. McCleary**, "Religion and Economic Growth Across Countries," *American Sociological Review*, 2003, *68* (5), 760–781.

Becker, Anke, Benjamin Enke, and Armin Falk, "The Ancient Origins of Cross-Country Heterogeneity in Risk Preferences," *Working Paper*, 2015.

Becker, Gary S., "Investment in Human Capital: A Theoretical Analysis," *Journal of Political Economy*, 1962, *70* (5), 9–49.

_ **and Casey B. Mulligan**, "The Endogenous Determination of Time Preference," *Quarterly Journal of Economics*, 1997, pp. 729–758.

Ben-Porath, Yoram, "The Production of Human Capital and the Life Cycle of Earnings," *Journal of Political Economy*, 1967, *75* (4), 352–365.

Buera, Francisco J., Joseph P. Kaboski, and Yongseok Shin, "Finance and Development: A Tale of Two Sectors," *American Economic Review*, 2011, *101* (5), 1964–2002.

Campante, Filipe R. and David Yanagizawa, "Does Religion Affect Economic Growth and Happiness?: Evidence from Ramadan," *Quarterly Journal of Economics*, forthcoming.

Caselli, Francesco, "Accounting for Cross-Country Income Differences," *Handbook of Economic Growth*, 2005, *1*, 679–741.

_ **and James Feyrer**, "The Marginal Product of Capital," *Quarterly Journal of Economics*, 2007, *122* (2), 535–568.

Cesarini, David, Christopher T. Dawes, Magnus Johannesson, Paul Lichtenstein, and Björn Wallace, "Genetic Variation in Preferences for Giving and Risk Taking," *Quarterly Journal of Economics*, 2009, *124* (2), 809–842.

Chabris, Christopher F, David Laibson, Carrie L Morris, Jonathon P Schuldt, and Dmitry Taubinsky, "Individual laboratory-measured discount rates predict field behavior," *Journal of Risk and Uncertainty*, 2008, *37* (2-3), 237–269.

Chen, M. Keith, "The Effect of Language on Economic Behavior: Evidence from Savings Rates, Health Behaviors, and Retirement Assets," *American Economic Review*, 2013, *103* (2), 690–731.

Cornsweet, Tom N., "The Staircase-Method in Psychophysics," *American Journal of Psychology*, 1962, *75* (3), 485–491.

Das, Mausumi, "Optimal Growth with Decreasing Marginal Impatience," *Journal of Economic Dynamics and Control*, 2003, *27*, 1881–1898.

Dean, Mark and Anja Sautmann, "Credit Constraints and the Measurement of Time Preferences," *Working Paper*, 2014.

Diamond, Jared M., *Guns, Germs, and Steel*, National Geographic, 2005.

Doepke, Matthias and Fabrizio Zilibotti, "Occupational Choice and the Spirit of Capitalism," *Quarterly Journal of Economics*, 2008, *123* (2), 747–793.

_ and _ , "Culture, Entrepreneurship, and Growth," in Philippe Aghion and Steven Durlauf, eds., *Handbbook of Economic Growth*, Vol. 2A, Elsevier, Amsterdam, 2013.

Dohmen, Thomas, Armin Falk, David Huffman, and Uwe Sunde, "Are Risk Aversion and Impatience Related to Cognitive Ability?," *American Economic Review*, 2010, *100* (3), 1238–1260.

_ , _ , _ , and _ , "The Intergenerational Transmission of Risk and Trust Attitudes," *Review of Economic Studies*, 2012, *79* (2), 645–677.

_ , _ , _ , and _ , "Interpreting Time-Horizon Effects in Inter-Temporal Choice," *Working Paper*, 2014.

_ , _ , _ , _ , Jürgen Schupp, and Gert G. Wagner, "Individual Risk Attitudes: Measurement, Determinants, and Behavioral Consequences," *Journal of the European Economic Association*, 2011, *9* (3), 522–550.

Drugeon, Jean-Pierre, "Impatience and Long-Run Growth," *Journal of Economic Dynamics and Control*, 1996, *20*, 281–313.

Erosa, Andres, Tatyana Koreshkova, and Diego Restuccia, "How Important is Human Capital? A Quantitative Theory Assessment of World Income inequality," *Review of Economic Studies*, 2010, *77* (4), 1421–1449.

Falk, Armin, Anke Becker, Thomas Dohmen, Benjamin Enke, Uwe Sunde, and David Huffman, "The Nature of Human Preferences: Global Evidence," *Working Paper*, 2015.

_ , _ , _ , **David Huffman, and Uwe Sunde**, "An Experimentally Validated Survey Module of Economic Preferences," *Working Paper*, 2015.

Gallup, John L., Jeffrey D. Sachs et al., "The Economic Burden of Malaria," *American Journal of Tropical Medicine and Hygiene*, 2000, *64* (1-2 Suppl), 85–96.

Gallup, John Luke, Jeffrey D. Sachs, and Andrew D. Mellinger, "Geography and Economic Development," *International Regional Science Review*, 1999, *22* (2), 179–232.

Galor, Oded and Ömer Özak, "The Agricultural Origins of Time Preference," *Working Paper*, 2014.

Gennaioli, Nicola, Rafael La Porta, Florencio Lopez de Silanes, and Andrei Shleifer, "Human Capital and Regional Development," *Quarterly Journal of Economics*, 2013, *105*, 164.

Glaeser, Edward L, Rafael La Porta, Florencio Lopez de Silanes, and Andrei Shleifer, "Do Institutions Cause Growth?," *Journal of Economic Growth*, 2004, *9* (3), 271–303.

Golsteyn, Bart H.H., Hans Grönqvist, and Lena Lindahl, "Adolescent Time Preferences Predict Lifetime Outcomes," *Economic Journal*, 2014.

Grosjean, Pauline, "A History of Violence: The Culture of Honor as a Determinant of Homicide in the US South," *Journal of the European Economic Association*, forthcoming.

Guiso, Luigi, Paola Sapienza, and Luigi Zingales, "Cultural Biases in Economic Exchange?," *Quarterly Journal of Economics*, 2009, *124* (3), 1095–1131.

Hall, Robert E. and Charles Jones, "Why Do Some Countries Produce So Much More Output Per Worker Than Others?," *Quarterly Journal of Economics*, 1999, *114* (1), 83–116.

Hanushek, Eric A and Ludger Woessmann, "Do Better Schools Lead to More Growth? Cognitive Skills, Economic Outcomes, and Causation," *Journal of Economic Growth*, 2012, *17* (4), 267–321.

Hofstede, Geert, *Culture's Consequences: Comparing Values, Behaviors, Institutions and Organizations Across Nations*, 2 ed., London: Sage, 2001.

House, Robert J., Paul John Hanges, Mansour Javidan, Peter W. Dorfman, and Vipin Gupta, *Culture, Leadership, and Organizations: The GLOBE study of 62 societies*, Sage, 2004.

Hsieh, Chang-Tai and Peter J. Klenow, "Development Accounting," *American Economic Journal: Macroeconomics*, 2010, *2* (1), 207–223.

Knack, Stephen and Philip Keefer, "Does Social Capital Have an Economic Payoff? A Cross-Country Investigation," *Quarterly Journal of Economics*, 1997, pp. 1251–1288.

Lucas, Robert E., "On the Mechanics of Economic Development," *Journal of Monetary Economics*, 1988, *22* (1), 3–42.

Manuelli, Rodolfo E. and Ananth Seshadri, "Human Capital and the Wealth of Nations," *American Economic Review*, 2014, *104* (9), 2736–2762.

Michalopoulos, Stelios, "The Origins of Ethnolinguistic Diversity," *American Economic Review*, 2012, *102* (4), 1508–1539.

Mischel, Walter, Yuichi Shoda, and Monica I Rodriguez, "Delay of gratification in children," *Science*, 1989, *244* (4907), 933–938.

Nordhaus, William D., "Geography and Macroeconomics: New Data and New Findings," *Proceedings of the National Academy of Sciences of the United States of America*, 2006, *103* (10), 3510–3517.

Nunn, Nathan, "The Long-Term Effects of Africa's Slave Trades," *Quarterly Journal of Economics*, 2008, *123* (1), 139–176.

_ **and Leonard Wantchekon**, "The Slave Trade and the Origins of Mistrust in Africa," *American Economic Review*, 2011, *101* (7), 3221–52.

Olsson, Ola and Douglas A. Hibbs Jr, "Biogeography and Long-Run Economic Development," *European Economic Review*, 2005, *49* (4), 909–938.

Porta, Rafael La, Florencio Lopez de Silanes, Andrei Shleifer, and Robert Vishny, "The Quality of Government," *Journal of Law, Economics, and Organization*, 1999, *15* (1), 222–279.

Putterman, Louis and David N. Weil, "Post-1500 Population Flows and the Long-Run Determinants of Economic Growth and Inequality," *Quarterly Journal of Economics*, 2010, *125* (4), 1627–1682.

Rajan, Raghuram G. and Luigi Zingales, "Financial Dependence and Growth," *American Economic Review*, 1998, pp. 559–586.

Rieger, Marc-Oliver, Mei Wang, and Thorsten Hens, "Risk Preferences Around the World," *Management Science*, forthcoming.

Romer, Paul M., "Endogenous Technological Change," *Journal of Political Economy*, 1990, *98* (5), S71–S102.

Shah, Anuj K., Sendhil Mullainathan, and Eldar Shafir, "Some Consequences of Having Too Little," *Science*, 2012, *338* (6107), 682–685.

Solow, Robert M., "Technical Change and the Aggregate Production Function," *Review of Economics and Statistics*, 1957, *39* (3), 312–320.

Spolaore, Enrico and Romain Wacziarg, "The Diffusion of Development," *Quarterly Journal of Economics*, 2009, *124* (2), 469–529.

_ **and** _ , "How Deep Are the Roots of Economic Development?," *Journal of Economic Literature*, 2013, *51* (2), 325–69.

Strulik, Holger, "Patience and Prosperity," *Journal of Economic Theory*, 2012, *147*, 336–352.

Sutter, Matthias, Martin G Kocher, Daniela Glätzle-Rützler, and Stefan T Trautmann, "Impatience and Uncertainty: Experimental Decisions Predict Adolescents' Field Behavior," *The American Economic Review*, 2013, *103* (1), 510–531.

Tabellini, Guido, "Culture and Institutions: Economic Development in the Regions of Europe," *Journal of the European Economic Association*, 2010, *8* (4), 677–716.

Tanaka, Tomomi, Colin F. Camerer, and Quang Nguyen, "Risk and Time Preferences: Linking Experimental and Household Survey Data from Vietnam," *American Economic Review*, 2010, *100* (1), 557–571.

Vieider, Ferdinand M., Mathieu Lefebvre, Ranoua Bouchouicha, Thorsten Chmura, Rustamdjan Hakimov, Michal Krawczyk, and Peter Martinsson, "Common Components of Risk and Uncertainty Attitudes Across Contexts and Domains: Evidence from 30 Countries," *Journal of the European Economic Association*, forthcoming.

_ , **Thorsten Chmura, Tyler Fisher, Takao Kusakawa, Peter Martinsson, Frauke Mattison-Thompson, and Adewara Sunday**, "Within- versus Between-Country Differences in Risk Attitudes: Implications for Cultural Comparisons," *Theory and Decision*, 2015, *78* (2), 209–218.

Voigtländer, Nico and Hans-Joachim Voth, "Persecution Perpetuated: The Medieval Origins of Anti-Semitic Violence in Nazi Germany," *Quarterly Journal of Economics*, 2012, *127* (3), 1339–1392.

Wang, Mei, Marc Oliver Rieger, and Thorsten Hens, "How Time Preferences Differ: Evidence from 45 Countries," *Working Paper*, 2011.

Weber, Max, *The Protestant Ethic and the "Spirit" of Capitalism*, New York: Charles Scribner's Sons., 1930.

APPENDIX

A Details on Data Collection and Patience Measure

The description of the dataset builds on Falk et al. (2015a).

A.1 Overview

The cross-country dataset including risk aversion, patience, positive and negative reciprocity, altruism, and trust, was collected through the professional infrastructure of the Gallup World Poll 2012. The data collection process essentially consisted of three steps. First, we conducted an experimental validation procedure to select the survey items. Second, Gallup conducted a pre-test in a variety of countries to ensure the implementability of our items in a culturally diverse sample. Third, the final data set was collected through the regular professional framework of the World Poll 2012.

A.2 Experimental Validation

To ensure the behavioral relevance of our preference measures, all underlying survey items were selected through an experimental validation procedure. To this end, a sample of 409 German undergraduates completed standard state-of-the-art financially incentivized laboratory experiments designed to measure risk aversion, patience, positive and negative reciprocity, altruism, and trust. The same sample of subjects then completed a large battery of potential survey items. In a final step, for each preference, those survey items were selected which jointly performed best in predicting the behavior under real incentives measured in choice experiments. See Falk et al. (2015a) for details.

A.3 Pre-Test

Prior to including the preference module in the Gallup World Poll 2012, it was tested in the field as part of the World Poll 2012 pre-test, which was conducted at the end of 2011 in 22 countries. The main goal of the pre-test was to receive feedback and comments on each item from various cultural backgrounds in order to assess potential difficulties in understanding and differences in the respondents' interpretation of items. Based on respondents' feedback and suggestions, minor modifications were made to the wordings of some items before running the survey as part of the World Poll 2012.

The pre-test was run in 10 countries in central Asia (Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Russia, Tajikistan, Turkmenistan, and Uzbekistan), 2 countries in South-East Asia (Bangladesh and Cambodia), 5 countries in Southern and Eastern Europe (Croatia, Hungary, Poland, Romania, Turkey), 4 countries in the Middle East and North Africa (Algeria, Lebanon, Jordan, and Saudi-Arabia), and 1 country in Eastern Africa (Kenya). In each country, the sample size was 10 to 15 people. Overall, more than 220 interviews were conducted. In most countries, the sample was mixed in terms of gender, age, educational background, and area of residence (urban / rural).

