Law and Economic Behaviour*

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Abstract

Preferences play a key role in economic models as drivers of behaviour. Recent contributions have started to model preferences as endogenously determined. This creates two fundamental issues for empirical research. The first concerns the determinants of preferences. The second concerns the effect of preferences on economic outcomes, which become difficult to quantify once preferences are endogenous. We explore the extent to which the prevalence of risk tolerance across countries is endogenously determined by the legal and institutional environment of a country, and whether this behavioural trait in turn contributes to shaping the aggregate entrepreneurship rate. To do so, we rely on structural equation modelling, where the direction of causality arises from the underlying model assumed to construct the equations. Data fit to the model serve to determine whether the underlying causal model presents a plausible representation of the empirical facts. We find that legal origins exert a strong effect on risk tolerance. We further document an indirect effect of legal origins on entrepreneurship rates passing through risk preferences. These findings illustrate the pervasiveness of the effect of legal origins on economic behaviour.

Keywords: Legal origins; risk taking; entrepreneurship;

JEL-classification: D9, D7, E7, G3, G4

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1 Introduction

Preferences play a central role in economic models. An inter-disciplinary consensus is starting to emerge that preferences are endogenously determined, rather than innate as has long been assumed in economics. This creates two fundamental issues for empirical research. The first one concerns the determinants of (differences in) preferences, which we are only beginning to understand. The second concerns the effect of preferences on economic outcomes. Once preferences are endogenous, effects of preferences become difficult to quantify, since preferences and outcomes may be co-determined by third variables, or there may be feedback cycles from economic outcomes to the preferences themselves. We endeavour to tackle both these issues at the aggregate level. We propose a structural equation model according to which the prevalence of risk tolerance across countries is endogenously determined by the legal and institutional environment of a country. Endogenously determined preferences may then impact economic behaviour. The direction of causality thereby flows from the model we propose, and the fit of the model to the data serves to assess the plausibility of the underlying causal model. This allows us to explore plausible channels of causation in a setting where watertight empirical causal identification may well be beyond reach.

We take the legal origin of a country as the main institution of interest. We build on the insight that the legal systems of countries can be traced back to a handful of legal families (La Porta, López-de Silanes, Shleifer and Vishny, 1998). These legal families are characterized as common law and civil law, and for civil law countries, further divided into French, German, or Scandinavian systems. The suitability of these legal indicators for our purposes derives from the observation that, especially for French civil law and English common law origins, these legal systems can be conceived of as having been exogenously implanted in most countries by conquest and colonization (La Porta, Lopez-de Silanes and Shleifer, 2008).[1] The legal systems of a country have been shown to matter hugely for

[1]There is some debate on whether a strict exogeneity assumption is warranted, either because some countries adopted their legal systems endogenously, or because colonization strategies may have differed systematically between countries. We will thus relax the strict exogeneity assump-

financial outcomes, influencing the ownership concentration in private enterprises (La Porta, Lopez-De-Silanes, Shleifer and Vishny, 1997), the development of financial intermediaries (Levine, Loayza and Beck, 2000), and the government ownership of banks (La Porta, Lopez-de Silanes and Shleifer, 2002), amongst other things (see Beck and Levine, 2008, and La Porta et al., 2008, for reviews of the literature).

The first contribution we make is to the literature on the determinants of preferences. While traditionally preferences have been treated as innate and unchangeable in economics (Bowles, 1998), this has been quickly changing over the last decade or so (Voors, Nillesen, Verwimp, Bulte, Lensink and Van Soest, 2012; Cohn, Engelmann, Fehr and Maréchal, 2015; Di Falco and Vieider, 2022). In particular, we contribute to the nascent literature documenting the cross-country determinants of preferences (Galor and Michalopoulos, 2012; Doepke and Zilibotti, 2014; Becker, Dohmen, Enke and Falk, 2015; Bouchouicha and Vieider, 2019). We thereby focus on the long-term determinants of preferences across countries, and abstract from the short-term determinants of preferences and behaviour within any given country (Malmendier and Nagel, 2011; Cohn et al., 2015). While preferences may differ systematically across regions within countries (Tabellini, 2010; Di Falco and Vieider, 2022), and while we would expect them to change over time (Hanaoka, Shigeoka and Watanabe, 2018; Brown, Montalva, Thomas and Velásquez, 2019; Di Falco and Vieider, 2022), the focus in the present paper is on differences between countries that persist over time on top of such changes and differences at lower levels.

Second, we use the part of preferences determined exogenously by legal origins to document plausibly causal relationships from aggregate preference patterns to economic outcomes which have been theoretically linked to risk preferences. In particular, we document the effect of risk tolerance on entrepreneurship rates (Kihlstrom and Laffont, 1979; Galor and Michalopoulos, 2012; Doepke and Zilibotti, 2014). By using simultaneous equation models, we postulate a causal effect running from legal origins to economic outcomes via the preference channel. To

tion in our sability analysis.

attenuate concerns about reverse causality, we exploit the fact that the legal origins of countries have mostly been determined exogenously by the occupying or colonizing power centuries ago. For the colonization decision to be influenced by the level of risk tolerance in a country, the occupying powers would have needed to a) know the prevalent level of risk tolerance; and b) select the country to invade based on differential risk tolerance levels. This seems highly implausible, given that we are only beginning to understand the between-country distribution in preferences. Notice that our approach is distinct from instrumental variable approaches, inasmuch as it permits us to document both the direct effect of legal origins on economic outcomes and the indirect effect passing via behavioural traits, thus circumventing the thorny issue of whether the exclusion restrictions may be met.

Being based on cross-country regressions, our causal model could be threatened by omitted variable bias. This is indeed an issue that our paper shares with the entire legal origins literature, as well as with cross-country regression at large. Specifically, the causal model we postulate could be threatened by systematic differences between countries existing at the time of colonization, e.g. in geographical endowments, economic development, or in their institutional history. An additional issue, specific to our setup, may occur if some such variable had determined not only the extent of risk tolerance in a country, but also the prevalence of entrepreneurship and/or the colonization by France versus England, and thus the legal origins of a country.

To counteract such concerns, we test the robustness of our model by presenting a number of alternative causal narratives. In first instance, we examine a variety of variables endogenous to the legal origins of a country to determine whether they may confound the main relationship of interest, running from legal origins to risk tolerance, to entrepreneurship rates. We subsequently relax the strict exogeneity assumpion of legal origins, and systematically explore the effect of a large number of variables capturing the geographical, economic, and demographic properties of countries around 1500 on both the likelihood of being colonized by the English

rather than the French (Auer, 2013), and on the contemporaneous distribution of risk preferences. All our inferences remain stable to the inclusion of these controls, and if anything, endogenizing legal origins tends indeed to reinforce the indirect effect running from legal origins to risk tolerance and thence to entrepreneurship.

We find that legal origins exert a strong effect on risk tolerance. Common law countries are more risk tolerant relative to French civil law countries. These effects are not only statistically significant, but also economically. Legal origins alone explain 21% of the cross-country variation in risk tolerance. Higher levels of risk tolerance, in turn, are associated with higher entrepreneurship rates. Focusing on the exogenous preference components induced by legal origins—the only part of the effect for which a causal interpretation is warranted under the assumptions underlying our structural modelling approach—we find that passing from French to English legal origins increases the entrepreneurship rate by 15.8%. These effects are sizeable, and illustrate the importance of preferences in the determination of aggregate economic outcomes. Further examining the effect of legal origins on trust and patience—which we include in our stability analysis to exclude that they may act as confounds of the effect of risk tolerance on entrepreneurship—we find that countries with English legal origins also exhibit higher levels of trust and higher levels of patience when compared to French legal origin countries. This shows the pervasiveness of the effect of legal origins on economic behaviour.

We postulate that these differences in behaviour originate from distinctive elements in the social contracts enshrined in French versus English legal origin systems. This account is grounded in historical narratives that have emphasized the necessity of keeping tight central control over social and economic conditions as the main rationale underlying French civil law, whereas common law evolved based on a philosophy of propping up private initiative using flexible, decentralized systems (Glaeser and Shleifer, 2002; Klerman and Mahoney, 2007). English legal origin systems thus tend to emphasize the independence of the judiciary, as well as individual responsibility and freedom, whereas systems grounded in French civil law tend to emphasize centralized state control and the responsibility of the state

for the wellbeing of its citizens over individual responsibility.

This paper proceeds as follows. Section 2 describes our model, and embeds our narrative in the extant literature. Section 3 describes our empirical methodology, and section 4 presents the data. Section 5 presents the results, and section 6 presents extensive robustness checks. Section 7 concludes the paper.

2 Concepts and literature review

We start from a review of the literature pertaining to the main relationships of interest in our setup. We structure the literature review into three parts, corresponding to the main channels of interest to our contribution.

2.1 Legal origins and financial and economic outcomes

Figure 1 shows the legal origins of countries around the world (La Porta et al., 2008). The main contrast of interest to us is the one between English common law and French civil law countries. After their original development in England and France, these legal codes—and the organizational and administrative practices that came with them—were subsequently spread to different parts of the World by conquest and colonization. The Napoleonic conquests spread French civil law to Belgium and the Netherlands, Italy, as well as to Spain and Portugal. England, France, Spain, The Netherlands, Belgium and Portugal subsequently spread their laws and institutions to their colonies in Africa, Asia, and Latin America. To the extent that these legal systems were imposed from the outside, the legal origin of a country can be taken as exogenous (La Porta et al., 1998).

An important question concerns the robustness of the exogeneity assumption. For instance, Scandinavian legal origins remain confined to their nordic countries of origin, and can thus not be seen as exogenous. German legal origins were often adopted endogenously, as was the case in Japan at the end of the 19th century, and given Germany's limited history of colonialism an exogenous interpretation is generally not warranted. The main contrast thus arises between exogenously

implanted common law versus French civil law origins. Even here, one needs to be careful. Russia adopted the French legal system endogenously, only to subsequently spread it to its neighbourhood by conquest. Thailand is a unique example of a country that endogenously adopted a common law system. Clearly, differences arose from the start even in countries where the legal system was implanted exogenously, and legal systems further evolved after the original implantation, so that there are large differences even within any given legal family. Our account, however, relies on the commonalities within each legal system that persist to this day. A more serious challenge to the exogeneity assumption may arise from differences in historical colonization strategies of England versus France and other French legal origin colonial powers (Auer, 2013). We will return to this issue after presenting our methodological approach and the main results.