Participants in the pre-test were asked to state any difficulties in understanding the items and to rephrase the meaning of items in their own words. If they encountered difficulties in understanding or interpreting items, respondents were asked to make suggestions on how to modify the wording of the item in order to attain the desired meaning.

Overall, the understanding of both the qualitative items and the quantitative items was good. In particular, no interviewer received any complaints regarding difficulties in assessing the quantitative questions. When asked for rephrasing the qualitative patience item in their own words, most participants seemed to have understood the item in exactly the way that was intended.

However, when being confronted with hypothetical choices between monetary amounts today versus larger amounts one year later, some participants, especially in countries with current or relatively recent phases of volatile and high inflation rates, stated that their answer would depend on the rate of inflation, or said that they would always take the immediate payment due to uncertainty with respect to future inflation. Therefore, we decided to adjust the wording, relative to the "original" experimentally validated item, by adding the phrase "Please assume there is no inflation, i.e., future prices are the same as today's prices" to each question involving hypothetical choices between immediate and future monetary amounts.

A.4 Selection of Countries

Our goal when selecting countries was to ensure representativeness for the global population. Thus, we chose countries from each continent and each region within continents. In addition, we aimed at maximizing variation with respect to observables, such as GDP per capita, language, historical and political characteristics, or geographical location and climatic conditions. Accordingly, we favored non-neighboring and culturally dissimilar countries. This procedure resulted in the following sample of 76 countries:

East Asia and Pacific: Australia, Cambodia, China, Indonesia, Japan, Philippines, South Korea, Thailand, Vietnam
Europe and Central Asia: Austria, Bosnia and Herzegovina, Croatia, Czech Republic, Estonia, Finland, France, Georgia, Germany, Greece, Hungary, Italy, Kazakhstan, Lithuania, Moldova, Netherlands, Poland, Portugal, Romania, Russia, Serbia, Spain, Sweden, Switzerland, Turkey, Ukraine, United Kingdom
Latin America and Caribbean: Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Guatemala, Haiti, Mexico, Nicaragua, Peru, Suriname, Venezuela
Middle East and North Africa: Algeria, Egypt, Iran, Iraq, Israel, Jordan, Morocco, Saudi Arabia, United Arab Emirates
North America: United States, Canada
South Asia: Afghanistan, Bangladesh, India, Pakistan, Sri Lanka
Sub-Saharan Africa: Botswana, Cameroon, Ghana, Kenya, Malawi, Nigeria, Rwanda, South Africa, Tanzania, Uganda, Zimbabwe

A.5 Sampling and Survey Implementation

A.5.1 Background

Since 2005, the international polling company Gallup has conducted an annual World Poll, in which it surveys representative population samples in almost every country around the world on, e.g., economic, social, political, and environmental issues. The collection of our preference data was embedded into the regular World Poll 2012 and hence made use of the pre-existing polling infrastructure of one of the largest professional polling institutes in the world.[37]

A.5.2 Survey Mode

Interviews were conducted via telephone and face-to-face. Gallup uses telephone surveys in countries where there is telephone coverage of at least 80% of the population or where this is the customary survey methodology. In countries where telephone interviewing is employed, Gallup uses a random-digit-dial method or a nationally representative list of phone numbers. In countries where face-to-face interviews are conducted, households are randomly selected in an area-frame-design.

[37]Compare
`http://www.gallup.com/strategicconsulting/156923/worldwide-research-methodology.aspx`

A.5.3 Sample Composition

In most countries, samples are nationally representative of the resident population aged 15 and older. Gallup's sampling process is as follows.

Selecting Primary Sampling Units
In countries where face-to-face interviews are conducted, the first stage of sampling is the identification of primary sampling units (PSUs), consisting of clusters of households. PSUs are stratified by population size and / or geography and clustering is achieved through one or more stages of sampling. Where population information is available, sample selection is based on probabilities proportional to population size. If population information is not available, Gallup uses simple random sampling.

In countries where telephone interviews are conducted, Gallup uses a random-digit-dialing method or a nationally representative list of phone numbers. In countries where mobile phone penetration is high, Gallup uses a dual sampling frame.

Selecting Households and Respondents
Gallup uses random route procedures to select sampled households. Unless an outright refusal to participate occurs, interviewers make up to three attempts to survey the sampled household. To increase the probability of contact and completion, interviewers make attempts at different times of the day, and when possible, on different days. If the interviewer cannot obtain an interview at the initially sampled household, he or she uses a simple substitution method.

In face-to-face and telephone methodologies, random respondent selection is achieved by using either the latest birthday or else the Kish grid method.[38] In a few Middle East and Asian countries, gender-matched interviewing is required, and probability sampling with quotas is implemented during the final stage of selection. Gallup implements quality control procedures to validate the selection of correct samples and that the correct person is randomly selected in each household.

Sampling Weights
Ex post, data weighting is used to ensure a nationally representative sample for each country and is intended to be used for calculations within a country. First, base sampling weights are constructed to account for geographic oversamples, household size,

[38]The latest birthday method means that the person living in the household whose birthday among all persons in the household was the most recent (and who is older than 15) is selected for interviewing. With the Kish grid method, the interviewer selects the participants within a household by using a table of random numbers. The interviewer will determine which random number to use by looking at, e.g., how many households he or she has contacted so far (e.g., household no. 8) and how many people live in the household (e.g., 3 people, aged 17, 34, and 36). For instance, if the corresponding number in the table is 7, he or she will interview the person aged 17.

and other selection probabilities. Second, post-stratification weights are constructed. Population statistics are used to weight the data by gender, age, and, where reliable data are available, education or socioeconomic status.

A.5.4 Translation of Items

The preference module items were translated into the major languages of each target country. The translation process involved three steps. As a first step, a translator suggested an English, Spanish or French version of a German item, depending on the region. A second translator, being proficient in both the target language and in English, French, or Spanish, then translated the item into the target language. Finally, a third translator would review the item in the target language and translate it back into the original language. If semantic differences between the original item and the back-translated item occurred, the process was adjusted and repeated until all translators agreed on a final version.

A.5.5 Adjustment of Monetary Amounts in Quantitative Items

All items involving monetary amounts were adjusted to each country in terms of their real value, i.e., all monetary amounts were calculated to represent the same share of the country's median income in local currency as the share of the amount in Euro of the German median income since the validation study had been conducted in Germany. Monetary amounts used in the validation study with the German sample were round numbers in order to facilitate easy calculations and to allow for easy comparisons (e.g., 100 Euro today versus 107.50 in 12 months). In order to proceed in a similar way in all countries, we rounded all monetary amounts to the next "round" number. While this necessarily resulted in some (very minor) variation in the real stake size between countries, it minimized cross-country differences in understanding the quantitative items due to difficulties in assessing the involved monetary amounts.

A.5.6 Staircase procedure

The sequence of survey questions that form the basis for the quantitative patience measure is given by the "tree" logic depicted in Figure 4 for the benchmark of the German questionnaire. Each respondent faced five interdependent choices between receiving 100 euros today or varying amounts of money in 12 months. The values in the tree denote the amounts of money to be received in 12 months. The rightmost level of the tree (5th decision) contains 16 distinct monetary amounts, so that responses can be classified into 32 categories which are ordered in the sense that the (visually) lowest path / endpoint indicates the highest level of patience. As in the experimental validation procedure in Falk et al. (2015b), we assign values 1-32 to these endpoints, with 32 denoting the highest level of patience.

A.6 Computation of Preference Measures

A.6.1 Cleaning and Imputation of Missings

In order to make maximal use of the available information in our data, missing survey items were imputed based on the following procedure:

If one survey item was missing, then the missing item was predicted using the responses to the other item. The procedure was as follows:

- Qualitative question missing: We regress all available survey responses to the qualitative question on responses to the staircase task, and then use these coefficients to predict the missing qualitative items using the available staircase items.

- Staircase item missing: The imputation procedure was similar, but made additional use of the informational content of the responses of participants who started but did not finish the sequence of the five questions. If the respondent did not even start the staircase procedure, then imputation was done by predicting the staircase measure based on answers to the qualitative survey measure using the methodology described above. On the other hand, if the respondent answered at least one of the staircase questions, the final staircase outcome was based on the predicted path through the staircase procedure. Suppose the respondent answered four items such that his final staircase outcome would have to be either x or y. We then predict the expected choice between x and y based on a probit of the "x vs. y" decision on the qualitative item. If the respondent answered three (or less) questions, the same procedure was applied, the only difference being that in this case the obtained predicted probabilities were applied to the expected values of the staircase outcome conditional on reaching the respective node. Put differently, the procedure outlined above was applied recursively by working backwards through the "tree" logic of the staircase procedure.

In total, for about 8% of all respondents, one of the two patience measures was imputed.

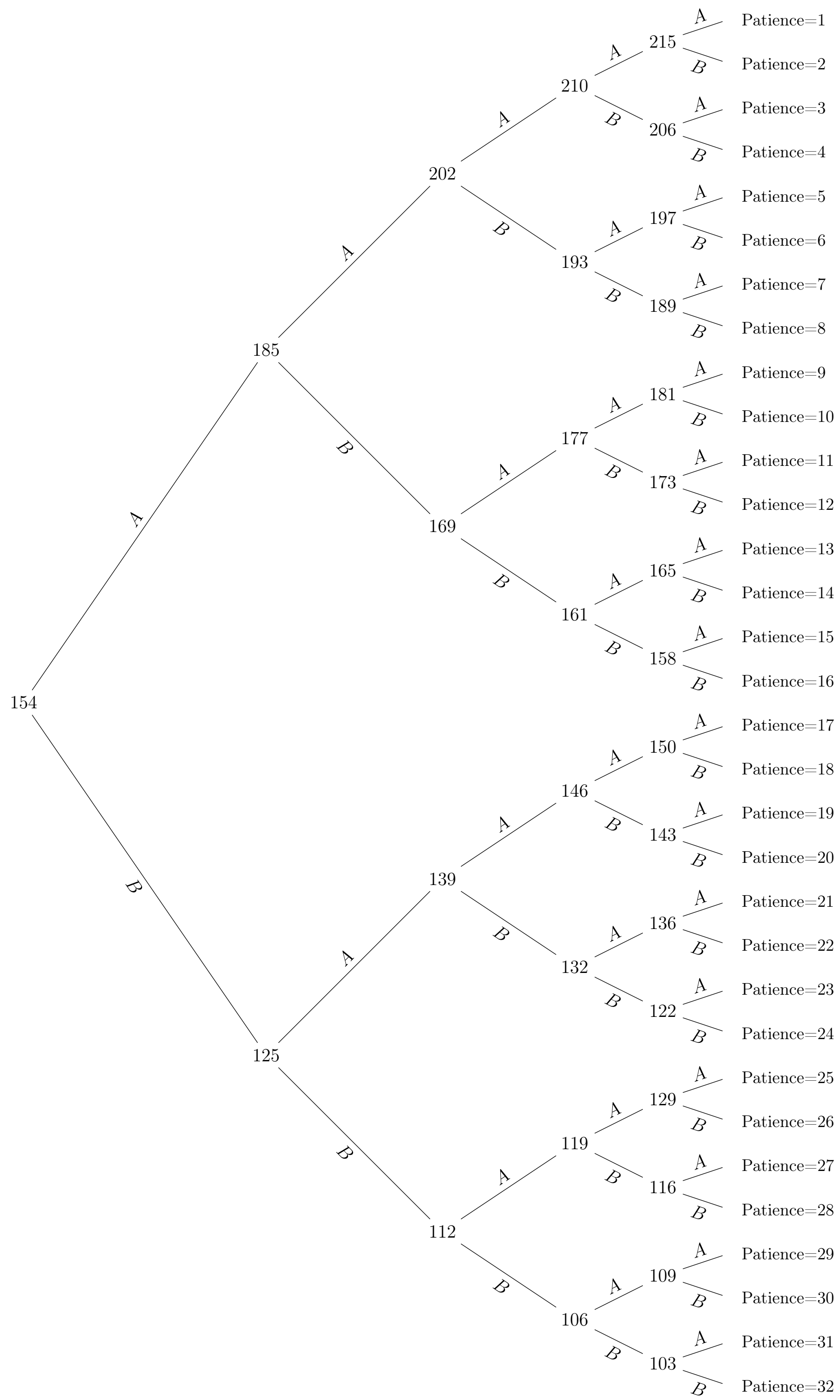

Figure 4: Tree for the staircase time task as implemented in Germany (numbers = payment in 12 months, A = choice of "100 euros today", B = choice of "x euros in 12 months"). First, each respondent was asked whether they would prefer to receive 100 euros today or 154 euros in 12 months from now (leftmost decision node). In case the respondent opted for the payment today ("A"), in the second question the payment in 12 months was adjusted upwards to 185 euros. If, on the other hand, the respondent chose the payment in 12 months, the corresponding payment was adjusted down to 125 euros. Working further through the tree follows the same logic.

A.6.2 Computation of Preference Indices at Individual Level

We compute an individual-level index of patience by (i) computing the z-scores of each survey item at the individual level and (ii) weighing these z-scores using the weights resulting from the experimental validation procedure of Falk et al. (2015a). Formally, these weights are given by the coefficients of an OLS regression of observed behavior on responses to the respective survey items, such that the coefficients sum to one. These weights are given by (see above for the precise survey items):

$$\text{Patience} = 0.7115185 \times \text{ Quantitative measure } + 0.2884815 \times \text{ Qualitative item}$$

A.6.3 Computation of Country Averages

In order to compute country-level averages, we weigh the individual-level data with the sampling weights provided by Gallup, see above.