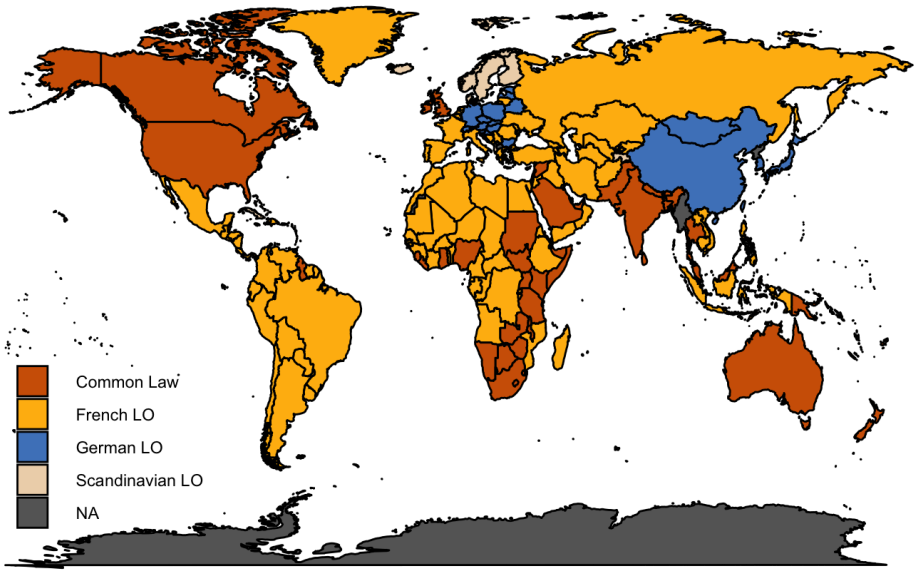


Figure 1: Legal origins of countries worldwide

Map of legal origins following La Porta et al. (2008). The contrast between English and French legal origins can be taken largely as exogenous, which underlies our identification strategy. German and Scandinavian legal origins cannot generally be seen as exogenous.

The theory of legal origins presents several historical accounts on how the differences between the legal systems have emerged. Glaeser and Shleifer (2002) emphasize the early development of the French and English legal system in the 13th century. The tighter hold of the English king on the country made it pos-

sible to introduce a system of trial by jury, whereby local juries could exploit local information and defend local interests. The continuing conflict of the French monarchy with feudal lords, on the other hand, made it desirable for the king to keep tight control over the administration of justice, which was supposed to strictly implement rules made centrally by the king and his court. Other accounts have emphasized instead the importance of the revolutions the two countries underwent in the 17th and 18th century (Klerman and Mahoney, 2007). In particular, the Glorious Revolution in England defended the rights of the parliament and commercial interests against the crown, thus further cementing the independence of the judiciary. To the contrary, the Napoleonic codification of the law following the French revolution served to tighten central control over legislation and the administration of justice, with judges supposed to strictly stick to the letter of the law, rather than interpreting it and contributing to its development, as in England.

The legal origins of a country have been shown to affect a great many financial and economic outcomes. La Porta, Lopez-de Silanes and Shleifer (1999) famously showed that common law countries showed lower concentration in the ownership of firms than French civil law countries. La Porta et al. (2002) similarly showed governments to take a larger role in the ownership of banks in French civil law countries as compared to common law countries. Levine et al. (2000) showed that intermediary financial institutions are more developed in common law countries than they are in French civil law countries. They further documented a positive link between financial development and subsequent economic growth. Djankov, La Porta, Lopez-de Silanes and Shleifer (2002) documented an effect of legal origins on the ease of doing business. Common law countries tend to have simpler procedures for opening businesses, albeit with much variation within each legal family. Many more outcomes have since been shown to depend on the legal origins of a country—La Porta et al. (2008) provide an extensive literature review.

The effects of legal origins on economic and financial outcomes are usually thought to pass through intermediate measures reflecting the translation of the different legal traditions into concrete legal provisions. For instance, the more

diffused company ownership structures characteristic of common law countries are thought to be driven by increased protection of private property, and particularly by legal provisions shoring up the rights of shareholders (La Porta et al., 1997; 1998). The rigorous enforcement of creditor rights and an emphasis on the rule of law have been linked to the development of banks, and thence to growth (Levine, 1998). In general, common law countries are seen as emphasizing the rule of law and private rights over administrative caprice and the prerogative of the state, an effect that is thought to be especially important in the poorer and more autocratic countries into which the legal systems have been transplanted by colonization (Glaeser and Shleifer, 2002). By documenting an effect of legal origins passing through individual preferences, our approach adds to this narrative by showing the pervasiveness of the effect of legal origins.

2.2 Legal origins and preferences

We now move on to a review of the literature more closely related to the channels we document, starting from the effect of legal origins (LO) on risk tolerance (RT). Building on a rapidly emerging consensus in economics, we conceive of risk tolerance as endogenously determined (Bowles, 1998; Voors et al., 2012; Galor and Michalopoulos, 2012; Bouchouicha and Vieider, 2019). We postulate that the effect of legal origins on behaviour originates in a broader social contract, and in particular, a conception of legal origins "as a style of social control of economic life" (La Porta et al., 2008, p. 286). As La Porta et al. (2008) further argue, "common law stands for the strategy of social control that seeks to support private market outcomes, whereas civil law seeks to replace such outcomes with state-desired allocations". Ben-Bassat and Dahan (2008) showed that the constitutions of French civil law countries contain more frequent commitments to social rights conferred by the state than common law countries. They further showed these social rights to result in higher social transfers by the state.

In this sense, common law may create a perception of larger potential payoffs to individual initiative, which may be subdued in the more controlling environ-

ments inherent in French civil law systems. Such a perception could then lead to increased levels of risk tolerance. Doepke and Zilibotti (2014) present a model in which parents prepare their children for the economic environment they will encounter as adults by systematically shaping their attitudes towards risk as well as time (see also Doepke and Zilibotti, 2008; 2017). According to this logic, the social contract inherent in English legal origins emphasizing returns to individual initiative ought to push parents to instilling risk tolerance into their children to encourage entrepreneurship.

Such a behavioural account passing through endogenously generated traits and preferences can furthermore account for the historical persistence of the effects of legal origins, since it is likely to result in feedback cycles whereby the protection of property rights and individual liberties fosters self-reliance and entrepreneurship, and entrepreneurs defend their privileges by asserting their rights against the central power (Acemoglu, Johnson and Robinson, 2002). Such effects ought to be especially strong in the autocratic and dictatorial states where the centralization of power in the hands of a few can be most harmful. Independent courts and the adaptability of rules by independent judges is particularly conductive to a system that emphasizes the rights of entrepreneurs and traders, and aids the financing of enterprise (Beck, Demirgüç-Kunt and Levine, 2003). This, in turn, may result in a culture that fosters self-reliance over dependency on the state.

Our results also contribute indirect evidence on the preference generation mechanism—an issue on which little solid empirical evidence exists to date. The literature is divided on this issue. The *deep roots* literature has emphasized the very long run, with the origin of modern differences in preferences going back centuries or even millennia (Galor and Özak, 2016; Galor and Savitskiy, 2018). Meanwhile, a different part of the literature has emphasized rather short-term mechanisms, which would take effect in the course of decades, or even months or weeks. Doepke and Zilibotti (2014) present a model in which risk and time preferences are wilfully instilled by parents into their children to prepare them for the economic circumstances they will face as adults, which could presumably lead to strong shifts in

preference patterns within a generation if parents' perception of future conditions were to shift radically. Yet another part of the literature has emphasized evolutionary mechanisms based on sensory adaptation of our neural circuitry (Robson, 2001; Netzer, 2009). Based on such mechanism, adaptation could happen in the course of days, weeks, or months.

The empirical literature, on the other hand, has mostly focused on the very short run, ranging from minutes (Cohn et al., 2015), to years (Voors et al., 2012; Cameron and Shah, 2015). Notice, however, that mechanisms resulting in differences in preferences over millennia, centuries, and days may well co-exist, possibly at different levels (across individuals, across regions, across countries, and across climatic zones). Our paper contributes to this debate by quantifying systematic differences across countries that would have emerged over the course of the last few centuries. We thereby abstract from shorter-term fluctuations, which would work against the effects we document, making our estimates conservative. We thus see our approach as complementary to recent approaches emphasizing tight causal identification of changes in preferences at the individual level, e.g. by using panel data including exogenous shocks (Hanaoka et al., 2018; Di Falco and Vieider, 2022). By documenting cross-country variations in preferences persisting over centuries, we attempt to define the aggregate boundaries within which the individual-level short-term fluctuations take place.

2.3 Preferences and economic outcomes

Correlations between risk tolerance and entrepreneurship are well-established empirically (Cramer, Hartog, Jonker and van Praag, 2002; Charles and Hurst, 2003; Dohmen, Falk, Huffman, Sunde, Schupp and Wagner, 2011; Falk, Becker, Dohmen, Enke, Huffman and Sunde, 2018; Bouchouicha and Vieider, 2019), as well as emerging from theoretical models (Kihlstrom and Laffont, 1979; Galor and Michalopoulos, 2012; Doepke and Zilibotti, 2014). Nevertheless, some studies have contested this relationship. For instance, Holm, Opper and Nee (2013) did not find a correlation between risk attitudes and entrepreneurship decisions in a field experiment

in China. Koudstaal, Sloof and Van Praag (2015) did not find a difference between entrepreneurs and managers in their aversion to risk in general (though they did find entrepreneurs to be less averse to losses). Perhaps more importantly, extant studies correlating risk tolerance with the decision to be an entrepreneur have generally not excluded the possibility of reverse causality in the empirical relationship, and could in some case even be driven by third variables affecting both risk tolerance and the entrepreneurship decision. Our approach allows us to establish a plausibly causal link, albeit at the macro-economic level only.

3 Model and Empirical strategy

3.1 The structural equation model

We focus on the effect of legal origins on preferences, and from aggregate country-level preferences to aggregate outcomes. We thereby exploit the exogenous variation in the prevalence of different preferences at the country level induced by the legal origins of a country in order to document the effect of these preferences on macroeconomic outcomes. Figure 2 shows a path diagram presenting the structural equation model (see Wright, 1920; 1921; 1934, for the original development of path diagrams to represent causal models). We hypothesize that legal origins (LO) have both a direct effect on economic outcomes (EO), and an indirect one passing through preferences (PR).

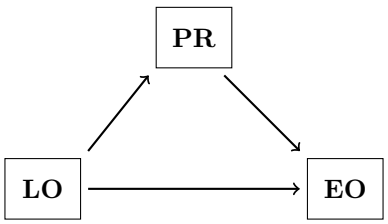


Figure 2: The basic model

Path diagram showing the effect of English legal origins relative to French legal origins (LO), on preferences (PR), and thence on aggregate economic outcomes (EO). The model also includes a direct effect from legal origins to economic outcomes, $LO \rightarrow EO$, distinguishing it from instrumental variables approaches.

We estimate our model using simultaneous equation systems (Wooldridge,

2010, chapter 9). This will allow us to identify the structural parameters of the model under certain assumptions. Whereas legal origins are only defined at the country level, preferences can be examined at both the country level and the individual level. While our model postulates causal relationships only at the macro-, between-country level, we can thus still control for individual-level characteristics in our setup. Technically, the model is a hierarchical simultaneous equation model, where LO and EO are observed at the macro level, and PR are observed at the micro level.

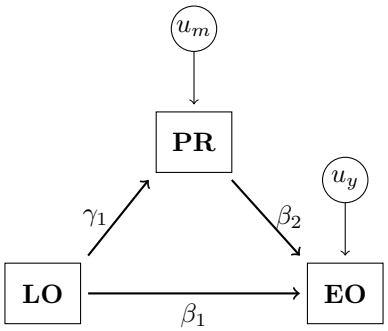


Figure 3: Empirical Model and Unconfoundedness

The figure depicts the basic model from figure 2, augmented by two independent error terms, u_m and u_y. The latter are represented by circles with an arrow pointing to the dependent variable in the relative equation, i.e. to PR and to EO respectively.

Figure 3 illustrates the assumptions underlying our estimations. The variables u_m and u_y represent residual terms containing unexplained variation in the preferences and the economic outcomes, respectively. We can write the underlying system of equations as follows:

$$PR = \gamma_0 + LO\gamma_1 + X\gamma_3 + u_m, \tag{1}$$

$$EO = \beta_0 + PR\beta_2 + LO\beta_1 + X\beta_4 + u_y \tag{2}$$

where LO is a matrix of legal origin dummies, and X is a matrix of control variables. The system of equations is recursive, since preferences depend only on the exogenous legal origins, and the endogenous economic outcomes are modelled as depending on endogenous preference, but not vice vera. Notice that this model is distinct from and more general than an instrumental variables approach, which is

a special case of the present setup postulating no direct effect from legal origins to economic outcomes (see Goldberger, 1972, for a discussion of the historical origins of the two approaches). We will refer to β_1 as the direct effect of legal origins on economic outcomes, and to to $\gamma_1 \times \beta_2$ as the indirect effect. The direct effect of preferences on economic outcomes, β_2, does not generally warrant a causal interpretation, since it encompasses the effect of both the exogenously induced component of behaviour, and an additional, potentially endogenous, component. The indirect effect, $\gamma_1 \times \beta_2$, is the main quantity of interest, capturing the effect of the exogenous variation in behaviour on our macroeconomic outcomes.

To warrant a plausibly causal interpretation of the indirect effect, we need to assume independence between the predictors and the error terms in the two equations, conditional on the controls included in X. Notice, in particular, that differences between countries arising for instance from the way legal institutions are implemented or enforced—or indeed any other differences emerging from geographic or climatic conditions—are not per se a problem for our model. They only threaten our causal narrative if they differ systematically between countries of French and English legal origin, thus questioning the conditional independence assumption above. We allay concerns about such an omitted variable bias by controlling for a large set of macroeconomic variables as is standard in the literature. Such variables include economic controls such as GDP per capita, geographic controls such as absolute latitude and continental fixed effects, institutional controls such as membership of OPEC and the OECD, as well as a history of democratic institutions, and for genetic diversity. We furthermore control for potential confounds at the individual level, such as the language spoken at home, and religious affiliation. We control for these factors at the microeconomic level, rather than using proportions in a given country, to avoid the ecological fallacy (Robinson, 1950).

While the approach just described is the standard procedure used to address omitted variables concerns in cross-sectional analysis, a plausibly causal interpretation of our results requires some additional assumptions when we move to the

structural estimations. An assumption that needs to hold in addition to the ones discussed thus far is that the residual terms be independent conditional on the included controls, i.e. $cov(u_y, u_m|X) = 0$ (Wooldridge, 2010, section 9.4.2). If this condition does not hold, a particular threat could arise from variables that are themselves caused by legal origins, and which in turn cause both preferences and the economic outcomes we ultimately want to explain. We now discuss how to address such potential confounds.

3.2 Confounds and mechanisms

The central assumption needed for the unbiased estimation of our model is that the error terms be uncorrelated, and independent of the exogenous treatment variable (the legal origins). If that is the case, our model parameters can be estimated in an unbiased fashion, and have a plausibly causal interpretation that flows from the model itself (Pearl, 2014). One may well consider this assumption to be too strong in practice. Indeed, it is not too difficult to come up with examples that may contradict our assumption and thus threaten our model. For instance, one could think of other intermediate variables that—contrary to our theoretical discussion of mechanisms above—are caused by legal origins, and that themselves cause preferences and economic outcomes. Examples of such mechanisms might include e.g. the rule of law, economic freedom, or other cultural traits or preferences, such as trust or patience. We consider such alternative accounts much less plausible for theoretical reasons. Given, however, that we have measures of these potential confounds, we need not rely on plausibility alone, but can directly test the relevance of such alternative causal narratives.

The threat to identification arises when these mechanisms do not intervene in the path $LO \rightarrow EO$ as postulated above (or indeed, in $LO \rightarrow PR$ or $PR \rightarrow EO$), but rather causally determine both PR and EO. Figure 4 illustrates the case in which such issues could arise. The path $LO \rightarrow ME$ indicates that legal origins directly cause some mechanism, ME, that may be involved in the causal chain. If this mechanism in turn causes both the economic outcome and the preferences,

our model in figure 2 risks picking up a spurious correlation instead of a plausibly causal link.

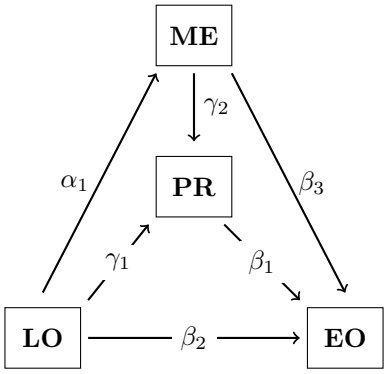


Figure 4: Mechanisms and counfounders

Path diagram of an augmented, three-equation model. If all three links $LO \to ME$, $ME \to PR$, and $ME \to EO$ are significant and one of the links $LO \to PR$ and $PR \to EO$ loses significance, then the mechanism ME constitutes a confound of the indirect effect of legal origins on economic outcomes via preferences. If both paths remain significant, ME could still constitute a partial confound. If at most two between the effects κ_1, κ_2, and κ_3 are significant, the mechanism operates as an additional indirect effect.

A mechanism would, however, only act as a confound if all three causal links indicated by α_1, γ_2, and β_3 in the figure were significant, and the causal path passing through PR, $\gamma_1 \times \beta_2$, lost significance. If one of these links is broken (i.e., not significant), then the mechanism can be seen to reduce to an additional indirect effect intervening in one of the main relationships. Such mechanisms hold some interest in and of themselves, inasmuch as they enrich the picture we paint by uncovering mediators of the main causal links. Since we have measures of the main mechanisms discussed in the literature, it is straightforward to control for such mechanisms empirically in linear models (Pearl, 2014). This can be done using the following recursive three-equation system:

$$ME = \alpha_0 + LO\alpha_1 + X\alpha_2 + u_3. \tag{3}$$
$$PR = \gamma_0 + LO\gamma_1 + ME\gamma_2 + X\gamma_3 + u_2 \tag{4}$$
$$EO = \beta_0 + PR\beta_1 + LO\beta_2 + ME\beta_3 + X\beta_4 + u_1 \tag{5}$$

Under the assumptions discussed above, and when the equations are autonomous in the sense of each equation having economic meaning in isolation from the other

equations in the system (Wooldridge, 2010, p. 239), then the relationships represented in this equation system do indeed represent causal relations. Autonomy in this case serves to reinforce the link, and is obtained when the endogenous variables in the model—preferences and economic outcomes in our context—are not all choices of the same economic unit. There is little space for doubt that our measures of preferences at the individual level and the temporally subsequent measures of aggregate economic outcomes fulfil this criterion.

4 Data and descriptives

4.1 General data strategy

To be as inclusive as possible, we combine the World Value Survey (WVS) with the European Social Survey (ESS). Both contain identical questions on risk taking, as well as a number of controls that can be matched. We focus on the period between 2005 and 2012, and for each country select one survey round during this period, with priority being given to earlier time periods for countries that recur repeatedly in either the WVS or the ESS.[2] When a country was included both in the WVS and the ESS, we use the WVS data. If a country did not figure in the WVS data, we added the data from the ESS, adding in the order round 3 , 4, 2 , or 5, depending on availability. These choices were made to obtain measures that fall as much as possible into the early part of the measurement window, to guarantee a temporal lag to the subsequent economic measures, and as close as possible to each other. The supplementary materials contain stability analyses concerning these choices, and show that they do not substantively impact our measures. That is, changes over time in countries are second-order relatively to the differences we observe between countries. This results in a novel dataset including representative samples for 92 countries and more than 130,000 observations—the

[2]We focus on one measurement period only in countries that were covered repeatedly for reasons of symmetry. Our analysis of the overall dataset indicated that the variation in preferences we observe within countries over different years is small relative to the variation we observe across countries. We thus abstract from the latter and focus our analysis on between country differences.

largest comparative dataset on risk taking to date.

We combine this datasets with entrepreneurship rates, as well as a large number of macro-economic and institutional controls from a variety of sources. Micro-economic controls are furthermore compiled from the WVS and ESS databases themselves. Entrepreneurship rates are measured at the country level, and are taken from subsequent waves of the same survey wherever possible, i.e. they generally stem from surveys run after 2012, the last year from which we use preference data. We include some data from the years of the surveys used to measure the preference in addition to those from subsequent survey rounds when the latter are not available, in order not to lose any observations. This serves to establish the proper temporal order between the independent and dependent variables, which is a necessary condition for establishing causal relationships. The legal origins thus come before the measures of preferences, and the preferences are measured no later than the economic outcomes we aim to predict.

4.2 Descriptives of Risk tolerance in the WVS-ESS data

To capture risk tolerance, we use a survey question contained in the World Value Survey (WVS) and the European Social Survey (ESS). Survey questions to capture risk preferences have gained traction in economics following a seminal validation by Dohmen et al. (2011). Subsequent validations using alternative methods confirm the viability of survey questions in capturing risk tolerance in controlled lottery experiments (Hardeweg, Menkhoff and Waibel, 2013; Galizzi, Machado and Miniaci, 2016). Using identical experiments with students in 30 countries, Vieider, Lefebvre, Bouchouicha, Chmura, Hakimov, Krawczyk and Martinsson (2015) showed that i) survey questions are predictive of risk tolerance as measured in incentivized experiments in most countries; ii) survey questions predict not only choices over gains, bus also over losses and when probabilities are unknown; and iii) these correlations are even stronger at the aggregate level.