A.7 Histograms

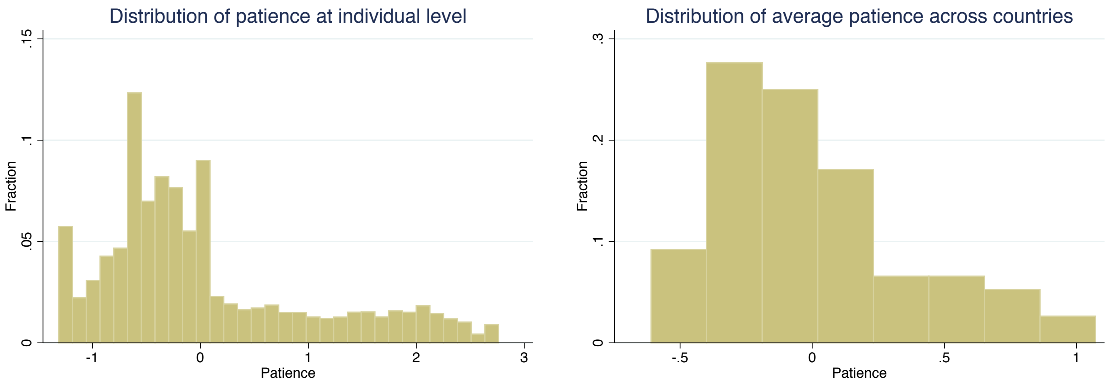

Figure 5: Distribution of individual- and country level patience

B Measuring Patience: Discussion and Robustness

The analysis rests on the premise that the patience parameters elicited by the survey items provide an appropriate representation of the underlying time preferences. We consider six different types of potential confounds that could affect the elicited patience measure: (i) differences in the financial environment in terms of inflation and interest rates, (ii) borrowing constraints, (iii) context- or culture-specific interpretations, (iv) systematic decision shortcuts ("heuristics"), (v) measurement error arising from censoring, and (vi) conflation of patience with a more general cultural trait of long-term orientation. We now discuss each of these concerns and provide evidence suggesting that none of them is likely to be a significant driver of our results.

Financial Environment. Respondents who expect higher levels of inflation might appear more impatient in our quantitative choice task as they require a compensation for inflation. Similarly, high market interest rates could induce people to behave as if they were impatient because they might try to "arbitrage" between the local credit market and the hypothetical interest rates implied in the quantitative survey measure. Cross-country differences in inflation and interest rates could bias our results on the relationship between comparative development and patience. It is important to recall, however, that our survey question explicitly asked people to imagine a zero inflation environment. Likewise, previous research has found that differences in interest rates are unlikely to drive choices in small-stakes experimental environments (e.g. Dohmen et al., 2010). To empirically address this issue, we explicitly control for inflation (in terms of the consumer price index, or the GDP deflator) and deposit interest rates. Columns (1) through (4) of Table 12 present the corresponding results. As one would expect, both inflation and high interest rates are negatively correlated with GDP. The coefficient of patience, however, remains quantitatively large and highly statistically significant when conditioning on these variables. In addition, the coefficient estimate is only slightly smaller in size.

Borrowing Constraints. Ceteris paribus, respondents who face upward-sloping income profiles and are borrowing-constrained might be more likely to opt for immediate payments in experimental choice situations not because of intrinsic preferences, but rather because of a current cash shortfall. Since participants in rather poor countries seem more likely to face such constraints, responses in our survey could make such populations appear less patient than they actually are, and hence drive the relationship between patience and development. Note, however, that all monetary values in the elicitation of the quantitative patience measure were adjusted in terms of purchasing power parity to be approximately comparable across countries, hence minimizing problems of income differences. Empirically, we approach the issue of borrowing constraints and financial development from two separate angles. On the one hand, we complement our baseline specification by including two additional covariates, which capture different dimensions of the level of financial development of a given country. In particular, we make use of the commonly employed ratio of external finance to GDP, where external finance is defined as the sum of private credit, private bond market capitalization, and stock market capitalization (Rajan and Zingales, 1998; Buera et al., 2011). In addition, we use the (log) number of Automated Teller Machines (ATMs), which arguably captures elements of the accessibility of cash for private households, as a measure of financial development. Columns (5)-(7) of Table 12 present the corresponding regression results, which provide reassuring evidence that the relationship between comparative development and our patience measure is largely unaffected by the level of a country's financial development. To reiterate this point from a different angle, we make use of the idea that borrowing constraints (if present) are likely to be less binding for relatively rich people. Thus, rather than computing simple country averages of our patience measure across all respondents, we compute the average patience of each country's top income quintile only and use this measure instead of the population average patience measure. As shown in columns (6) and (7), both in unconditional and conditional regressions the relationship between GDP and patience is very similar to the baseline results using all respondents, which again suggests that borrowing constraints on the part of respondents are unlikely to be a main driver of our results.

Context and Cross-Cultural Differences. Conducting surveys in culturally heterogeneous samples poses the difficulty that respondents might interpret survey items in different ways. This problem appears particularly severe in the case of qualitative and context-specific items. Recall, however, that our quantitative question format provided a specific, neutral, and quantitative choice context for respondents, hence alleviating the need to construe alternative choice scenarios. Given that this quantitative item is arguably less prone to culture-dependent interpretations, we conduct a further robustness check in which we show that similar results obtain if we only employ the quantitative measure. The latter measure is also more in line with how economists define and measure time preferences, i.e., choices over monetary rewards at different points in time. Columns (1) and (2) of Table 13 show that using only the quantitative measure in fact strengthens the results; in contrast, the qualitative item alone is only weakly correlated with national income, suggesting that culture-dependent interpretations might indeed be an issue regarding this

Table 12: Patience and income: Robustness against inflation, interest rates, and borrowing constraints

	Dependent variable: Log [GDP p/c PPP]								
	The specifications address concerns regarding...								
	Inflation and interest rates				Borrowing constraints				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Patience	1.18***	1.14***	1.08**	0.96**	1.07***	1.02**	0.78*		
	(0.39)	(0.38)	(0.44)	(0.42)	(0.35)	(0.49)	(0.45)		
Patience of top income quintile								2.32***	1.41***
								(0.18)	(0.28)
Log [CPI]	-0.37***								
	(0.11)								
Log [GDP deflator]		-0.71***		-0.48**			-0.19		
		(0.16)		(0.20)			(0.29)		
Log [Deposit interest rate]			-0.76***	-0.42			-0.43*		
			(0.19)	(0.28)			(0.25)		
Log [# ATMs]					0.54***		0.47*		
					(0.10)		(0.23)		
External finance as % of GDP						0.25	-0.16		
						(0.18)	(0.29)		
Constant	-166.5***	-232.5***	-237.6***	-271.8***	-37.2	-178.4***	-117.4	7.98***	-139.5**
	(58.67)	(62.01)	(55.63)	(57.16)	(53.71)	(48.69)	(128.66)	(0.14)	(53.16)
Additional controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
Observations	73	73	66	65	74	55	49	76	74
R^2	0.882	0.890	0.890	0.896	0.907	0.910	0.953	0.475	0.863
Adjusted R^2	0.830	0.842	0.834	0.838	0.867	0.848	0.901	0.468	0.808

OLS estimates, robust standard errors in parentheses. Log CPI, GDP deflator, and deposit interest rate are calculated as log (1 + x), where x is the respective variable. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. See column (7) of Table 1 for a complete list of the additional controls.

particular qualitative self-assessment. In this respect, it should also be noted that the qualitative item is also a weaker predictor of financially incentivized behavior in the validation experiments as compared to the quantitative measure (though it is significantly related to experimental choices).

Cognitive Limitations and Heuristics. An issue that specifically concerns the quantitative patience measure is the possibility of measurement error, due to the use of heuristics tied to limited cognitive resources. For example, since our five-step procedure forces respondents into five fairly similar decision problems, respondents might adopt simple rules such as “always choose money today” in order to reduce cognitive burden. Indeed, in our data, 55 % of respondents do always choose the immediate payment. Notably, to bias our results, the prevalence of decision shortcuts would have to be systematic at the *country* level, rather than at the individual level, presumably due to differing levels of education. As a first robustness check, we repeat our baseline specifications, but now weight each country by its average years of schooling, to reflect potentially less accurate measures of time preference in general for populations with less education. Columns (3) and (4) of Table 13 show

Table 13: Patience and income: Decision heuristics

	Dependent variable: Log [GDP p/c PPP]					
	OLS		WLS		WLS	
	(1)	(2)	(3)	(4)	(5)	(6)
Staircase patience	0.27***	0.17***	0.24***	0.17***	0.23***	0.13***
	(0.02)	(0.04)	(0.02)	(0.02)	(0.02)	(0.05)
Constant	6.25***	-176.5***	6.79***	-138.4**	6.98***	-137.5
	(0.25)	(59.76)	(0.27)	(61.50)	(0.29)	(133.19)
Additional controls	No	Yes	No	Yes	No	Yes
Observations	76	74	71	70	49	48
R^2	0.465	0.864	0.535	0.900	0.537	0.867
Adjusted R^2	0.457	0.810	0.528	0.856	0.527	0.760

OLS estimates, robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. See column (7) of Table 1 for a complete list of the additional controls. In columns (3) and (4), each observation is weighted by average years of schooling, and in columns (5) and (6) by average cognitive skills.

that this procedure yields results similar to the baseline results. In Columns (5) and (6) we try an alternative approach, weighting countries by average cognitive skills as proxied by performance on standardized achievement tests (see Hanushek and Woessmann (2012) for a discussion of the cognitive skills measure), and find similar results. In unreported regressions we also verify that the results on development and the regional and individual levels also go through when we weight responses by appropriate measures of educational attainment, or cognitive skills. Taken together, we find little indication that variation in the use of heuristics across countries or individuals could drive our results.

Censoring of the Quantitative Patience Measure. A related concern is that the quantitative patience measure might suffer from measurement error due to censoring. For individuals who always choose the immediate payment in all choices, up to the maximum possible delayed payment, the staircase procedure gives only a lower bound for the level of impatience (see Figure 4). This could potentially bias our results. In our robustness checks we distinguish between two cases: (1) A narrower case in which censored individuals might happen to have approximately the same true patience value, but we overstate this patience value (relative to uncensored observations) by assigning an upper bound level of 1; (2) a broader case in which individuals in the censored range might have substantially different true patience values, so that there is an additional bias from ignoring heterogeneity when we assign them an identical (upper bound) patience value.[39] Both cases would introduce bias at the individual level, and at higher levels of aggregation, because we assign a quantitative meaning to the difference in patience between the censored and uncensored observations, even though we do not observe the true switching point of censored individuals.

Starting with case (1), we test whether the results are robust to assigning alternative quantitative values of patience to the group of censored individuals. In columns (1)-(6) of Table 14, we impute arbitrary values to censored individuals, ranging from -2 to -50. The resulting estimates show that regardless of which value of patience one assumes for the censored individuals, our result about average patience and national income still holds.[40] This suggests that in case (1), a particular quantitative interpretation of the censoring value does not drive the findings. Notably, moving the censoring value to minus infinity corresponds to collapsing the patience measure to a binary indicator distinguishing between censored and non-censored observations. We check robustness to this specification below.

Turning to case (2), in which there is an additional bias due to unobserved heterogeneity, we first address what is fundamentally a problem about quantitative interpretation by taking an approach that avoids a quantitative interpretation altogether. To this end, we collapse the quantitative patience measure into a binary indicator for whether an individual's patience exceeds some patience threshold or not, so that a country's average patience is given by the fraction of the population that exceeds a given patience level. For instance, in columns (7) and (8) in Table 14, we binarize the data according to whether a given individual was censored or not. The results show that, despite the ordinal interpretation of the data, countries with a higher proportion of censored respondents have lower income per capita. Similarly, in columns (9) through (14), we introduce binary individual-level indicators for different patience cutoff levels (recall that the staircase variable is coded to be between 1 and 32, so that higher cutoffs at the margin discriminate between increasingly patient people). The results are robust to these different choices of cut-offs. This suggests that the conclusions are robust to a range of different qualitative definitions of patience, and do not hinge on a strict quantitative interpretation of variation in the patience measure.

A second approach to addressing case (2) is to minimize the influence of censored

[39]This corresponds to the notion of "expansion bias" arising from a censored regressor. If the true relationship between patience and GDP is linear, the "piling" up of observations at the (left-) censoring boundary for patience leads to an inflated (in absolute value) OLS coefficient on patience.

[40]Note that the manipulation affects some country averages more than others, due to varying proportions of censored individuals across countries, and thus the coefficient on patience need not change monotonically across the columns.

observations on the analysis. In columns (15) and (16), we report results in which all censored individuals (equivalently, those using a heuristic to always choose immediate payments) are excluded from the calculations of country averages. The results show that countries with higher GDP have more patient uncensored populations.[41] In columns (17) and (18) we take a different approach, switching to median levels of patience because, unlike country averages, median values are unaffected by the presence of censored individuals in the population, as long as the median individual in a country is not censored. We then exclude entirely those countries for whom the median individual is censored. The regressions with the remaining set of countries indicate a strong and robust relationship between GDP and median level of patience.[42] Here, censoring bias is excluded, and the quantitative patience measure explains more than 50% of the variation in national income (compared to 42% when we include all median-censored countries). This indicates that the relationship between patience and GDP is not driven by censoring, and interestingly, shows that patience can explain differences in national income even among relatively rich nations in which the median individual is not censored. In addition, if anything, the higher explained variance within the group of uncensored countries suggests that the missing variation in the left tail of the country-level distribution prevents an even stronger relationship between patience and national income in terms of variation explained.