The particular question we use to capture risk tolerance describes a person who 'looks for adventures and likes to take risks', and asks respondents to indi-

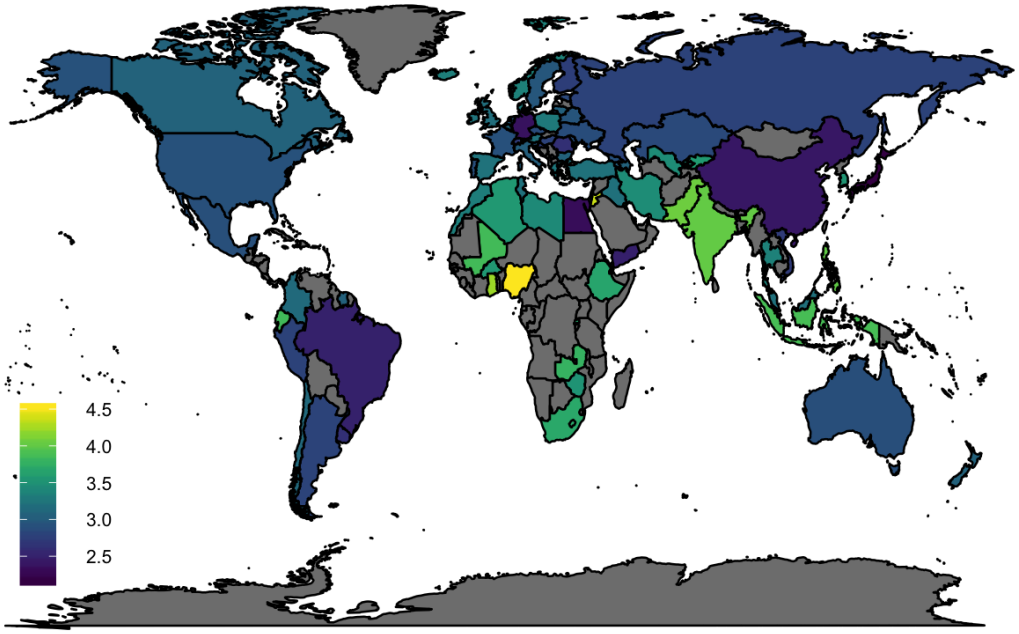


Figure 5: Map of risk tolerance

Map of risk tolerance. Higher values indicate higher levels of risk tolerance. The data are obtained from a combination of WVS and ESS data.

cate their similarity to that person from 1 ('very much like me') to 6 ('not like me at all'). Falk et al. (2018) showed that this measure taken from the WVS correlates strongly with their own validated survey instruments at the macroeconomic level. Bouchouicha and Vieider (2019) presented an extensive validation of this particular question, and showed that i) it predicts choices under risk using incentivized lotteries with a general population sample, emulating the validation of Dohmen et al. (2011); ii) it strongly correlates with the incentivized measures of risk aversion of Vieider et al. (2015) at the macroeconomic level across countries; and iii) it is predictive of risk taking behaviour in real life. These validation exercises show a remarkable consistency of different measures of risk taking at the country level. We reverse code the variable, and refer to it as 'risk tolerance' (RT).

Figure 5 maps the worldwide distribution of risk tolerance across the 92 countries and territories in the sample. We observe the highest levels of risk tolerance in Africa, as well as South Asia and South-East Asia. The lowest levels of risk tolerance are observed in East Asia and central Europe. Beyond these general trends, we also observe considerable variation in risk tolerance within each continent.

4.3 Descriptives of Entrepreneurship in the WVS-ESS data

We compose our data on entrepreneurship rates from the same surveys from which we take our measure of risk tolerance. Since both the WVS and the ESS provide nationally representative data, our measure ought to accurately measure entrepreneurship rates in the included countries. To guarantee independence of the different measures, and to use as much as possible data on economic outcomes hat are measured subsequent to the preference data in keeping with the proper consecutio temporum implied by our structural equations, we generally use entrepreneurship data from survey waves subsequent to he ones from which we obtain the preference data. Exceptions are made for countries that do not recur in subsequent waves, and where we thus considered it preferable to use the same wave rather than losing the observation.

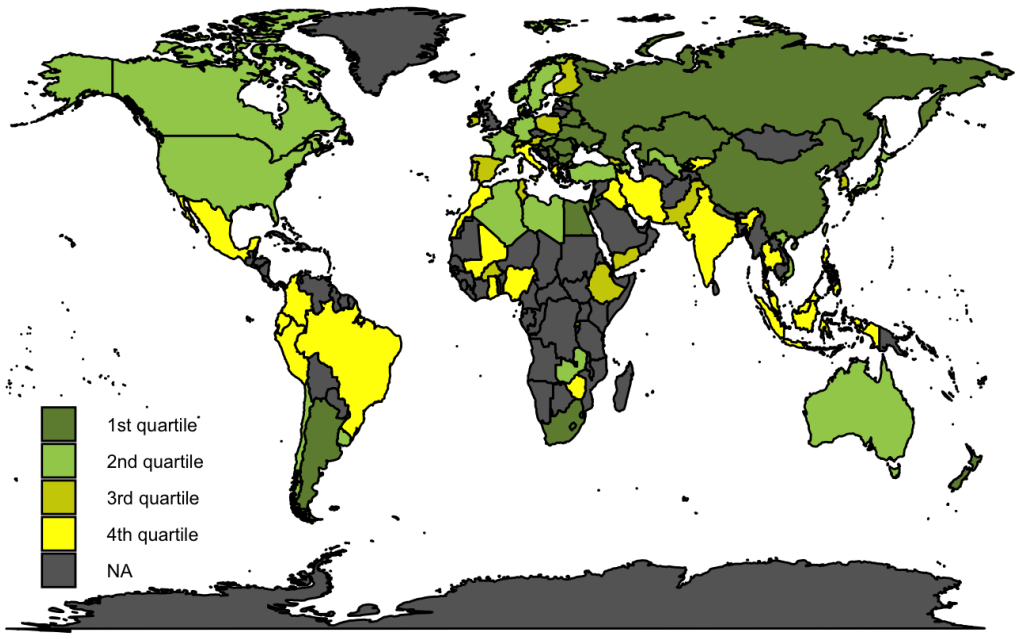


Figure 6: Map of risk tolerance

Map of entrepreneurship by quartiles. Higher values indicate higher entrepreneurship rates. The data are obtained from a combination of WVS and ESS data.

The entrepreneurship data derive from a question asking respondents whether they are self-employed. This type of question has been used frequently in the literature to capture entrepreneurship (see e.g. Borjas and Bronars, 1989; Chanda and

Unel, 2019). We found that in some developing countries included in the WVS, the question seemed to have registered independent farmers as entrepreneurs. We thus used a different question in the WVS on employment to correct such entries. Figure 6 shows a world map of entrepreneurship rates. Countries with entrepreneurship rates in the 4th quartile are invariably developing or middle income countries, such as Nigeria, Ghana, India, Indonesia, Iran, and Thailand, as well as Mexico and several south-American countries. The lowest levels of entrepreneurship are found in Eastern Europe and parts of Central and East Asia, as well as in Argentina.

Entrepreneurship may take very different forms in the developing versus the developed world. Surveying the characteristics of entrepreneurship in developing countries, Jayachandran (2019) discusses how entrepreneurship in the developing world more often than not is driven by need rather than vocation. The type of entrepreneurship one engages in may indeed differ systematically by development status, which is why we will control for this in our regression analysis. An issue could further arise if there were institutional determinants of entrepreneurship that vary systematically by legal origins, but that are not captured or proxied by any of the controls that we will be using in our regression analysis. We will address this issue explicitly in section 5.2 on potential confounds of the relationship, which will test the stability of our main inferences to a number of institutional variables that may be relevant for entrepreneurship.

5 Results

5.1 Risk tolerance and entrepreneurship rates

We are interested in documenting the effect of the prevalence of risk tolerance in a country that is determined by English legal origins. Table 1 shows the structural equations. The second panel from the top shows the effect of legal origins on risk tolerance, $LO \rightarrow RT$. English legal origins result in significantly higher levels of risk tolerance than French legal origins. At the same level of development, English

legal origins increase aggregate risk tolerance by about 0.8 standard deviations—an economically sizeable effect. These results are robust to controlling for GDP per capita, absolute latitude and continental fixed effects, institutional variables such as OPEC and OECD membership, a history of stability of democratic institutions, and genetic diversity. They are also stable to controlling for the language spoken at home and religious affiliation at the micro-economic level.[3] The effect of legal origins also stands out in terms of the variance it explains. GDP per capita explains 10.5% of the overall between country variance in risk tolerance (Bouchouicha and Vieider, 2019). Legal origins explain an additional 21 percentage points—the largest part of variance explained by any single variable or dimension.

The top panel shows the effect of risk tolerance on entrepreneurship rates, $RT \rightarrow ES$. Entrepreneurship may be due to different motivations in developed countries than in developing ones, where it often arises from necessity (Jayachandran, 2019). GDP per capita has furthermore been documented to correlated strongly with risk tolerance, with poorer countries being more risk tolerant on average (Bouchouicha and Vieider, 2019; L'Haridon and Vieider, 2019). This can indeed be seen when comparing regression (1), which does not control for GDP per capita, to regression (2), which introduces this control in addition to some geographical controls. While this reduces the strength of the effect, the indirect effect of interest nevertheless remains substantial and highly statistically significant. Higher levels of aggregate risk tolerance can be seen to have a substantially positive effect on entrepreneurship rates. In regression (4), an increase in the aggregate risk tolerance of one standard deviation is associated with an uptick of 2.3 percentage points in the entrepreneurship rate. This corresponds to an increase of 20% over the baseline level.

The bottom panel documents the indirect effect from legal origins via risk tolerance to entrepreneurship rates. This is the main effect of interest, since it is the only path involving risk tolerance as an independent variable that warrants

[3]We do not control for demographic characteristics and educational achievement, as these could be potentially endogenous to the legal origins. Controlling for such variables does in any case not affect the relationships shown.

Table 1: Legal origins, risk tolerance, and entrepreneurship

	(1)	(2)	(3)	(4)	(5)	(6)
dep. var:	**entrepreneurship rate**					
risk tolerance	0.031***	0.024***	0.022***	0.023***	0.023***	0.030***
	(0.008)	(0.008)	(0.009)	(0.008)	(0.007)	(0.009)
English LO	-0.002	0.004	-0.000	0.003	0.026	0.026
	(0.018)	(0.018)	(0.020)	(0.024)	(0.025)	(0.025)
German LO	-0.017	-0.002	-0.009	-0.009	-0.012	-0.007
	(0.021)	(0.020)	(0.019)	(0.012)	(0.012)	(0.012)
Scandinavian LO	-0.013	0.039	0.019	0.017	0.022	-0.014
	(0.032)	(0.033)	(0.032)	(0.018)	(0.019)	(0.018)
colonized					-0.067**	-0.098***
					(0.030)	(0.036)
colonized by Spain					0.078**	0.074*
					(0.033)	(0.039)
state history in 1500						0.016
						(0.014)
state hist. 1500 * English LO						-0.000
						(0.019)
dep. var:	**risk tolerance**					
English LO	0.649***	0.671***	0.923***	0.780***	0.889***	0.672***
	(0.225)	(0.211)	(0.226)	(0.225)	(0.234)	(0.218)
German LO	-0.772***	-0.613**	-0.435*	-0.413*	-0.293	-0.249
	(0.252)	(0.244)	(0.230)	(0.221)	(0.198)	(0.191)
Scandinavian LO	-0.104	0.334	0.495	0.541**	0.503*	0.902***
	(0.411)	(0.405)	(0.390)	(0.269)	(0.270)	(0.254)
colonized					0.573	0.836**
					(0.409)	(0.398)
colonized by Spain					1.147***	0.932***
					(0.360)	(0.282)
state history in 1500						-0.449***
						(0.136)
state hist. 1500 * English LO						0.310
						(0.227)
dep var: entrepreneurship rate	**indirect effect of LO via risk tolerance**					
English LO	0.020**	0.016**	0.021**	0.018**	0.020**	0.020**
	(0.009)	(0.008)	(0.007)	(0.008)	(0.009)	(0.008)
colonized by Spain					0.026**	0.028**
					(0.012)	0.012)
Observations	92	92	92	90	90	83
GDP p. c., geo. controls	NO	YES	YES	YES	YES	YES
institutions, genetic div.	NO	NO	YES	YES	YES	YES
language and religion	NO	NO	NO	YES	YES	YES

Robust, heteroscedasticity-resistant standard errors in parentheses. $*$ $p < 0.10$, $**$ $p < 0.05$, $***$ $p < 0.01$. Risk tolerance is standardized throughout. Regression (1) includes only legal origins. Regression (2) adds GDP per capita, absolute latitude, and continental fixed effects. Regression (3) further adds controls for institutional quality and membership (democracy, OPEC membership, OECD membership) and for predicted genetic diversity. Regression (4) adds controls at the micro-economic level for language spoken at home and religion. Regression (5) adds a dummy indicating whether a country has ever been colonized, and one indicating whether a country has been colonized by Spain. regression (6) introduces the measure of state history discounted at 1% from Borcan, Olsson and Putterman (2018), and its interactions with the different legal origins (interactions with Scandinavian and German legal origins are not shown for parsimony).

a causal interpretation, subject to our structural assumptions. This effect is significant throughout, showing the causal effect running from English legal origins,

via risk tolerance, to entrepreneurship. While somewhat smaller than the direct effect of RT documented above, the indirect effect of English legal origins via risk tolerance results in entrepreneurship rates that are 1.8 percentage points larger than for comparable countries with French legal origins. This constitutes an increase of 15.8% over the base rate. We conclude that the effect of risk tolerance on entrepreneurship is economically sizeable, as well as statistically significant.

So far, we have implicitly assumed that the effect of legal origins is homogenous across countries. French legal origins were spread by different colonizing powers, most notably the French themselves as well as the Spanish. To explore whether this makes a difference, regression (5) includes a control indicating whether a country has ever been colonized, and an additional dummy variable indicating whether a country has been colonized by Spain. The Spanish colonization dummy shows a significantly positive effect on risk tolerance, indicating that countries colonized by Spain are more risk tolerant than countries with otherwise similar characteristics that have been colonized by France (or by Portugal or Italy, in the cases of Brazil and Ethiopia, respectively). This effect furthermore carries through from risk tolerance to entrepreneurship, as shown by the significant indirect effect shown in the bottom panel of the table. This indicates that the legal origins installed by France itself are what causes most of the negative effect of French legal origins on risk tolerance and thence on entrepreneurship, with Spanish-colonized countries less affected by their legal origins. The upshot of all of this is that, once we take this additional dimension into account, the effect of the exogenous component of risk tolerance on entrepreneurship results much increased. Summing the two effects, we now find that an increase in risk tolerance of 1 standard deviation, as determined by the legal origins and who installed them, results in an increase in entrepreneurship rates of 4.6 percentage point, or fully 40%.

In regression (6) we further insert a variable capturing the state history of a country in the year 1500, and its interactions with the various legal origin dummies. We use the measure of state history introduced by Borcan et al. (2018), measuring for how long a modern-day country has had formal state institutions since 3500

BCC.[4] We find an interaction effect of French legal origins and state history, as captured by the simple effect of the state history variable in regression (6), indicating that risk tolerance is particularly low in countries of French legal origins with a long state history such as e.g. Egypt, Iraq, Turkey, or Italy. The interaction of state history with English legal origins—and indeed also with Scandinavian and German legal origins, which are not shown for parsimony but are included in regression (6)—shows no significant effect. A one standard deviation increase in state history in the year 1500, conditional on later obtaining French legal origins, results in a decline of entrepreneurship rates of 1.2 percentage points, or 10%.

There are different possible interpretations for this finding. One possibility is very simply that risk tolerance was already lower in countries with long state histories at the time of occupation by the French, and that French legal origins have further lowered the level of risk tolerance from an already low base. However, no such effect appears to occur for countries with English legal origins. Another possibility is more closely linked to the account of Borcan et al. (2018). The latter discuss how a long state history may have been beneficial in the beginning, leading for instance to the high cultural development in ancient Mesopotamia and Egypt, and later in Rome. This, however, subsequently led to a phase of stagnation, whereby the centralized structure of early states was often abused, resulting in excessive taxation and appropriation of the economic proceeds by an autocratic elite. Borcan et al. (2018) show how this is reflected in lower national income levels in those countries in the year 2000, so that the relationship between state history and economic development is inverse-U shaped. The latter account resounds with the theoretical account of the effect of legal origins presented by Glaeser and Shleifer (2002), according to which the centralization inherent in French legal origin systems may have been particularly deleterious in countries that were strongly autocratic. Countries with well-developed democratic checks and balances, such as France and England themselves, on the other hand, would not

[4]We use the measure applying a 1% discount rate per year. Using the measure with 2% discounting, or indeed including the square of the measure, does not affect our results in any way. We use the z-score of the original variable, which allows for an interpretation of the legal origins dummies at an average level of state history.

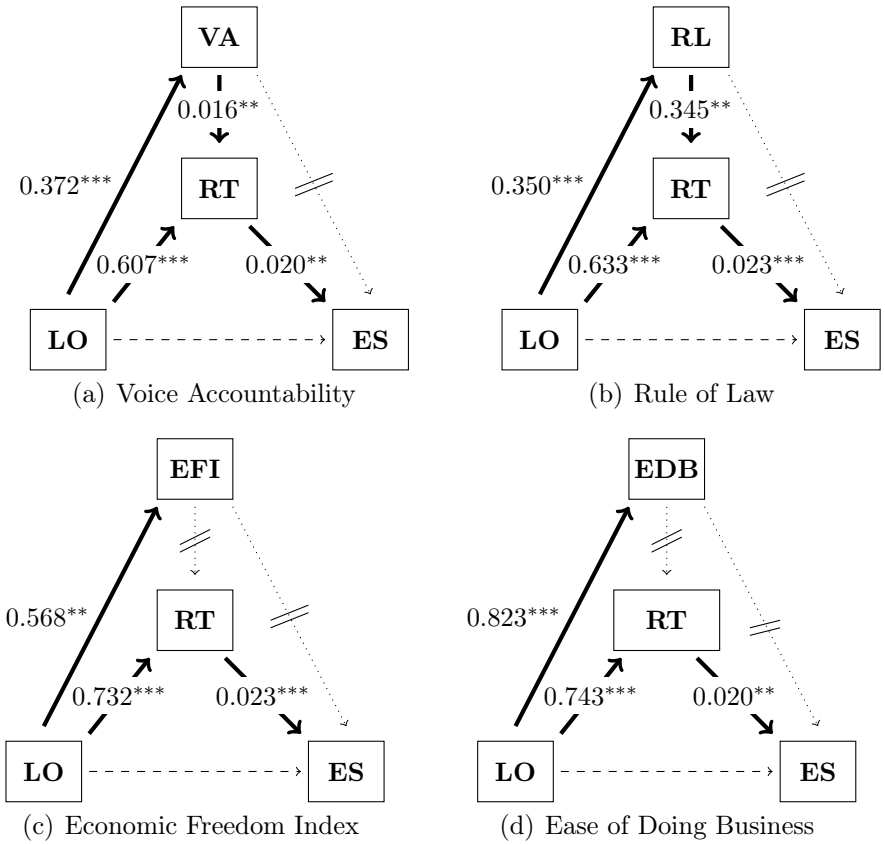
be impacted strongly by their legal origins. This raises the possibility that French legal origins may have had an especially deleterious impact in countries which, due to their long state history, had already relatively centralized and autocratic institutions at the time of colonization or conquest.

5.2 Confounds and channels

We next test the effect of a series of variables capturing the quality of institutions and law enforcement in our setup, using the three-equation model represented in figure 4. This serves to exclude that differences in entrepreneurship rates be driven by systematic differences in institutional variables conductive to entrepreneurship between the legal families. If this were the case, and if these measures were furthermore to have a causal effect on risk tolerance, then the relationship we document may indeed be spurious.

We have hypothesized that higher levels of risk tolerance in common law countries form part of a social contract whereby citizens are empowered at the expense of centralized control by the state. A particularly interesting measure in this respect is *voice and accountability* (VA). VA is described as 'capturing perceptions of the extent to which a country's citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and a free media'. This resonates immediately with accounts emphasizing individual freedom over state control.