Other results in the paper also pass robustness checks for censoring. For example, the finding that even binary variants of the quantitative measure predict outcomes is neither confined to analyses with GDP as dependent variable nor to country-level analyses as a whole. Section C illustrates, repeating all of our main country-, regional-, and individual-level analyses with a binary version of the quantitative measure in which a value of zero is assigned to censored individuals and of one to non-censored respondents. The results also hold for all measures of development at the country level, and at the individual level, if we perform similar analyses excluding all censored individuals, although the regional-level results weaken with this approach. Finally, note that to the extent that censoring is a manifestation of decision heuristics, these robustness checks provide further evidence that heterogeneity in cognitive skills does not drive the results.

[41]Notably, censoring is less prevalent in wealthier countries; this is consistent with a distribution of patience values that is shifted to the right for wealthy countries, and suggests censored populations are likely more patient in rich countries as well.

[42]We also find similar results if we regress GDP on patience of the median individual, and leave countries with a censored median in the analysis.

Alternative Measure: Long-Term Orientation. In a final step, we provide additional evidence regarding the appropriateness and value added of our patience measure by contrasting it with the broader notion of a long-term orientation variable such as the one developed by Hofstede (2001) and used in Galor and Özak (2014). This measure is correlated with ours ($\rho = 0.25$, $p = 0.05$). However, conceptually, there are several reasons to believe that our variable is a superior measure of time preferences in economically relevant domains. Our variable is based on a rigorous experimental validation procedure and intuitively captures economically meaningful tradeoffs between immediate and delayed consumption. Hofstede's measure, on the other hand, is based on an a construction involving responses to qualitative items which were chosen based on an ad hoc procedure. These questions include subjective assessments of several dimensions, including saving patterns, differential behaviors in private and public, the importance of effort, and the value of heroes from the past.

Thus, by construction, the long-term orientation variable is intended to capture elements of economists' notion of time preference, but also dimensions which lack a clear association with tradeoffs between utility flows at different points in time. Consistent with this view, the analyses in Table 15 indicate that our preference measure has substantially more predictive power for national income than the Hofstede measure of long-term orientation. While Hofstede's measure is raw correlated with GDP, the share of explained variation in the corresponding regression is rather small compared to the explanatory power of the patience measure, and long-term orientation loses significance once controls are added. In addition, once both measures are included in the empirical model, the coefficient on long-term orientation is insignificant, while patience continues to be a significant predictor of GDP.[43]

[43]The observation that patience outperforms long-term orientation is not restricted to regressions with GDP as dependent variable. In virtually all analyses pertaining to the proximate determinants is long-term orientation much less (and sometimes not even at all) predictive of macroeconomic outcomes than our preference measure.

Table 14: Patience and national income: Robustness against censoring

	Dependent variable: Log [GDP p/c PPP]																	
	Independent variable is staircase patience in the following variations:																	
	Patience at lower censoring point set to...						Fraction of respondents who are more patient than outcome node...								Exclude all censored individuals		Exclude all median-censored countries	
	-2		-20		-50		1		8		16		24					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
Staircase patience	2.71***	1.73***	2.67***	1.69***	2.69***	1.68***	5.59***	3.39***	6.52***	3.89***	7.89***	4.92***	10.2***	6.10***	0.18***	0.11**		
	(0.22)	(0.35)	(0.21)	(0.33)	(0.21)	(0.33)	(0.48)	(0.70)	(0.57)	(0.86)	(0.73)	(1.12)	(1.13)	(1.55)	(0.05)	(0.05)		
Staircase patience (median)																	0.14***	0.14***
																	(0.03)	(0.04)
Constant	8.32***	-170.0***	8.32***	-152.0***	8.32***	-141.2**	5.87***	-126.5**	6.38***	-157.8***	6.76***	-182.2***	6.97***	-181.5***	5.56***	-175.9**	8.30***	8.68***
	(0.13)	(58.73)	(0.13)	(56.80)	(0.13)	(56.20)	(0.28)	(56.25)	(0.25)	(57.79)	(0.22)	(62.90)	(0.22)	(66.97)	(0.77)	(78.90)	(0.39)	(0.58)
Continent FE	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Additional controls	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	No
Observations	76	74	76	74	76	74	76	74	76	74	76	74	76	74	76	74	25	25
R^2	0.473	0.865	0.484	0.864	0.482	0.861	0.473	0.854	0.442	0.858	0.434	0.858	0.399	0.845	0.121	0.818	0.522	0.543
Adjusted R^2	0.466	0.810	0.477	0.808	0.475	0.805	0.466	0.795	0.434	0.800	0.427	0.801	0.391	0.783	0.109	0.745	0.502	0.423

OLS estimates, robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. See column (7) of Table 1 for a complete list of the additional controls. In columns (1)-(6), the independent variable consists of the quantitative patience measure, where varying values are assumed for the lower censoring point, i.e., for those respondents who always opt for the payment today (these variables are standardized at the individual level). In columns (7)-(14), the independent variable consists of the fraction of respondents in a given country who are more patient than a given outcome node, see Figure 4. In columns (15)-(16), the staircase patience variable is computed is average staircase outcomes of those respondents who are not censored, i.e., all censored individuals are excluded from the sample. In columns (17) and (18), we the independent variable is the median quantitative patience measure and we exclude all countries from the analysis in which the median is censored.

Table 15: Patience and income: Contrasting patience with future-orientation

	Dependent variable: Log [GDP p/c PPP]				
	Full LTO sample		Common sample		
	(1)	(2)	(3)	(4)	(5)
Patience				2.38***	1.41***
				(0.29)	(0.48)
Hofstede long-term orientation	0.015**	-0.0022	0.0052	0.0083	-0.000024
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Constant	7.98***	167.8*	9.57	8.09***	-43.5
	(0.34)	(87.56)	(110.88)	(0.30)	(93.61)
Additional controls	No	Yes	Yes	No	Yes
Observations	91	82	60	61	60
R^2	0.054	0.796	0.807	0.451	0.860
Adjusted R^2	0.043	0.729	0.701	0.432	0.776

OLS estimates, robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. See column (7) of Table 1 for a complete list of the additional controls. In column (2), the control vector excludes the GPS trust measure to achieve a larger sample.

C Main Results Based on a Binary Version of the Quantitative Patience Measure

This section provides a robustness check for all main results in the paper using a binary version of the quantitative patience measure as explanatory variable. Specifically, we assign a value of zero (one) to all (non-) censored individuals, so that the country-level patience measure consists of the fraction of respondents who are not censored. Figure 6 illustrates the distribution of this patience variable across countries. Even using this much coarser measure of patience do all of our results on the relationship between patience, national income, growth rates, and the proximate determinants hold, see Tables 16 and 17.[44] In fact, as Figure 7 illustrates, this binarized patience measure confers an even stronger relationship with national income than our baseline measure because it also captures meaningful variation in patience within the group of fairly impatient countries (which are often "almost censored" using the average baseline staircase measure).

As Tables 18 and 19 show, the subnational results are also robust to employing this binarized patience measure.

[44] Results for all other dependent variables (i.e., other proxies for the proximate determinants) closely mirror those established in the main text and are available upon request.

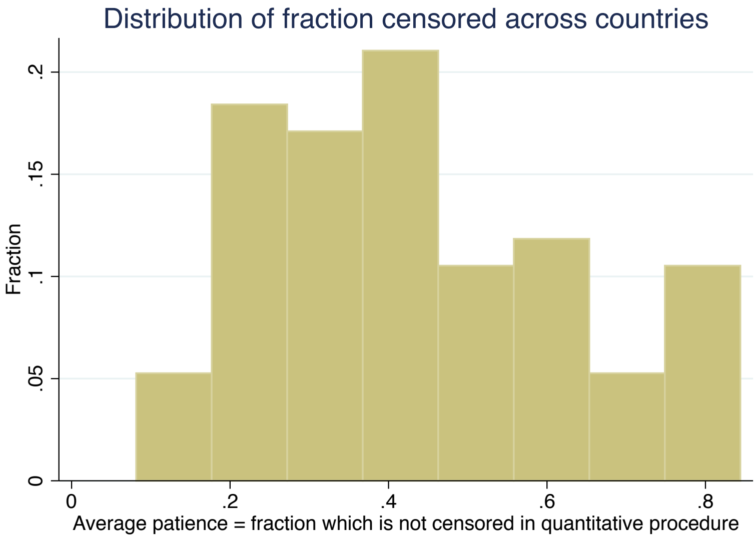

Figure 6: Distribution of average binarized patience variable across countries. Each individual is assigned a value of one if they are not censored and zero otherwise.

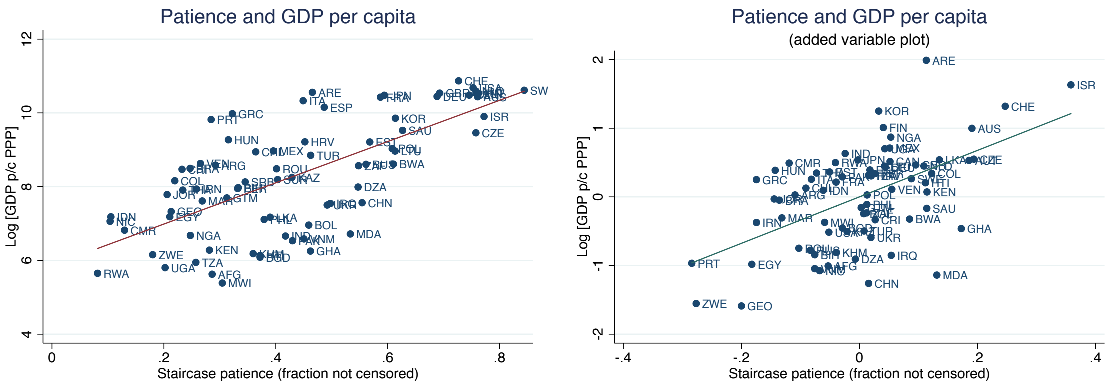

Figure 7: Patience and national income. The left panel depicts the raw correlation between log GDP per capita (purchasing-power parity) and patience. Patience is the fraction of respondents in a given country who never switch to preferring the delayed payment in the staircase elicitation procedure, i.e., who are left-censored. The right panel contains a plot conditional on the full set of baseline covariates in column (7) of Table 1.

Table 16: Replicate main country-level results with binarized quantitative patience measure (1/2)

	Dependent variable:													
	Log [current GDP p/c]		Log [GDP p/c 1925]		Log [GDP p/c 1870]		Log [GDP p/c 1820]		Growth since 1975		Growth since 1925		Growth since 1820	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Staircase patience	5.59***	3.39***	1.79***	1.62***	1.67***	1.20**	0.88***	-0.11	1.43	3.20**	1.19**	2.58***	0.77***	0.59
(fraction not censored)	(0.48)	(0.70)	(0.35)	(0.52)	(0.34)	(0.54)	(0.31)	(0.25)	(0.90)	(1.21)	(0.54)	(0.73)	(0.20)	(0.38)
Log [GDP p/c base year]										-1.09***		-1.03***		-0.65***
										(0.25)		(0.22)		(0.17)
Constant	5.87***	-126.5**	6.84***	7.34***	6.07***	6.72***	6.10***	6.68***	1.00**	9.80***	1.39***	8.87***	1.04***	5.08***
	(0.28)	(56.25)	(0.16)	(0.41)	(0.13)	(0.43)	(0.12)	(0.14)	(0.43)	(1.97)	(0.28)	(1.59)	(0.09)	(1.10)
Continent FE	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Additional controls	No	Yes	No	No	No	No	No	No	No	No	No	No	No	No
Observations	76	74	31	31	40	40	29	29	63	63	31	31	29	29
R^2	0.473	0.854	0.374	0.622	0.347	0.584	0.223	0.662	0.029	0.524	0.141	0.590	0.212	0.586
Adjusted R^2	0.466	0.795	0.353	0.528	0.329	0.493	0.194	0.550	0.013	0.453	0.112	0.466	0.183	0.420

OLS estimates, robust standard errors in parentheses. The patience variable is the fraction of respondents who are not left-censored in the quantitative patience procedure. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. See column (7) of Table 1 for a complete list of the additional controls.

Table 17: Replicate main country-level results with binarized quantitative patience measure (2/2)

	Dependent variable:													
	Average years of schooling		Education expenditure		Log [Capital stock p/c]		Net adjusted savings		Total factor productivity		R&D expenditure		Property rights	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Staircase patience	9.85***	7.42***	3.08***	3.18***	4.57***	2.36***	12.4***	18.3**	0.77***	0.36*	3.96***	3.58**	83.3***	71.1***
(fraction not censored)	(0.90)	(1.77)	(0.63)	(0.94)	(0.52)	(0.68)	(4.17)	(7.22)	(0.10)	(0.21)	(0.51)	(1.40)	(8.79)	(16.42)
Constant	1.07**	-32.1	2.88***	-34.4	7.99***	-125.3***	4.67**	629.6	0.28***	2.93	-0.83***	53.6	12.0***	543.0
	(0.45)	(116.53)	(0.32)	(111.37)	(0.31)	(38.31)	(2.28)	(759.54)	(0.06)	(13.87)	(0.20)	(52.47)	(4.34)	(1268.86)
Additional controls	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Observations	71	70	71	70	71	69	68	68	60	59	66	65	75	73
R^2	0.518	0.799	0.184	0.596	0.448	0.871	0.072	0.515	0.387	0.771	0.539	0.669	0.448	0.619
Adjusted R^2	0.511	0.711	0.172	0.419	0.440	0.813	0.058	0.294	0.377	0.640	0.532	0.507	0.441	0.463

OLS estimates, robust standard errors in parentheses. The patience variable is the fraction of respondents who are not left-censored in the quantitative patience procedure. Education and R&D expenditure are % of GDP, while net adjusted savings are % of GNI. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. See column (7) of Table 1 for a complete list of the additional controls.