Panel 7(a) of figure 7 depicts the results. English legal origin countries score significantly higher in terms of VA than French legal origin countries. Higher levels of VA, in turn, show a positive effect on risk tolerance, just as hypothesized. There is no link from VA to entrepreneurship, however, excluding that it operates as a confound of the effect of legal origins on entrepreneurship through risk tolerance that we document. Instead, we conclude that VA acts as an intermediate mechanism in the effect running from legal origins to risk tolerance. Panels 7(b) and 7(c) document the effect of the rule of law (RL) and of the economic freedom index (EFI), respectively. The rule of law is positively influenced by common law



(a) Voice Accountability (b) Rule of Law

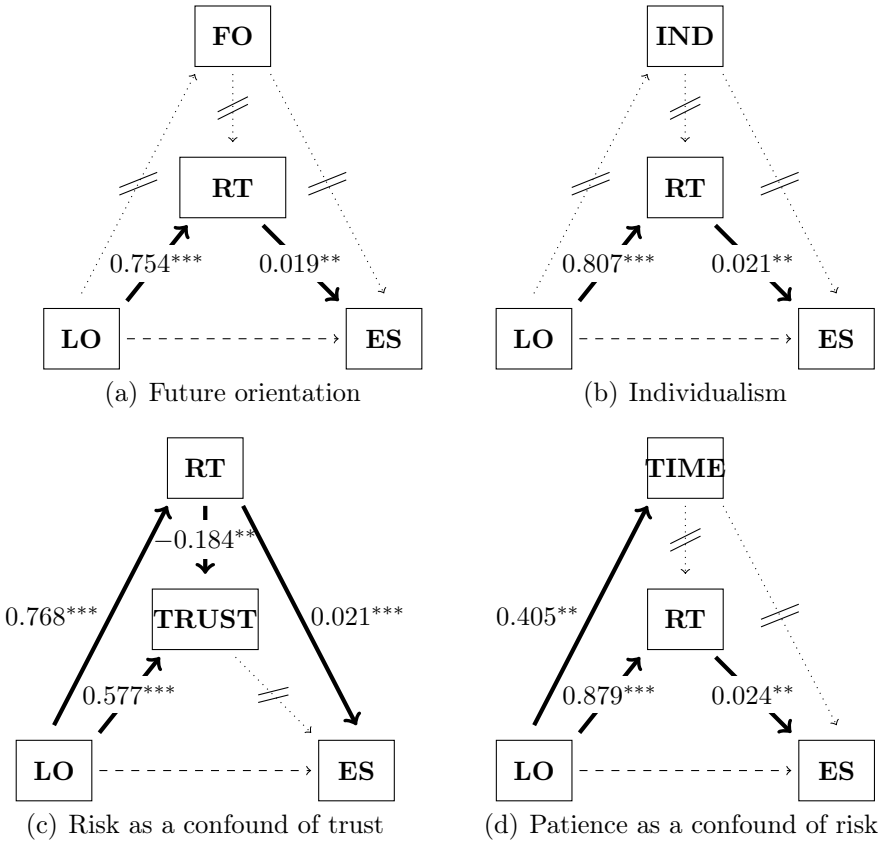
(c) Economic Freedom Index (d) Ease of Doing Business

Figure 7: Mechanisms as counfounders of the $RT \rightarrow ES$ relation

Path diagrams of main relationship in the three-equation model. The equations contain the usual full suite of controls. The effect of legal origins depicted always refers to the effect of English legal origins relative to French legal origins. The Rule of Law (RL), Voice Accountability (VA), and Ease of Doing Business (EDB) indicators were obtained from the World Bank tables. The Economic Freedom Indicator (EFI) was obtained from the Fraser Institute. Bold, thick arrows indicate significant effects. Dashed and dotted arrows represent non-significant effects.

origins, and in turn exerts a positive influence on risk tolerance. It thus occupies a similar position as VA. Economic freedom is greater in common law countries, but bears no link either to risk tolerance or entrepreneurship. We thus think of it as being part of the same social contract, but not capturing an essential element in the causal chain. Finally, figure 7(d) shows the role played by ease of doing business. We find a strong effect of English legal origins on ease of doing business, as originally documented by Djankov et al. (2002). We do, however, find no effect of ease of doing business on risk tolerance. Perhaps more oddly, we find no effect of ease of doing business on entrepreneurship rates. The absence of such an effect may be due to the fact that much of the entrepreneurship we capture is informal,

which is indeed typical for developing countries (Jayachandran, 2019).



(a) Future orientation (b) Individualism

(c) Risk as a confound of trust (d) Patience as a confound of risk

Figure 8: Other preferences as counfounders of the $RT \rightarrow ES$ relation

Path diagrams of main relationship in the three-equation model. The equations contain the usual full suite of controls. The effect of legal origins depicted always refers to the effect of English legal origins relative to French legal origins. The measures of future orientation (FO) and individualism (IND) were assembled from the WVS. Trust was assembled from the same surveys as risk tolerance, with both the WVS and the ESS containing identical questions on generalized trust (the ESS measure was transformed into a binary measure to be comparable). The measure of patience, *TIME*, is the UP6 measure obtained from Rieger, Wang and Hens (2021).

Another potential confound may derive from other cultural variables which may be correlated with risk tolerance. Potential candidates include future orientation and individualism, which bear a degree of conceptual similarity to our measure of risk tolerance.[5] We obtain a measure of future orientation from the World Value Survey, using the question on whether 'thrift and saving money' are important

[5]The empirical evidence is less clear. Conducting survey in 4 countries, Weber and Hsee (1998) organized their findings using the individualsm-collectivism dichotomy, with more individualistic countries described as more risk averse. However, subsequent cross-country studies including the Hofstede measures at the individual level did not find a correlation with individualism at either the individual or the country level (Rieger, Wang and Hens, 2015; L'Haridon and Vieider, 2019). See Rieger et al. (2015) for a more detailed discussion.

qualities for a child. For individualism, using the Hofstede index would leave us with an overlap of only 30 countries. We thus follow the methodology of Ang (2019) to construct a measure of individualism from the WVS data.[6] This leaves us with 73 countries in the sample. Panel 8(a) investigates future orientation, and panel 8(b) individualism. Neither of the variables is associated with any of our measures of interest, and the path $LO \rightarrow RT \rightarrow ES$ remains intact.

We next control for preferences measures, and in particular, trust and patience. We assemble the data on trust from the same WVS and ESS surveys as done for risk tolerance, using the question on generalized trust included in both surveys. In the ESS, we reduce answers to the question to a binary measure to make it comparable to the WVS answers. In figure 8(c), risk tolerance takes the place of the confound in the model, since from a theoretical point of view we best think of risk tolerance as determining trust, rather than the other way around. We find a significant effect of legal origins on trust, indicating higher trust levels in English legal origin countries than in countries with French legal origins. We also find a significant effect of risk tolerance on trust, though the latter is negative instead of positive as one might have thought.[7] There is, however, no effect of trust on entrepreneurship. The role of risk tolerance, on the other hand, remains intact.

The data on patience are taken from Rieger et al. (2021), which reduces our sample to 73 countries. Figure 8(d) documents the effects of patience, whereby we revert to a model where patience plays the role of potentially confounding factor. We find a significant effect of legal origins on patience, with English legal origin countries more patient than French legal origin countries. However, we find no effect of patience on risk tolerance, nor an effect of patience on entrepreneurship. The effect of legal origins on risk tolerance, and from there to entrepreneurship rates meanwhile remains intact. All of this goes to show that the effect running

[6]The measure consists of the first principal component of six questions, including whether independence and imagination are important qualities for children, whether obedience is ont an important quality, whether divorce is justfiable, if somebody lives with their parents, and whether private business ownership should be encouraged. This measure correlates highly with Hofstede's individuals index in the overalpping countries, with $\rho = 0.69$.

[7]This is a manifestation of the ecological fallacy. At the individual level, the correlation is indeed positive as one would expect. Controlling for trust at the individual level does not make any difference to our conclusions, either.

from legal origins to risk tolerance and thence to entrepreneurship is stable to controlling for a large set of potential confounds. The effect of legal origins on economic preferences, meanwhile, seems pervasive. Not only does it affect risk tolerance, but also trust and patience.

We have built up the regressions illustrated above following the logic that additional institutional variables or preferences may constitute a confound of the main relationship from LO to RT to ES we document, while for trust we have inverted the variables. It is of course possible that the actual causal relationship runs in the opposite direction, i.e. from risk tolerance to the institutional and preference variables, and from trust to risk tolerance. While such relationships would be less threatening for our main relationship of interest, they may nevertheless be interesting. We have thus also estimated all the structural equations depicted above while switching the positions of risk tolerance and the institutional and cultural indicators. These alternative specifications do not affect any of our conclusions, with the main effect still found to run from legal origins to risk tolerance, and thence to entrepreneurship.

6 Robustness analysis

The biggest challenge to the model as estimated so far comes from potential endogeneity concerns about the legal origins variable. While reverse causality from risk tolerance to the colonization or conquest by one versus another European power centuries ago would appear extremely implausible, it is nevertheless conceivable that some other characteristics of the countries included in our dataset—be they geographic, climatic, economic, or demographic—may have affected the likelihood of being colonized by England rather than France. If those same characteristics have also contributed to shaping risk tolerance, this could bias the effects we estimate. In this section, we tackle this issue head-on, using two complementary strategies. We start by running additional regressions while excluding countries for which the exogeneity assumption does not appear to hold from a historical perspective, and including some additional controls to obtain a more fine grained

picture of the process involved. Subsequently, we expand our model to include an error term on the legal origin of the country, and see whether our results withstand the explicit modelling of a large array of potential determinants of both legal origins, and risk tolerance and entrepreneurship.