Table 18: Main regional-level results replicated with binarized quantitative patience measure

	Dependent variable:					
	Log [Regional GDP p/c]			Avg. years of education		
	(1)	(2)	(3)	(4)	(5)	(6)
Staircase patience (fraction not censored)	3.39***	0.46**	0.54***	7.83***	0.59	0.86**
	(0.60)	(0.19)	(0.16)	(1.00)	(0.54)	(0.40)
Temperature			-0.0097			-0.048***
			(0.01)			(0.02)
Inverse distance to coast			0.76*			1.42**
			(0.39)			(0.53)
Log [Oil production p/c]			0.18***			-0.14
			(0.04)			(0.12)
# Ethnic groups			-0.14**			-0.37***
			(0.06)			(0.14)
Log [Population density]			0.090*			0.23**
			(0.05)			(0.09)
Constant	7.29***	9.07***	8.32***	3.79***	6.94***	5.98***
	(0.38)	(0.05)	(0.29)	(0.55)	(0.15)	(0.52)
Country FE	No	Yes	Yes	No	Yes	Yes
Observations	710	710	693	699	699	682
R^2	0.276	0.938	0.953	0.349	0.934	0.958
Adjusted R^2	0.275	0.932	0.949	0.348	0.929	0.954

Weighted least squares estimates, observations weighted by number of respondents in region. Standard errors (clustered at country level) in parentheses. The patience variable is the fraction of respondents who are not left-censored in the quantitative patience procedure. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 19: Main individual-level results replicated with binarized quantitative patience measure

	Dependent variable:							
	Log [Household income p/c]				Education level			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Staircase patience	0.74***	0.084***	0.069***	0.071***	0.35***	0.16***	0.15***	0.11***
(1 if not censored)	(0.11)	(0.01)	(0.01)	(0.01)	(0.05)	(0.02)	(0.02)	(0.02)
Age				0.0054***				0.021***
				(0.00)				(0.01)
Age squared				-0.000041**				-0.00041***
				(0.00)				(0.00)
1 if female				-0.097***				-0.14***
				(0.02)				(0.03)
Constant	7.55***	6.32***	5.90***	5.83***	1.15***	2.33***	3.14***	3.36***
	(0.12)	(0.00)	(0.00)	(0.04)	(0.05)	(0.05)	(0.05)	(0.14)
Country FE	No	Yes	No	No	No	Yes	No	No
Regional FE	No	No	Yes	Yes	No	No	Yes	Yes
Observations	79870	79870	79840	79567	79945	79945	79921	79704
R^2	0.059	0.600	0.633	0.635	0.012	0.112	0.144	0.174
Adjusted R^2	0.059	0.600	0.628	0.630				

Columns (1)-(4) are OLS and columns (5)-(8) ordered probit estimates. Standard errors (clustered at country level) in parentheses. The dependent variable in (5)-(8) is educational attainment as a three-step category. In columns (5)-(8), the R^2 is a Pseudo-R^2. The patience variable is a dummy equal to one if the respondent was not censored in the staircase procedure. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

D Patience and Historical Income

Accumulating evidence indicates that preferences are transmitted across generations (see, e.g., Cesarini et al., 2009; Dohmen et al., 2012), and that differences in future-orientation or time preferences may have deep cultural or environmental roots in the distant past (Chen, 2013; Galor and Özak, 2014).[45] If the relative distribution of patience (but not necessarily the absolute levels) across countries originates from agro-climatological conditions, becomes manifest in linguistic patterns, and exhibits substantial persistence over time, then the patience patterns found in contemporaneous populations should be related to not just contemporary, but also historical development. To test this hypothesis, we repeat the analysis with measures of historical income before and after the Industrial Revolution.

Columns (1)-(6) of Table 20 present the results of OLS regressions, in which we relate patience to (log) per capita income in 1925, 1870, and 1820, respectively.[46] Throughout, the results reveal positive and significant relationships, which hold up conditional on continent fixed effects.

[45] Additional evidence for the persistence of preferences and cultural values in general comes from the work of, e.g., Nunn and Wantchekon (2011), Voigtländer and Voth (2012), Alesina et al. (2013b), Becker et al. (2015), and Grosjean (forthcoming).

[46] The choice of these years is due to data availability constraints in the Maddison data set.

In order to investigate whether such a relationship was already present in pre-industrial times, i.e., around 1500, we follow the literature and use (log) population density as proxy for economic development in the Malthusian epoch (Ashraf and Galor, 2011). We account for the compositional changes in the population since 1500 due to migration flows and compute an ancestry-adjusted measure of population density by adjusting the historical population density figures by post-Columbian migration flows using the world migration matrix of Putterman and Weil (2010).[47] In essence, we relate patience of today's population to the weighted average of population density that prevailed in the country of residence of their ancestors in 1500. For example, we relate the average patience of the contemporary US population to a weighted average of the past population density of the "source countries" of US immigrants such as the UK, China, or Angola.[48]

Columns (7) and (8) of Table 20 report the corresponding results. Consistent with the findings for contemporary income, patience exhibits a significant unconditional correlation with past population density. The inclusion of control variables leads to an even stronger correlation between patience and past development.[49] Columns (9)-(12) report the results from complementary regressions with non-adjusted population density in 1500 as dependent variable and excluding countries with particularly high migratory inflows, or countries from the New World, from the analysis.[50] These robustness checks deliver qualitatively and quantitatively similar results.

[47]This procedure of computing ancestry-adjusted values is analogous to the standard procedure in the literature, see, e.g., Ashraf and Galor (2011, 2013).

[48]Notice that the reverse, a computation of the distribution of patience for historical populations, corrected for post-1500 migration flows, is not possible due to the missing information on the historical ancestry of the survey respondents.

[49]Figure 10 in Appendix H visualizes these two results.

[50]These countries are Argentina, Australia, Brazil, Canada, and the United States. Columns (9) and (10) also exclude Serbia, for which no data on (non-adjusted) historical population density are available.

Table 20: Patience and historical development

	Dependent variable:											
	Log [GDP p/c] in...						Log [Population density in 1500]					
	1925		1870		1820		Full sample (ancestry-adjusted)		Low migration sample (non-adjusted)		Old World (non-adjusted)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Patience	0.90***	0.74***	0.80***	0.60**	0.46***	-0.081	0.65*	0.77**	0.95*	1.04***	0.69	0.95**
	(0.18)	(0.25)	(0.18)	(0.27)	(0.15)	(0.15)	(0.36)	(0.34)	(0.49)	(0.36)	(0.50)	(0.37)
Constant	7.58***	7.99***	6.80***	7.16***	6.47***	6.62***	1.83***	-13.3**	1.43***	-10.4**	1.60***	-7.78*
	(0.09)	(0.23)	(0.07)	(0.24)	(0.06)	(0.01)	(0.13)	(5.02)	(0.16)	(3.96)	(0.17)	(4.09)
Continent FE	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Additional controls	No	No	No	No	No	No	No	Yes	No	Yes	No	Yes
Observations	31	31	40	40	29	29	75	74	69	69	59	59
R^2	0.390	0.606	0.349	0.589	0.244	0.663	0.048	0.596	0.061	0.770	0.035	0.746
Adjusted R^2	0.369	0.508	0.332	0.499	0.216	0.551	0.035	0.473	0.047	0.699	0.018	0.657

OLS estimates, robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. In columns (1)-(6), the dependent variable is historical national income per capita. Due to the small number of obervations, we only control for continent fixed effects in these columns. In columns (7) and (8), the dependent variable is ancestry-adjusted population density in 1500. In columns (9) and (10), it is non-adjusted population density, and the sample excludes Argentina, Australia, Brazil, Canada, Serbia, and the United States, see footnote 50. In columns (11)-(12), we exclude the New World. See the text for details on the construction of the ancestry-adjusted variable. See column (7) of Table 1 for a complete list of the additional controls. In this table, the control vector excludes the colonization dummy, genetic diversity and its square, and ethnic fractionalization.

E Details for Regional-Level Analysis

Our regional-level data contain 710 regions (typically states or provinces) from the following countries: Argentina (16), Australia (8), Austria (9), Bolivia (8), Brazil (24), Cambodia (14), Cameroon (10), Canada (10), Chile (12), China (23), Colombia (23), Czech Republic (7), Egypt (3), Germany (16), Finland (4), France (22), Georgia (10), Ghana (10), Great Britain (12), Greece (13), Hungary (7), India (24), Indonesia (17), Iran (30), Israel (6), Italy (17), Jordan (6), Kazakhstan (6), Kenya (8), Lithuania (10), Macedonia (3), Malawi (3), Mexico (28), Morocco (13), Nigeria (6), Nicaragua (17), Netherlands (12), Pakistan (4), Poland (16), Portugal (7), Romania (8), Russia (33), Serbia (2), Spain (19), Sri Lanka (9), Sweden (8), Tanzania (20), Thailand (5), Turkey (4), Uganda (4), Ukraine (27), United Arab Emirates (7), USA (51), South Africa (9), Zimbabwe (10)

F Instrumental Variable Estimations

The results presented in the main text reveal a consistent pattern of correlations between patience and income, as well as the proximate determinants of development. While these results are informative regarding the validity of the conceptual framework and its consistency with empirical evidence, they do not constitute an identification of causal effects. As discussed in the concluding remarks, the main threat for the validity of the estimates are the existence of third variables and reverse causality. The specifications contain essentially all deep determinants of development discussed in the literature, so that it appears unlikely that a third factor would be able to explain the full pattern of correlations we observe. Regarding reverse causality, it could be that economic development affects (individual or aggregate) patience, as discussed in the main text. While devising an identification approach for ruling out such a feedback appears difficult, one way to learn about its empirical relevance could be to exploit information about population patterns that have been determined a long time ago.

A simple strategy that solves at least the issue of patience being measured before income outcomes is based on the so-called "Weber-hypothesis" (Weber, 1930). According to this hypothesis, protestant ethic was instrumental in fostering industrialization by making hard work, thriftiness, effort, and wealth accumulation, but also human capital accumulation in the sense of acquiring reading and writing skills, the objects of ethical and religious norms. In fact, according to Weber, protestantism attributes particular importance to faith, virtue, and patience, which made protestant ethics distinct in terms of its focus on worldliness, and favorable for capitalism and ultimately economic development.[51] The link between religion and forward-looking behavior has been documented in cross-cultural studies (see, e.g., the evidence discussed in House et al., 2004). Based on these considerations, we propose protestantism as a tentative instrument for patience. In fact, the raw correlation between a country's average patience and the share of protestants of $\rho = 0.45$ ($p < 0.01$) indicates that protestantism is a strong (first-stage) predictor of patience.[52] The exclusion restriction for validity would stipulate that the share of protestants does not affect national income through channels other than patience, conditional on the full set of control variables. In this respect, note that the Weber-hypothesis is explicitly about time preferences and the resulting desire for thrift and hard work, rather than about protestantism affecting other individual traits. Prima facie, the evidence is consistent with this view. For instance, the share of protestants is only very weakly correlated with the average willingness to take risks ($\rho = 0.11$, $p = 0.33$) and trust ($\rho = 0.00$, $p = 0.98$). Nevertheless, the protestantism instrument should be viewed as tentative, and the results should be interpreted with care. For instance, it is possible that the religious reformation induced not only different time preferences, but also altered preferences over consumption and leisure.

2SLS estimations of log GDP per capita on patience using the contemporary share of protestants (taken from Barro, 2003) as instrument for patience deliver results that are qualitatively very similar to the main results. Table 22 presents the respective second-stage results, while Table 21 reports the first stage. The first-stage F-statistic is 19.1, indicating that protestantism is not a weak instrument. Column (1) shows that patience has a significant second stage effect on national income in a specification that does not contain other control variables. Furthermore, the resulting coefficient is close to the OLS point estimate. Column (2) includes our full baseline set of geographic, climatic, and population-level control variables into the estimated specification, but the effect of patience on income remains large and significant. As column (3) shows, this effect also persists once Hofstede's measure of long-term orientation is accounted for.

In columns (4) to (6), we employ historical data on the share of protestants as of 1900 to instrument for patience. This additional exercise alleviates concerns regarding the endogeneity of the contemporary share of Protestants with respect to GDP due to potential economic migration over the last 100 years. Interestingly, historical data on protestantism is an even stronger first-stage predictor of patience (F-statistic=68.8). Also, reassuringly, the second-stage results are qualitatively and quantitatively similar to those using contemporary data. These results, despite being

[51] See, e.g., Weber's quote of Milton's "Paradise Lost" (Weber, 1930, Ch. I.3).
[52] See Figure 17 in Appendix H for an illustration of this correlation.

only suggestive, provide an additional piece of evidence in support of the conceptual link between patience and development.

Table 21: First stage of IV (Table 22)

	Dependent variable: Patience					
	(1)	(2)	(3)	(4)	(5)	(6)
Share of Protestants in 2000	1.04***	0.89***	0.99***			
	(0.25)	(0.29)	(0.31)			
Share of Protestants in 1900				1.07***	0.77***	0.83***
				(0.13)	(0.22)	(0.27)
Hofstede long-term orientation			0.0050*			0.0050**
			(0.00)			(0.00)
Constant	-0.12***	-0.052	-3.29	-0.12***	1.22	-6.69
	(0.04)	(18.09)	(40.59)	(0.03)	(17.42)	(38.84)
Additional controls	No	Yes	Yes	No	Yes	Yes
Observations	76	74	60	76	74	60
R^2	0.205	0.661	0.693	0.482	0.686	0.719
Adjusted R^2	0.195	0.525	0.511	0.475	0.560	0.551
F	16.6	11.9	10.8	63.8	84.5	82.1

First stage of IV, robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. See column (7) of Table 1 for a complete list of the additional controls. The table is estimated using religion adherence data constructed by Barro (2003).

Table 22: Second stage of IV regression: Patience and national income

	Dependent variable: Log [GDP p/c PPP]					
	Instrument is share of Protestants in year...					
	2000			1900		
	(1)	(2)	(3)	(4)	(5)	(6)
Patience	1.89**	3.37***	3.14***	3.23***	2.79***	2.62***
	(0.81)	(0.71)	(0.67)	(0.36)	(0.50)	(0.51)
Hofstede long-term orientation			-0.0064			-0.0045
			(0.01)			(0.01)
Constant	8.31***	-190.0***	-107.1	8.31***	-176.8***	-87.5
	(0.14)	(49.84)	(87.32)	(0.14)	(46.41)	(77.16)
Additional controls	No	Yes	Yes	No	Yes	Yes
Observations	76	74	60	76	74	60
R^2	0.363	0.771	0.781	0.379	0.813	0.822
Adjusted R^2	0.355	0.679	0.651	0.370	0.737	0.715

IV estimates, robust standard errors in parentheses. Patience is instrumented with the share of Protestants, using religion adherence data constructed by Barro (2003). * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. See column (7) of Table 1 for a complete list of the additional controls.

G Additional Tables

Table 23: Patience and national income: Additional control variables

	Dependent variable: Log [GDP p/c PPP]					
	(1)	(2)	(3)	(4)	(5)	(6)
Patience	2.02***	1.88***	1.86***	1.41**	1.39**	1.50**
	(0.48)	(0.46)	(0.50)	(0.53)	(0.58)	(0.58)
Will. to take risks	-1.11**	-0.83*	-0.70	-1.10**	-0.89	-0.98*
	(0.42)	(0.42)	(0.44)	(0.50)	(0.54)	(0.55)
Mean elevation		-1.07*	-1.72***	-0.95	-1.10	-1.11
		(0.60)	(0.56)	(0.56)	(0.68)	(0.81)
Standard deviation of elevation		-0.63	-0.13	-0.20	0.0079	0.017
		(0.56)	(0.52)	(0.41)	(0.46)	(0.49)
Terrain roughness		3.47***	3.16**	0.76	1.28	1.22
		(1.28)	(1.22)	(1.50)	(2.17)	(2.28)
Mean distance to nearest waterway		-0.60**	-0.85***	-0.97***	-0.77**	-0.77*
		(0.29)	(0.31)	(0.33)	(0.33)	(0.38)
1 if landlocked		0.39	0.63*	0.60	0.43	0.46
		(0.35)	(0.37)	(0.43)	(0.40)	(0.46)
Log [Area]		0.097	0.14	0.14	0.10	0.11
		(0.11)	(0.12)	(0.13)	(0.12)	(0.13)
Linguistic fractionalization			0.087	0.36	-0.023	0.11
			(0.54)	(0.51)	(0.56)	(0.59)
Religious fractionalization			-0.63	-1.15**	-1.16**	-0.86
			(0.47)	(0.44)	(0.54)	(0.62)
% of European descent						0.083
						(0.76)
Genetic distance to the U.S. (weighted)						0.028
						(0.06)
Constant	-187.2***	-159.4**	-175.5**	-222.0***	-241.8***	-245.1***
	(63.18)	(67.92)	(68.92)	(63.31)	(66.51)	(68.25)
Additional controls	Yes	Yes	Yes	Yes	Yes	Yes
Legal origin FE	No	No	No	Yes	Yes	Yes
Major religion shares	No	No	No	No	Yes	Yes
Observations	74	74	72	72	72	71
R^2	0.866	0.895	0.905	0.929	0.948	0.949
Adjusted R^2	0.808	0.830	0.835	0.863	0.881	0.873

OLS estimates, robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Major religion shares include the share of Protestants, Catholics, Muslims, Buddhists, Hinduists, and Atheists. See column (7) of Table 1 for a complete list of the additional controls.

Table 24: Patience, Physical Capital, and Savings: Conditioning on per capita income

	Dependent variable:															
	Log [Capital stock p/c]				Gross savings (% of GNI)				Net adjusted savings (% of GNI)				Household savings rate			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Patience	2.04***	0.99***	-0.17	0.059	6.85***	7.33*	7.63**	7.82*	7.89***	8.97***	12.4***	13.4***	6.21**	7.08**	8.13**	8.82**
	(0.28)	(0.32)	(0.15)	(0.15)	(2.18)	(3.96)	(3.60)	(4.45)	(2.16)	(3.13)	(3.37)	(3.19)	(2.70)	(3.13)	(3.19)	(3.46)
Log [GDP p/c PPP]			0.84***	0.71***			-0.29	-0.37			-1.68*	-3.52**			-2.17	-2.01
			(0.04)	(0.09)			(1.10)	(2.50)			(0.89)	(1.50)			(2.34)	(2.55)
Constant	9.97***	-147.5***	2.97***	-78.1**	21.8***	-1446.3**	24.2**	-1485.9**	10.0***	484.8	24.0***	175.1	3.27**	2.86*	24.7	22.8
	(0.13)	(42.84)	(0.40)	(35.90)	(1.16)	(566.05)	(9.71)	(648.93)	(1.06)	(773.44)	(7.91)	(812.13)	(1.50)	(1.63)	(22.26)	(25.67)
Continent FE	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Additional controls	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	No	No	No
Observations	71	69	71	69	73	71	73	71	68	68	68	68	21	21	21	21
R^2	0.328	0.863	0.896	0.949	0.064	0.461	0.065	0.461	0.108	0.522	0.157	0.567	0.231	0.272	0.255	0.293
Adjusted R^2	0.319	0.801	0.893	0.925	0.050	0.230	0.038	0.214	0.094	0.304	0.131	0.355	0.191	0.144	0.173	0.116

OLS estimates, robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. See column (7) of Table 1 for a complete list of the additional controls.

Table 25: Patience and Human Capital Accumulation: Conditioning on per capita income

	Dependent variable:															
	Average years of schooling				Human capital index				Cognitive skills				Education expenditure (% of GNI)			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Patience	4.70***	3.60***	1.80***	2.17**	0.77***	0.42**	0.23*	0.24	0.81***	0.36*	0.31*	0.040	1.46***	1.43***	0.77	1.30*
	(0.53)	(0.84)	(0.63)	(0.96)	(0.11)	(0.16)	(0.13)	(0.17)	(0.13)	(0.21)	(0.18)	(0.18)	(0.31)	(0.52)	(0.53)	(0.72)
Log [GDP p/c PPP]			1.07***	0.87**			0.21***	0.16**			0.23***	0.28***			0.26*	0.097
			(0.15)	(0.37)			(0.03)	(0.08)			(0.06)	(0.10)			(0.15)	(0.31)
Constant	5.38***	-88.5	-3.57***	27.8	2.60***	-29.7	0.88***	-19.4	4.39***	-15.2	2.40***	14.9	4.22***	-54.0	2.08	-44.9
	(0.24)	(128.34)	(1.16)	(115.04)	(0.05)	(35.47)	(0.26)	(35.43)	(0.08)	(65.39)	(0.53)	(67.84)	(0.16)	(113.95)	(1.30)	(116.69)
Additional controls	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Observations	71	70	71	70	67	66	67	66	49	48	49	48	71	70	71	70
R^2	0.438	0.800	0.679	0.830	0.331	0.717	0.578	0.745	0.283	0.757	0.436	0.813	0.150	0.588	0.197	0.589
Adjusted R^2	0.430	0.712	0.669	0.751	0.320	0.582	0.565	0.615	0.268	0.561	0.412	0.649	0.138	0.408	0.173	0.397

OLS estimates, robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. See column (7) of Table 1 for a complete list of the additional controls.

Table 26: Patience and Total Factor Productivity: Conditioning on per capita income

	Dependent variable:															
	Total factor productivity				R&D expenditure (% of GDP)				# of researchers in R&D (per 1,000)				Global Innovation Index			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Patience	0.38***	0.15*	0.035	0.046	2.07***	1.83***	1.35***	1.08**	3.31***	1.40***	1.67***	0.67	23.6***	18.1***	12.5***	10.2***
	(0.05)	(0.09)	(0.05)	(0.07)	(0.22)	(0.60)	(0.23)	(0.42)	(0.41)	(0.46)	(0.38)	(0.51)	(1.70)	(2.91)	(1.74)	(2.44)
Log [GDP p/c PPP]			0.14***	0.098*			0.29***	0.54***			0.63***	0.88***			4.30***	5.43***
			(0.02)	(0.05)			(0.06)	(0.14)			(0.09)	(0.20)			(0.44)	(0.77)
Constant	0.62***	2.41	-0.58***	11.8	0.92***	15.6	-1.52***	63.0	1.40***	-5.16	-3.87***	63.1	39.1***	-119.3	3.15	650.6**
	(0.03)	(14.49)	(0.20)	(13.25)	(0.08)	(54.67)	(0.47)	(42.64)	(0.15)	(74.30)	(0.67)	(71.94)	(0.82)	(458.69)	(3.82)	(308.59)
Additional controls	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Observations	60	59	60	59	66	65	66	65	61	60	61	60	72	71	72	71
R^2	0.368	0.765	0.696	0.805	0.583	0.716	0.678	0.795	0.531	0.828	0.726	0.889	0.619	0.825	0.834	0.912
Adjusted R^2	0.357	0.632	0.685	0.685	0.576	0.577	0.668	0.688	0.523	0.733	0.717	0.824	0.613	0.750	0.830	0.872

OLS estimates, robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. See column (7) of Table 1 for a complete list of the additional controls.

Table 27: Patience and Institutions: Conditioning on per capita income

	Dependent variable:															
	Democracy				Property rights				Social infrastructure				S&P credit rating			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Patience	4.53***	3.36*	1.75	1.85	47.2***	37.8***	26.8***	15.9*	0.43***	0.17**	0.13**	-0.069	10.7***	9.03***	7.44***	5.88***
	(0.85)	(1.68)	(1.34)	(1.69)	(4.32)	(8.16)	(5.79)	(8.63)	(0.05)	(0.07)	(0.06)	(0.08)	(0.82)	(1.35)	(1.27)	(1.79)
Log [GDP p/c PPP]			1.04***	1.09**			7.79***	14.6***			0.11***	0.17***			1.31***	2.02***
			(0.35)	(0.53)			(1.47)	(3.10)			(0.01)	(0.04)			(0.30)	(0.66)
Constant	6.48***	225.5	-2.12	377.5	48.5***	-85.5	-16.4	1928.0	0.50***	13.2	-0.42***	43.3***	14.5***	-270.5	3.33	46.3
	(0.37)	(224.44)	(2.92)	(248.45)	(1.89)	(1217.66)	(12.36)	(1296.41)	(0.02)	(12.57)	(0.10)	(14.88)	(0.42)	(299.17)	(2.48)	(322.83)
Additional controls	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Observations	72	70	72	70	75	73	75	73	61	60	61	60	64	62	64	62
R^2	0.218	0.702	0.337	0.736	0.536	0.647	0.687	0.780	0.461	0.793	0.729	0.882	0.607	0.768	0.688	0.810
Adjusted R^2	0.207	0.572	0.318	0.612	0.529	0.502	0.678	0.684	0.451	0.679	0.720	0.812	0.601	0.647	0.678	0.702

OLS estimates, robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. See column (7) of Table 1 for a complete list of the additional controls.

Table 28: Regional patience, human capital, and income: Robustness

	Dependent variable:														
	Log [Regional GDP p/c]								Average years of education						
	Sub-samples: Number of observations larger than...														
	N > 0		N > 10		N > 20		N > 50		N > 0		N > 10		N > 20		N > 50
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
Patience	0.079	0.074	0.16***	0.15***	0.15**	0.14**	0.20**	0.18**	0.24*	0.42***	0.39**	0.40**	0.35**	0.43	0.42**
	(0.05)	(0.05)	(0.05)	(0.05)	(0.06)	(0.05)	(0.09)	(0.07)	(0.13)	(0.15)	(0.15)	(0.18)	(0.16)	(0.31)	(0.20)
Temperature		-0.016**		-0.022***		-0.015*		-0.0060	-0.050***		-0.054***		-0.057***		-0.056***
		(0.01)		(0.01)		(0.01)		(0.01)	(0.01)		(0.01)		(0.02)		(0.02)
Inverse distance to coast		0.53**		0.51**		0.55*		0.65*	0.62		0.80		1.17*		1.45**
		(0.20)		(0.25)		(0.32)		(0.38)	(0.49)		(0.56)		(0.61)		(0.70)
Log [Oil production p/c]		0.23***		0.27***		0.20***		0.13*	0.039		0.023		-0.023		-0.090
		(0.05)		(0.05)		(0.04)		(0.07)	(0.04)		(0.04)		(0.07)		(0.11)
# Ethnic groups		-0.12*		-0.10*		-0.12*		-0.19***	-0.31*		-0.24*		-0.31**		-0.49**
		(0.07)		(0.06)		(0.07)		(0.07)	(0.17)		(0.13)		(0.15)		(0.19)
Log [Population density]		0.054		0.079***		0.097**		0.091*	0.13		0.21***		0.24***		0.26**
		(0.04)		(0.03)		(0.04)		(0.05)	(0.09)		(0.07)		(0.08)		(0.11)
Constant	9.04***	8.77***	9.01***	8.78***	9.05***	8.64***	9.56***	8.82***	7.17***	6.99***	6.84***	7.08***	6.61***	7.48***	6.43***
	(0.02)	(0.20)	(0.02)	(0.24)	(0.02)	(0.33)	(0.02)	(0.47)	(0.58)	(0.05)	(0.58)	(0.06)	(0.67)	(0.05)	(1.13)
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	710	693	662	645	547	530	363	346	682	651	634	537	520	357	340
R^2	0.928	0.939	0.930	0.944	0.937	0.952	0.942	0.958	0.947	0.936	0.951	0.937	0.957	0.932	0.961
Adjusted R^2	0.921	0.934	0.923	0.939	0.930	0.946	0.932	0.950	0.942	0.930	0.946	0.930	0.951	0.920	0.953