6.1 Robustness to endogenous adopters and outliers

Table 2: Robustness analysis: Dropping endogenous adopters and outliers

	(1)	(2)	(3)	(4)	(5)	(6)
dep. var:	**entrepreneurship rate**					
risk tolerance	0.023***	0.027***	0.023***	0.022***	0.025***	0.026***
	(0.008)	(0.008)	(0.007)	(0.008)	(0.005)	(0.006)
English LO	0.002	-0.017	0.007	0.009	-0.028	-0.039**
	(0.026)	(0.023)	(0.026)	(0.028)	(0.018)	(0.019)
German LO	-0.012	-0.010	-0.012	-0.013	-0.015	-0.018*
	(0.012)	(0.012)	(0.011)	(0.012)	(0.010)	(0.010)
Scandinavian LO	0.014	0.009	0.011	0.003	0.001	-0.005
	(0.018)	(0.020)	(0.019)	(0.019)	(0.017)	(0.018)
dep. var:	**risk tolerance**					
English LO	0.832***	0.805***	0.941***	0.969***	0.871***	0.940***
	(0.235)	(0.251)	(0.275)	(0.278)	(0.277)	(0.317)
German LO	-0.457**	-0.394	-0.301	-0.135	-0.321	-0.316
	(0.221)	(0.241)	(0.214)	(0.221)	(0.199)	(0.217)
Scandinavian LO	0.461*	0.377	0.357	0.320	0.469*	0.309
	(0.274)	(0.276)	(0.275)	(0.313)	(0.271)	(0.275)
dep var: entrepreneurship rate	**indirect effects via risk tolerance**					
English LO	0.019**	0.021**	0.021**	0.022**	0.021**	0.024**
	(0.009)	(0.008)	(0.009)	(0.010)	(0.011)	(0.011)
Countries	88	83	83	80	85	79
controls	YES	YES	YES	YES	YES	YES

Robust, heteroscedasticity-resistant standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Risk tolerance is standardized throughout. The included controls are the standard macro- and microeconomic controls from regression (6) in table 1. Regression (1) drops Great Britain and France from the analysis. Regression (2) additionally drops Russia, Turkey, and Iran, and Thailand. Regression (3) introduces a dummy indicating whether a country has ever been colonized, taken from Ertan, Fiszbein and Putterman (2016), and further adds a dummy indicating whether a country has been colonized by Spain. Regression (4) controls for a country belonging to the group of Neo-Europes, and for the proportion of population of European origin. In regression (5), we revert to the full sample and we drop the indicators of post-15oo population flows, since the latter reduced our sample. We then proceed to excluding outliers. These are Nigeria and Ghana, characterized by very high entrepreneurship rates as well as high levels of risk tolerance, and both having English legal origins; Thailand and Peru, which have very high entrepreneurship rates and average to low levels of risk tolerance; and Jordan, a country of French legal origins exhibiting extremely high levels of risk tolerance. Regression (6) additionally excludes all endogenous adopters excluded in regression (2).

We know from historical accounts that even the contrast of French versus

English legal origins that forms the main interest in our analysis cannot be interpreted as exogenous in all countries. As a first robustness check, we thus exclude countries in which the exogeneity assumption is known not to hold. Table 2 shows the regressions, which follow the same setup as the ones used in the main analysis, and always include the full set of macro- and microeconomic controls from regression (4) in table 1. Regression (1) drops Great Britain and France from the analysis—the countries from which the legal systems originated. Regression (2) additionally drops Russia, Turkey, and Iran, which endogenously adopted a French-inspired legal system, and Thailand, which was the sole country to endogenously adopt a common law system. All effects we previously documented remain stable to this reduction in the sample.

Regression (3) introduces a dummy indicating whether a country has ever been colonized, taken from Ertan et al. (2016), to distinguish those countries from countries that got their legal origins through conquest rather than colonization. It further adds a dummy indicating whether a country has been colonized by Spain, discussed above at some length. Once again, the effects we document remain unaffected by these additional controls. Regression (4) further introduces controls for post-1500 population movements (Putterman and Weil, 2010). In particular, we include a measure of the proportion of population that is of European origin, to exclude that the effects are driven purely by European immigrants from the home countries where the legal origins arose endogenously. We further add a dummy variable that takes the value 1 if the country is a so-called neoeuropean country, taking the value of 1 for Canada, the USA, Australia, and New Zealand. This dummy thus indicates countries with English legal origins whose populations were replaced almost entirely by immigrants originating to a large extent from the British isles. Our conclusions remain unaffected by these additional controls.

Regression (5) and (6) probe the sensitivity of our results to the exclusion of outliers in terms of risk tolerance, entrepreneurship, or both. In regression (5), we revert to the full sample, including the endogenous adopters, and exclude outliers. These are Nigeria and Ghana, characterized by very high entrepreneurship rates

as well as high levels of risk tolerance, and both having English legal origins; Thailand and Peru, which have very high entrepreneurship rates and average to low levels of risk tolerance; and Jordan, a country of French legal origins exhibiting extremely high levels of risk tolerance, but very low entrepreneurship rates. The effects we document remain stable to the exclusion of these outliers. Regression (6) finally combines the exclusion of theses same outliers with the exclusion of the endogenous adopters from regressions (2) and (3). Once again, the effects we document remain stable, and if anything, appear to be slightly strengthened.

6.2 Endogenizing legal origins

Above we have excluded from our analysis countries for which the exogeneity assumption of legal origins was clearly a stretch. In this section, we go one step further and endogenize legal origins. This serves to address more general concerns according to which colonization or conquest by England versus France may not have been random, but may instead have depended on some pre-existing geographical, climatic, or economic conditions. If some of those same factors also affected the contemporary distribution of preferences, as for instance suggested in some of the literature examining the deep roots of preferences (Galor and Özak, 2016; Galor and Savitskiy, 2018), this could threaten our causal identification approach.

To counteract such concerns, we now expand our equation system to include a third equation endogenizing legal origins:

$$LO = \alpha_0 + X\alpha_1 + u_\ell, \tag{6}$$

$$PR = \gamma_0 + LO\gamma_1 + X\gamma_3 + u_m \tag{7}$$

$$EO = \beta_0 + PR\beta_1 + LO\beta_2 + X\beta_3 + u_y, \tag{8}$$

where the error term u_ℓ now clearly indicates the endogenous nature of legal origins. In addition to the identification issues already discussed above, we now need the covariance of the error terms to be zero conditional on the included controls, and in particular, $cov(u_\ell, u_y|X) = 0$ and $cov(u_\ell, u_m|X) = 0$. Our strategy

will thus consist in controlling for as many factors as possible in X. In choosing these controls, we focus on geographic, economic, institutional, and demographic endowments existing before the onset of colonization around the year 1500. If such factors have indeed affected he likelihood of being colonized by England rather than France—and if these same endowments determine the prevalence of risk tolerance, entrepreneurship, or both, either completely or partially—then the setup proposed will allow us to capture such effects. At the same time, we will be able to determine how the effect of legal origins on risk tolerance and thence on entrepreneurship rates is affected by pre-colonial endowments.

In what follows, we focus only on countries with French or English legal origins in order to simplify our setup (otherwise each legal origin additional to the French would need its own equation). After excluding England and France itself, this leaves us with 69 countries for our analysis. English legal origins are predicted using a logit link function. We start by focusing on the shipping distance from Europe, which has been shown by Auer (2013) to predict colonization by England rather than France. The reason for this can be found in the different colonization strategies followed by France and England. France first colonized Algeria, and then expanded its colonial empire from there to neighbouring countries in north Africa and subsequently moved down to West Africa. England's colonization strategy, on the other hand, was focused on securing its shipping routes to the Indies, resulting in the occupation of territories that were on average farther removed from Europe, followed by further expansion into the neighbourhood of those countries. Its greater fleet further led to the occupation of far-off territories in Oceania that were beyond the reach of the other colonizing powers.[8]

Regression (1) in table 3 shows our three-equation system, where English legal origins are allowed to endogenously depend on the shipping distance from Eng-

[8]Notice that while Auer focuses on colonies only, using non-colonies as a control, our focus on legal origins in general leads us to include a wider set of countries. Since we try to predict English legal origins, however, this difference will be minimal for our estimations, since virtually all English legal origin countries are former colonies. The only two exceptions to this rule are Ireland, where the legal origins have been installed by conquest, and Thailand, which adopted legal origins endogenously.

Table 3: Controlling for endogeniety in legal origins

	(1)	(2)	(3)	(4)	(5)	(6)
dep. var:	**entrepreneurship rate**					
risk tolerance	0.042***	0.048***	0.029***	0.026***	0.028***	0.046***
	(0.010)	(0.011)	(0.011)	(0.010)	(0.010)	(0.014)
English LO	-0.017	-0.024	-0.007	0.008	0.004	-0.014
	(0.022)	(0.024)	(0.022)	(0.021)	(0.021)	(0.022)
shipping distance	0.002	-0.001	-0.009**	-0.013***	-0.017***	-0.010***
	(0.003)	(0.003)	(0.004)	(0.004)	(0.006)	(0.004)
landlocked	-0.048**	-0.069**	-0.057**	-0.052*	-0.084***	-0.059**
	(0.023)	(0.030)	(0.029)	(0.027)	(0.028)	(0.027)
dep. var:	**risk tolerance**					
English LO	0.715***	0.731***	0.736***	0.775***	0.737***	0.412**
	(0.249)	(0.259)	(0.238)	(0.242)	(0.248)	(0.205)
shipping distance	-0.028	0.041	-0.031	-0.044	0.000	-0.057
	(0.030)	(0.039)	(0.044)	(0.046)	(0.073)	(0.035)
landlocked	0.614**	0.714**	0.628*	0.653**	0.677**	0.445*
	(0.272)	(0.337)	(0.329)	(0.329)	(0.345)	(0.257)
dep. var:	**English legal origins (logit link)**					
shipping distance	0.189**	0.387***	0.585**	0.713**	1.442**	0.589*
	(0.078)	(0.141)	(0.255)	(0.295)	(0.657)	(0.316)
landlocked	-0.789	-2.544	-2.626	-3.129	-8.259	-3.679
	(0.840)	(1.710)	(1.774)	(2.085)	(5.429)	(2.654)
dep var: entrepreneurship rate	**indirect effects via risk tolerance**					
English LO	0.030**	0.035**	0.022**	0.020**	0.021**	0.019*
	(0.009)	(0.013)	(0.015)	(0.011)	(0.010)	(0.011)
Countries	69	65	63	63	63	56
ECON controls	NO	YES	YES	YES	YES	YES
temp. & precip. volatility	NO	NO	YES	YES	YES	YES
calories & growth cycle	NO	NO	NO	YES	YES	YES
geographical controls	NO	NO	NO	NO	YES	YES
excl. endogenous adoptors	NO	NO	NO	NO	NO	YES

Standard errors are reported in parentheses. Stars signal significance at the following levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Risk tolerance is standardized throughout. The regression only use countries with French or English legal origins, and include France and England throughout.

land as assembled by Auer (2013).[9] In addition, we insert a landlocked dummy, since landlocked countries may have been less likely to be colonized by England, given the differences in colonization and conquest strategies (using other variables instead, such as the shipping distance and land based distance following actual

[9]The measure of Auer is available for 153 countries, but is missing for some smaller countries and territories in our data. In order to not lose any observations, we impute the shipping data for the countries where it is missing from the existing observations. That is, we build an equation predicting shipping distance from latitude, longitude, and the square of longitude. We insert the square of longitude to account for the fact that shipping distances to the Eastern colonies in the times preceding the opening of the Suez canal would have been inreased by the need to circumnavigate Africa. These three variables alone explain 95% of the variation in shipping distance in the data. We then use the estimated coefficients to predict shipping distances for the countries and territories where it is missing.

colonization routes developed by Ertan et al., 2016, delivers very similar results). We have further purged all additional controls previously used from the equation, in an effort to focus exclusively on exogenous variables at the time of colonization, or that are unchanging across time. We do indeed find an effect of shipping distance on the likelihood of a country having English legal origins. We further find a positive effect of being landlocked on risk tolerance, and a negative effect of being landlocked on entrepreneurship. The indirect effects of English legal origins on entrepreneurship passing via risk tolerance results reinforced from this, likely because it was previously partially hidden by the effect of being landlocked.