OLS estimates, standard errors (clustered at country level) in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

H Additional Figures

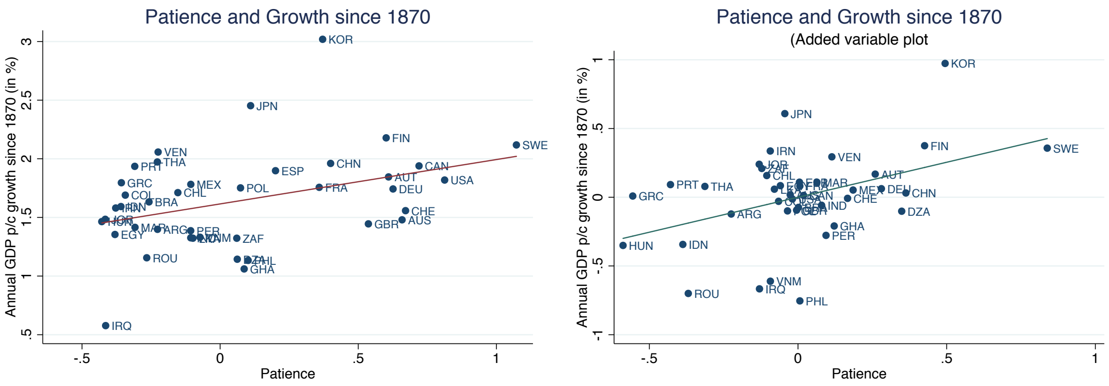

Figure 8: Patience and long-run growth. The left panel depicts the raw correlation between annual growth rates in GDP per capita (in %) since 1870 and patience, while the right panel contains a plot conditional on continent fixed effects.

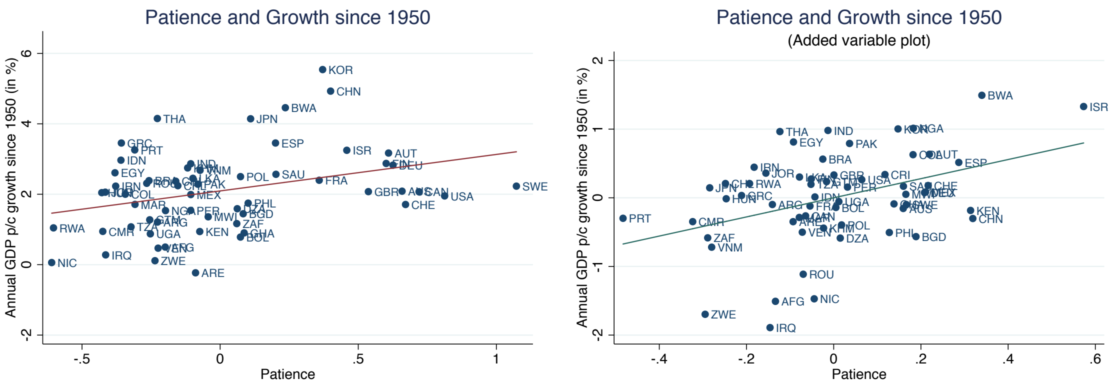

Figure 9: Patience and medium-run growth. The left panel depicts the raw correlation between annual growth rates in GDP per capita (in %) since 1950 and patience, while the right panel contains a plot conditional on the full set of baseline covariates in column (7) of Table 1.

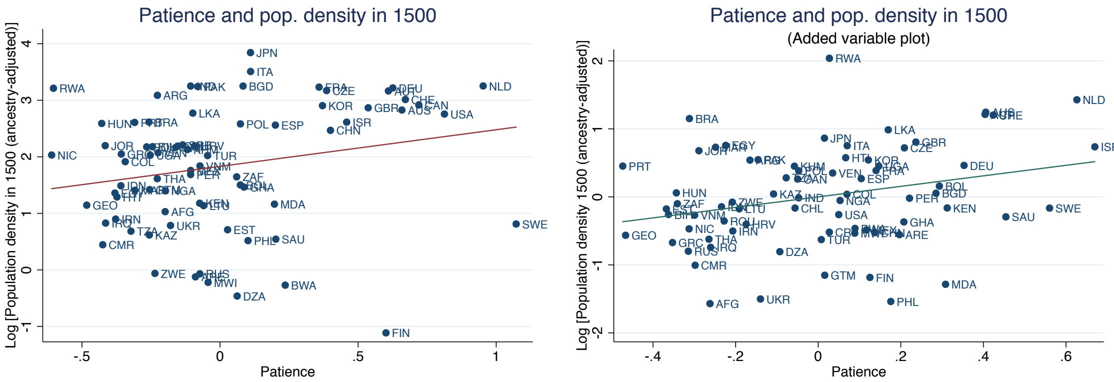

Figure 10: Patience and ancestry-adjusted population density in 1500. The left panel depicts the raw correlation between ancestry-adjusted population density in 1500 and patience, while the right panel contains a plot conditional on the full set of baseline covariates in column (2) of Table 20.

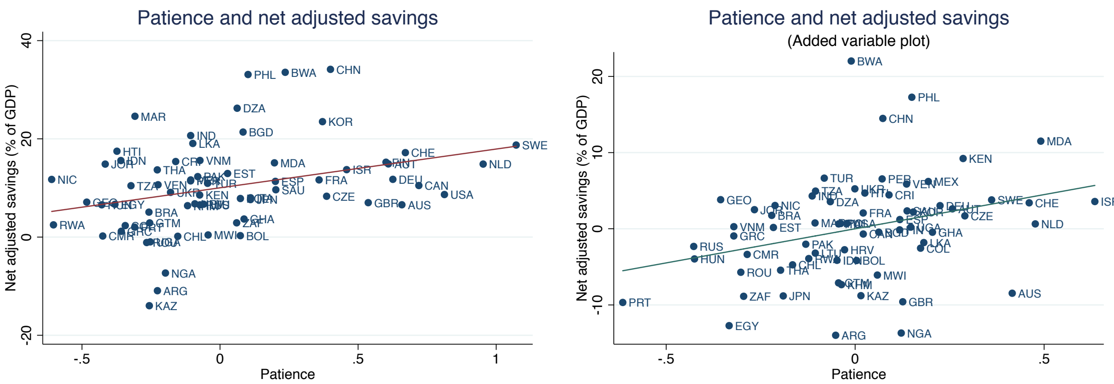

Figure 11: Patience and Savings. The left panel depicts the raw correlation between net adjusted savings (% of GDP) and patience, while the right panel contains a plot conditional on the full set of baseline covariates in column (7) of Table 1.

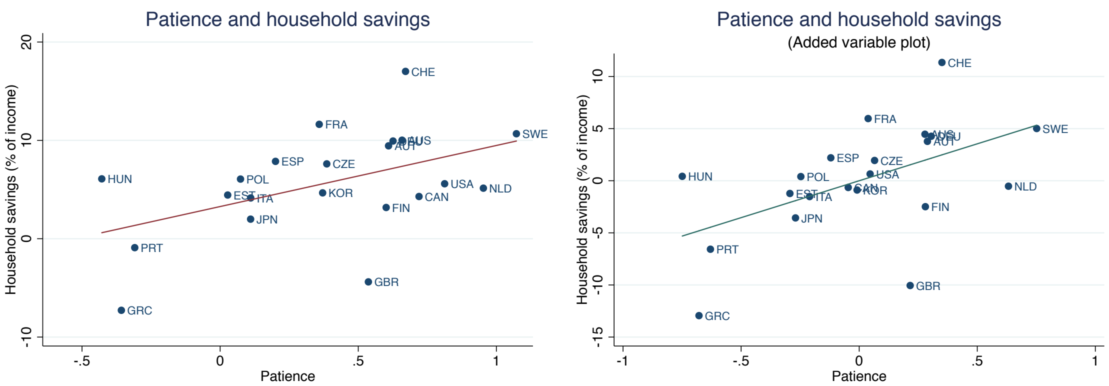

Figure 12: Patience and Household Savings. The left panel depicts the raw correlation between household savings (% of disposable income) and patience, while the right panel contains a plot conditional on the full set of baseline covariates in column (7) of Table 1.

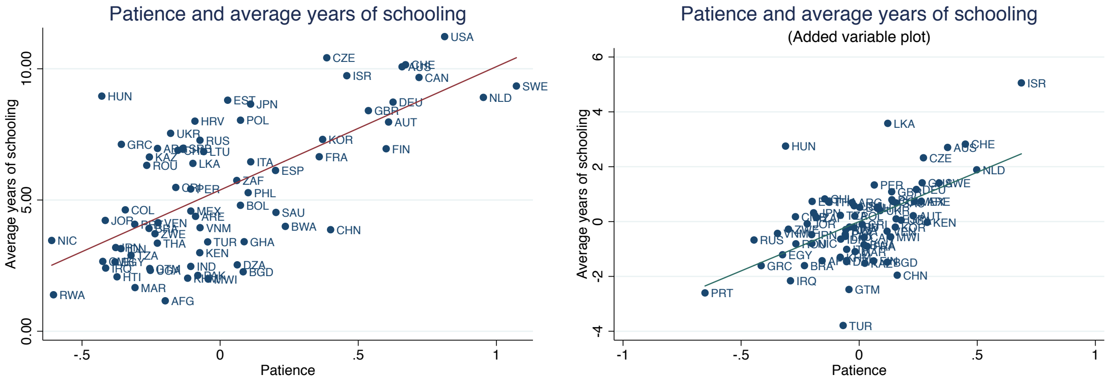

Figure 13: Patience and Average Years of Schooling. The left panel depicts the raw correlation between average years of schooling and patience, while the right panel contains a plot conditional on the full set of baseline covariates in column (7) of Table 1.

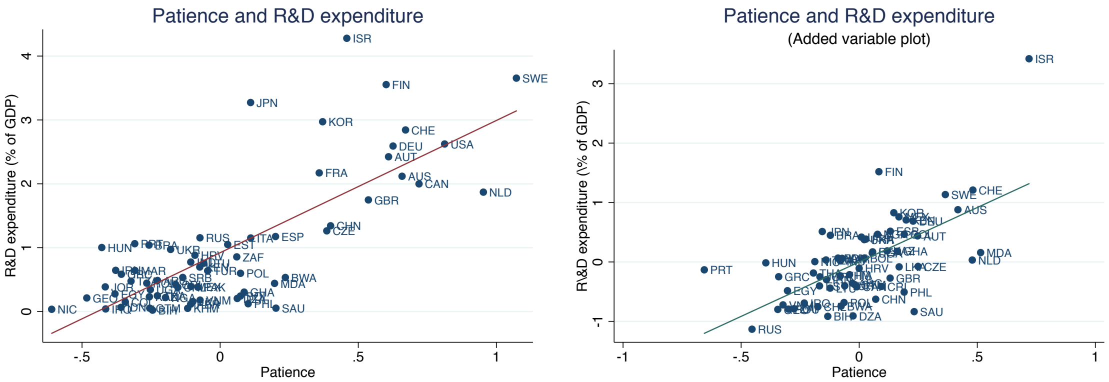

Figure 14: Patience and innovation. The left panel depicts the conditional correlation between R&D expenditure (as % of GDP) and patience, while the right panel contains a conditional plot of the relationship between the global innovation index and patience. Both plots are conditional on the full set of baseline covariates in column (7) of Table 1.

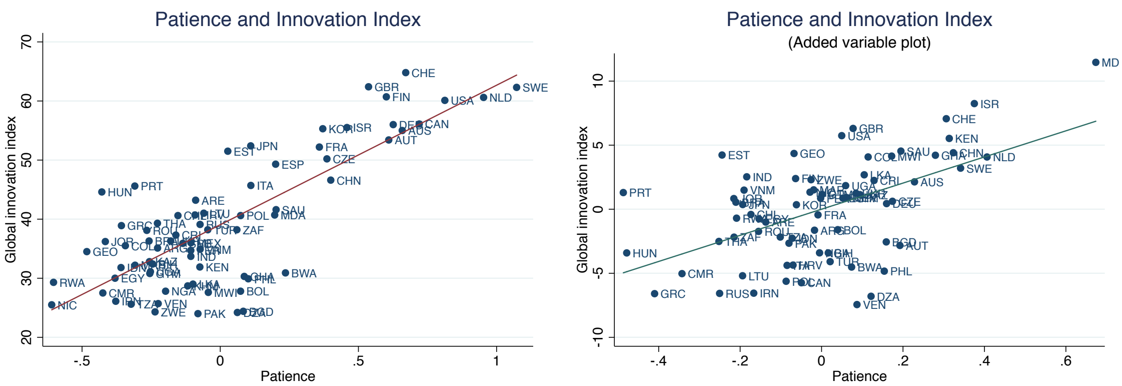

Figure 15: Patience and innovation. The left panel depicts the raw correlation between R&D expenditure (as % of GDP) and patience, while the right panel plots the raw correlation between the Global Innovation Index and patience

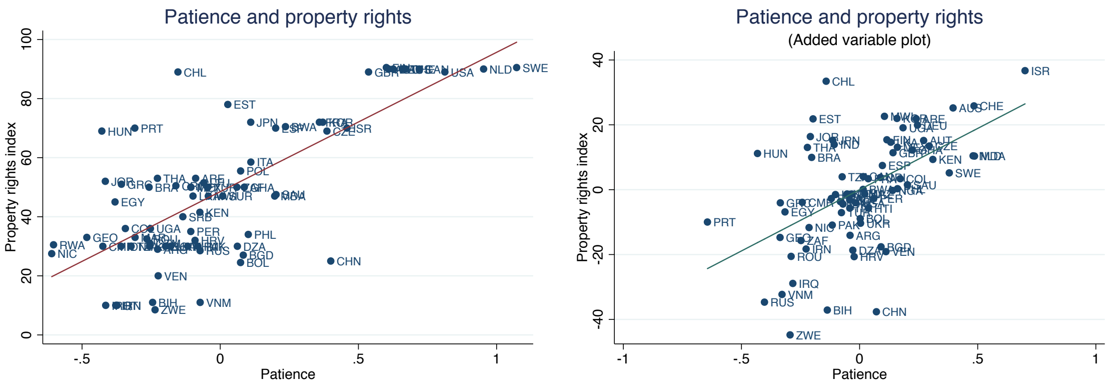

Figure 16: Patience and property rights. The left panel depicts the raw correlation between the property rights index and patience, while the right panel contains a plot conditional on the full set of baseline covariates in column (7) of Table 1.

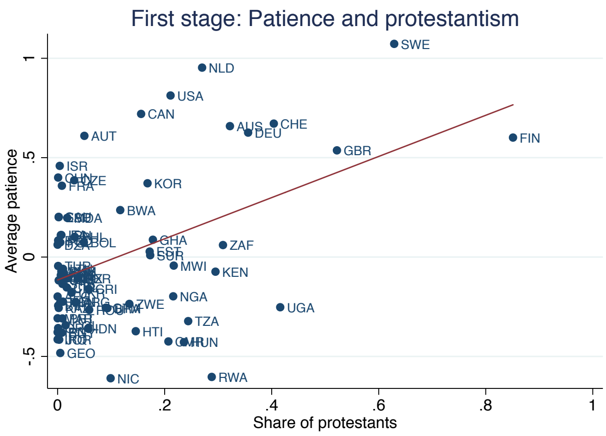

Figure 17: First stage of IV: Patience and protestantism

I Description and Sources of Main Variables

I.1 Country-Level Variables

I.1.1 Outcome Variables

Contemporary national GDP per capita. Average annual GDP per capita over the period 2001 – 2010, in 2005US$. Source: World Bank Development Indicators.

National GDP per worker. GDP per worker, 1990US$. Source: World Bank Development Indicators, average 2001 – 2010.

Human Development Index. The Human Development Index (HDI) is a summary measure of average achievement in key dimensions of human development: a long and healthy life, being knowledgeable and have a decent standard of living. The HDI is the geometric mean of normalized indices for each of the three dimensions. Average 2000-2010, taken from UNDP.

Average subjective happiness. In Gallups' World Poll, respondents are asked to evaluate the current state of their lives, using the image of a ladder, with the best possible life for them as a 10 and the worst possible life as a 0. Source: the World Happiness Report 2013, at `http://unsdsn.org/resources/publications/world-happiness-report-2013/`.

Historical Income Data and Growth rates in GDP per capita. Source: the Maddison project.

Population density in 1500. Persons per square km, original data taken from Ashraf and Galor (2013). The ancestry-adjusted population density measure is computed by multiplying the contemporary population shares (as obtained from Putterman and Weil (2010)) with the historical population density of the respective population's ancestor countries.

Average years of schooling. The mean over the 2000-2010 time period, of the 5-yearly figure, reported by Barro and Lee (2012), on average years of schooling amongst the population aged 25 and over.

Human capital index. Human capital index provided by the Penn World Tables, which aims to provide a quality-adjusted index of human capital by combining years of schooling with returns to schooling. The index is defined as $e^{f(s)}$, where $f(s) = 0.134s$ if $s \leq 4$, $f(s) = 0.134s \times 4 + 0.101(s-4)$ if $4 < s \leq 8$ and $f(s) = 0.134 \times 4 + 0.101 \times 4 + 0.068(s-8)$ if $s > 8$, where s = years of schooling.

Cognitive skills. Measure of cognitive skills derived from a series of standardized tests in math, science, and reading across countries, see Hanushek and Woessmann (2012).

Education expenditure. Current operating expenditures in education, including wages and salaries and excluding capital investments in buildings and equipment. Source: World Bank Development Indicators, average 2001 – 2010.

Capital stock. Capital stock at constant 2005 national prices (in mil. 2005US$), average from 2001 to 2010. Data taken from the Penn World Tables.

National savings. Gross savings are calculated as gross national income less total consumption, plus net transfers. Net national savings are equal to gross national savings less the value of consumption of fixed capital. Adjusted net savings are equal to net national savings plus education expenditure and minus energy depletion, mineral depletion, net forest depletion, and carbon dioxide and particulate emissions damage. Source: World Bank Development Indicators, average 2001 – 2010.

Household savings rate. The household saving rate is calculated as the ratio of household saving to household disposable income (plus the change in net equity of households in pension funds). Source: the OECD statistics database. We use the most recent available data point (either projected or realized), working backwards from 2010.

Total factor productivity. TFP level at current PPPs (USA=1), average from 2001 to 2010. Source: the Penn World Tables.

R&D expenditure. Expenditures for research and development are current and capital expenditures (both public and private) on creative work undertaken systematically to increase knowledge, including knowledge of humanity, culture, and society, and the use of knowledge for new applications. R&D covers basic research, applied research, and experimental development. Source: World Bank Development Indicators, average 2001 – 2010.

Number of researchers in R&D. Researchers in R&D are professionals engaged in the conception or creation of new knowledge, products, processes, methods, or systems and in the management of the projects concerned. Average from 2001 to 2010, taken from the World Bank Development Indicators.

Global innovation index. This index is a summary statistic of innovative capacity that consists of over 80 qualitative and quantitative items, including measures of institutions, human capital and research, infrastructure, market sophistication, business sophistication, knowledge and technology outputs, and creative outputs. Data from 2014, taken from `https://www.globalinnovationindex.org/content.aspx?page=data-analysis`.

Democracy index. Index that quanties the extent of institutionalized democracy, as reported in the Polity IV dataset. Average from 2001 to 2010.

Social infrastructure index. Index due to Hall and Jones (1999) which measures the wedge between the private return to productive activities and the social return to such activities. This index is derived from two separate indices. First, an index of government antidiversion is policies created from data assembled by Political Risk Services and covers the categories law and order, bureaucratic quality, corruption, risk of expropriation, and government repudiation of contracts. The second element of the index captures the extent to which a country is open to international trade.

Property rights. This factor scores the degree to which a country's laws protect private property rights and the degree to which its government enforces those laws. It also accounts for the possibility that private property will be expropriated. In addition, it analyzes the independence of the judiciary, the existence of corruption within the judiciary, and the ability of individuals and businesses to enforce contracts. Average 2001-2010, taken from the Quality of Government dataset, `http://www.qogdata.pol.gu.se/codebook/codebook_basic_30aug13.pdf`.

Standard & Poor's long-term credit rating. Captures a country's likelihood of payment-capacity and willingness to meet its financial commitments, the nature of and provisions of the underlying debt, as well as the protection in case of bankruptcy. Source: `http://www.standardandpoors.com/ratings/sovereigns/ratings-list/en/us/?subSectorCode=39` on 9 October 2014.

I.1.2 Covariates

Consumer price index. Average 2001-2010, taken from the World Bank Development Indicators.

GDP deflator. Average 2001-2010, taken from the World Bank Development Indicators.

Ratio of external finance and GDP. External finance is defined as the sum of private credit, private bond market capitalization, and stock market capitalization. Source: Buera et al. (2011).

Number of automated telling machines. Average 2001-2010. Source: World Bank Development Indicators.

Long-term orientation. Hofstede defines this concept by noting that every society has to maintain some links with its own past while dealing with the challenges of the present and the future. Societies prioritize these two existential goals differently. Societies who score low on this dimension, for example, prefer to maintain time-honoured traditions and norms while viewing societal change with suspicion. Those with a culture which scores high, on the other hand, take a more pragmatic approach: they encourage thrift and efforts in modern education as a way to prepare for the future. Source: `http://geerthofstede.eu/research--vsm`, retrieved on March 25, 2015.

Colonization dummy. Dummy equal to one if the respective country had at least one colonizer over a long period of time and with substantial participation in governance. Source: the CEPII geo database.

Area, distance to equator, longitude, landlocked dummy. Source: the CEPII geo database.

Mean and standard deviation of elevation. Elevation in km above sea level, taken from Ashraf and Galor (2013). Data originally based on geospatial elevation data reported by the G-ECON project (Nordhaus, 2006).

Percentage of arable land. Fraction of land within a country which is arable, taken from the World Bank Development Indicators.

Land suitability for agriculture. Index of the suitability of land for agriculture based on ecological indicators of climate suitability for cultivation, such as growing degree days and the ratio of actual to potential evapotranspiration, as well as ecological indicators of soil suitability for cultivation, such as soil carbon density and soil pH, taken from Michalopoulos (2012).

Neolithic revolution timing. The number of thousand years elapsed, until the year 2000, since the majority of the population residing within a country's modern national borders began practicing sedentary agriculture as the primary mode of subsistence. The measure is weighted within each country, where the weight represents the fraction of the year 2000 population (of the country for which the measure is being computed) that can trace its ancestral origins to the given country in the year 1500. Measure taken from Ashraf and Galor (2013).

Precipitation. Average monthly precipitation of a country in mm per month, 1961-1990, taken from Ashraf and Galor (2013). Data originally based on geospatial average monthly precipitation data for this period reported by the G-ECON project (Nordhaus, 2006).

Temperature. Average monthly temperature of a country in degree Celsius, 1961-1990, taken from Ashraf and Galor (2013). Data originally based on geospatial average monthly temperature data for this period reported by the G-ECON project (Nordhaus, 2006).

Percentage in (sub-)tropical zones. ercentage of area within a country which forms part of each of the tropical or sub-tropical climatic zones. Data taken from John Luke Gallup, `http://www.pdx.edu/econ/jlgallup/country-geodata`.

Percentage at risk of malaria. The percentage of population in regions of high malaria risk (as of 1994), multiplied by the proportion of national cases involving the fatal species of the malaria pathogen, P. falciparum. This variable was originally constructed by Gallup et al. (2000) and is part of Columbia University's Earth Institute data set on malaria. Data taken from Ashraf and Galor (2013).

Predicted genetic diversity. Predicted genetic diversity of the contemporary population, adjusted for post-Columbian migration flows and genetic distance between ethnic groups. See Ashraf and Galor (2013).

Ethnic, linguistic, and religious fractionalization. Indices due to Alesina et al. (2003) capturing the probability that two randomly selected individuals from the same country will be from different ethnic (religious) groups.

Terrain roughness. Degree of terrain roughness of a country, taken from Ashraf and Galor (2013). Data originally based on geospatial undulation data reported by the G-ECON project (Nordhaus, 2006).

Distance to nearest waterway. The distance, in thousands of km, from a GIS grid cell to the nearest ice-free coastline or sea-navigable river, averaged across the grid cells of a country. Source: Ashraf and Galor (2013), originally constructed by Gallup et al. (1999).

Legal origins. Origin of legal system: UK, French, German, Scandinavian, Soviet. Source: La Porta et al. (1999).

Major religion shares. Source: Barro (2003).

Fraction of European descent. Fraction of the population which is of European dexcent. Constructed from the "World Migration Matrix" of Putterman and Weil (2010).

Genetic distance to the United States. Fst genetic distance of a country's contemporary population to the population of the United States. Source: Spolaore and Wacziarg (2009).

Trust. Part of Global Preference Survey. Elicited through respondents' self-assessment regarding the following statement on an 11 point scale: "I assume that people have only the best intentions."

Risk preferences. Risk preferences were measured in the Global Preference Survey using two survey items. First, respondents went through a quantitative five-step staircase procedure:
Please imagine the following situation. You can choose between a sure payment of a particular amount of money. or a draw. where you would have an equal chance of getting 300 Euro or getting nothing. We will present to you five different situations. What would you prefer: a draw with a 50 percent chance of receiving 300 Euro, and the same 50 percent chance of receiving nothing, or the amount of 160 Euro as a sure

payment? See Falk et al. (2015a) for an exposition of the entire sequence of survey items.
In addition, respondents provided a self-assessment:
Please tell me, in general, how willing or unwilling you are to take risks. Please use a scale from 0 to 10, where 0 means "completely unwilling to take risks" and a 10 means you are "very willing to take risks". You can also use any numbers between 0 and 10 to indicate where you fall on the scale, like 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10.
These items were combined on standardized data using the following formula:

$$\text{Will. to take risks } = 0.4729985 \times \text{ Staircase risk } + 0.5270015 \times \text{ Qualitative item}$$

I.2 Regional-Level Data

Except for the patience measures and a region's size (area), all regional-level data are taken from Gennaioli et al. (2013). The area data were collected by research assistants from various sources on the web.

I.3 Individual-Level Data

Household income per capita. Included in Gallup's background data. To calculate income, respondents are asked to report their household income in local currency. Those respondents who have difficulty answering the question are presented a set of ranges in local currency and are asked which group they fall into. Income variables are created by converting local currency to International Dollars (ID) using purchasing power parity (PPP) ratios. Log household income is computed as log (1+ household income).

Education level. Included in Gallup's background data. Level 1: Completed elementary education or less (up to 8 years of basic education). Level 2: Secondary - 3 year tertiary education and some education beyond secondary education (9-15 years of education). Level 3: Completed four years of education beyond high school and / or received a 4-year college degree.