In regression (2) we add a broad set of indicators capturing economic and demographic development around the year 1500, which we have obtained from the data of Ashraf and Galor (2013). These include the average elevation and roughness of the terrain, the percentage of arable land, and the timing of the neolithic transition. We also control for population density around 1500, which in Malthusian economies may serve as a proxy for economic development. We further add a dummy indicating whether a country is rich in oil reserves, taken from Auer (2013), and a variable capturing the migratory distance to Addis Ababa, to capture the out of Africa effect documented by Ashraf and Galor (2013). Adding the square of this measure does not change our conclusions in any way. The same holds true if we use the measure of predicted genetic diversity instead.

Regressions (3) and (4) introduce variables meant to control for deep-root determinants of preferences. Regression (3) adds a measure of the volatility of precipitation and a measure capturing the volatility of temperature, both taken from Galor and Özak (2016), and meant to control for the deep roots of loss aversion as discussed by Galor and Savitskiy (2018). These controls do not affect our conclusions in any way. Using average measures of temperature and precipitation instead yields similar insights. Regression (4) further adds the measures of agricultural productivity in calories per year per hectare and of the agricultural growth cycle, used by Galor and Özak (2016) to predict patience. All our conclusions remain unaffected. Regression (5) further includes absolute latitude and continental fixed

effects. None of the relations are affected by this. Finally, regression (6) drops all endogenous adopters discussed above, leaving us with 56 countries. The indirect effect remains significant, albeit only at the 10% level.

7 Conclusion

Other than traditionally assumed in economics, there is a growing consensus that preferences may be endogenously determined. This raises the question of what may determine the preferences themselves. At the same time, it creates issues for the identification of the effects running from preferences to economic behaviour, since it raises the spectre of reverse causality and of spurious correlations. Using exogenously installed legal origins, we have shown that countries with Common law origins are more risk tolerant than countries with French civil law origins. This effect is economically strong as well as statistically significant and can account for a large part of the variation in preferences across countries. We then used the exogenously determined preference component of a country to quantify the effect of preferences on economic outcomes at the aggregate level by means of a simultaneous equation model. In particular, we showed that the increase in risk tolerance exogenously determined by English legal origins causes an increase in entrepreneurship rates. The effect is economically strong, and stable to a large number of robustness checks for omitted variables and imperfect exogeneity. The results presented thus document the importance of preferences for economic behaviour at the aggregate level.

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SUPPLEMENTARY MATERIALS (for online publication)

Legal origins and preferences

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S1 Legal origins, original definition including Socialist

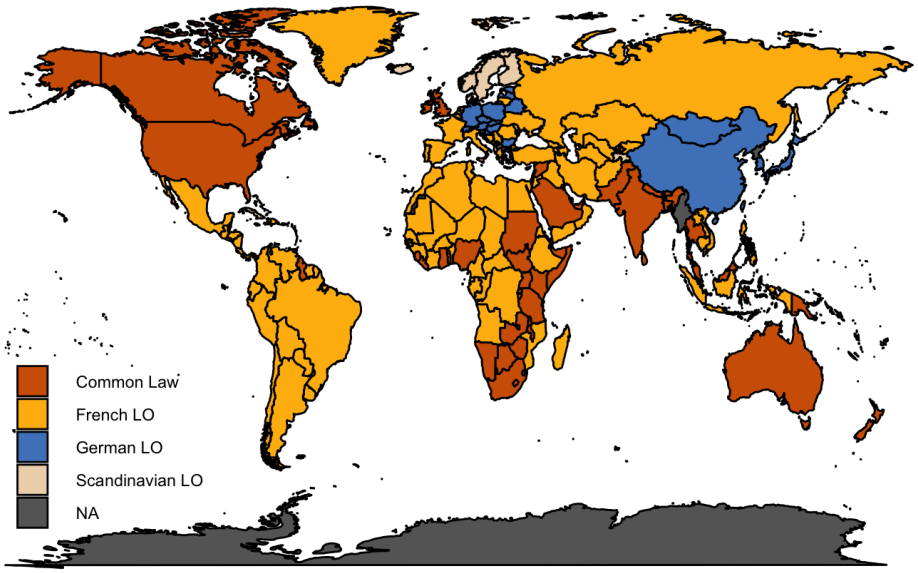

Figure S1: Legal origins for 91 countries in data

Map of legal origins of 91 out of 92 countries for which we have preference data (Palestine is unclassified). The map follows the original classification including socialist legal origins. This classification was subsequently changed, as the formerly socialist countries adopted legal systems from elsewhere. In particular, this led to Russia, Ukraine, the Central Asian Republics, and much of the Balkan to be reclassified as having French legal origins. Some central and eastern European countries, notably Belorussia, Poland, Czechia, Slovakia, Slovenia and Croatia, were re-classified as having adopted German legal origins. China was also reclassified as having adopted German legal origins. We will test our inference for stability to these different classifications.

S2 Risk data stability analysis

S2.1 Risk taking

We start by comparing the risk preferences elicited in the WVS survey across different waves. Figure S2 shows the data for the two waves separately plotted against the log of GDP per capita. For the 34 countries included both in wave 5 and in wave 6 of the WVS, there is no significant difference in risk taking ($z = -1.239, p = 0.215$, Mann-Whitney test).

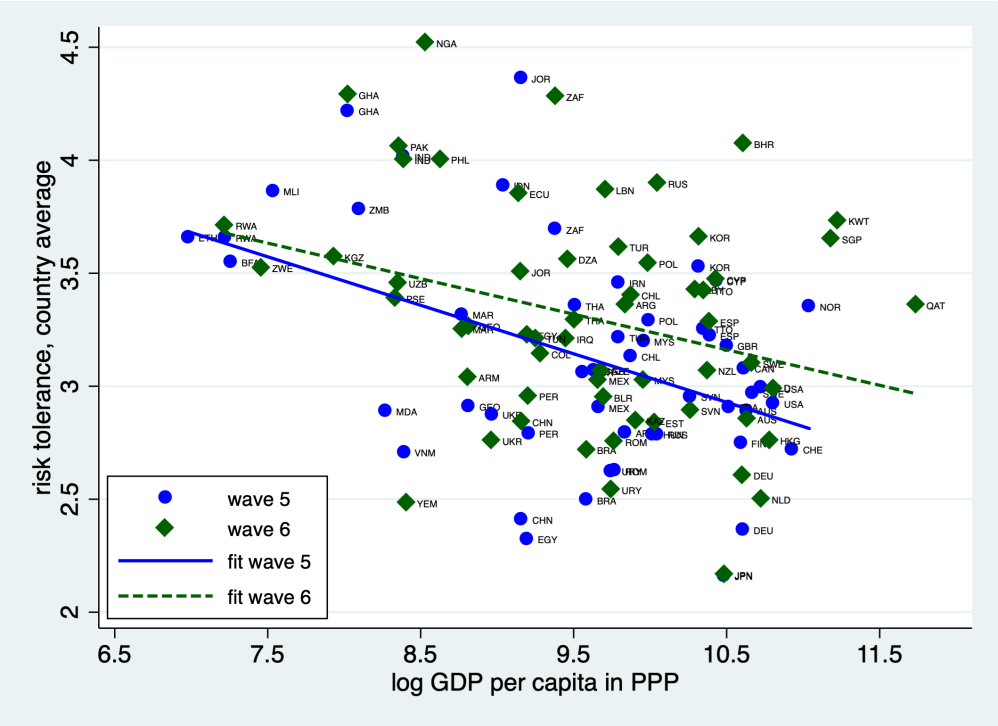

Figure S2: Risk data in WVS across waves

Figure S3 shows the data from the WVS together with the ESS data and plots average risk tolerance against GDP per capita. Overall, the ESS data can be seen to fit the general pattern of the WVS data. There is no significant difference between the ESS and the WVS for the 23 countries included in both datasets ($z = -1.065, p = 0.287$, signed rank test).

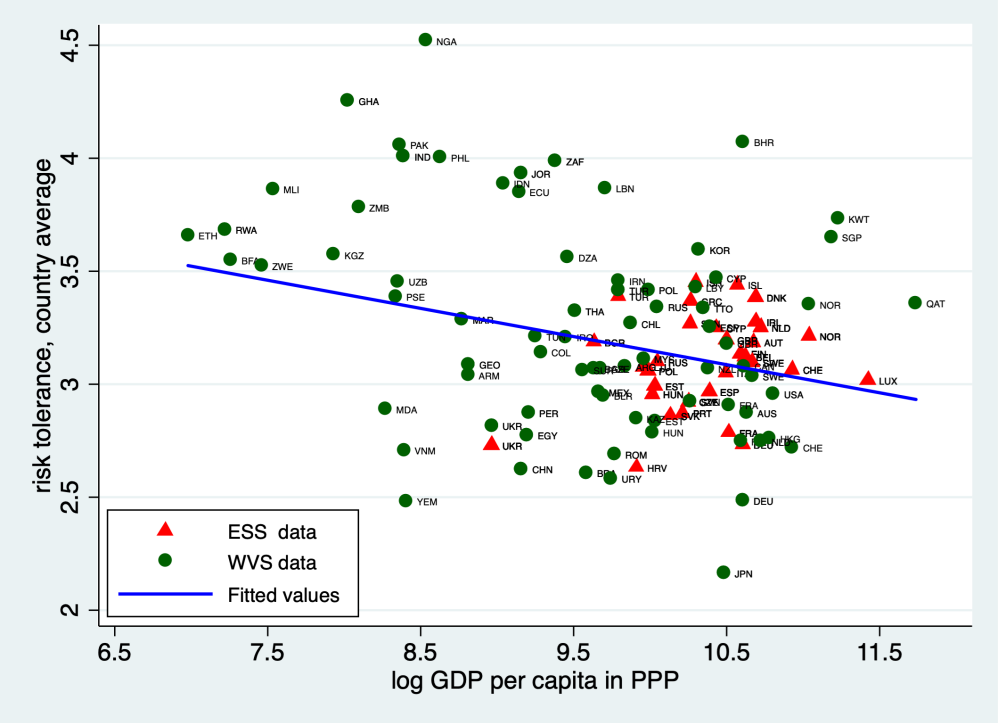

Figure S3: Risk data in WVS across waves