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## Are both dimensions of property rights “efficient”?

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### Abstract

The “efficient institutions view” on property rights claims that property rights emerged and are enforced when their enforcement maximizes net wealth. In a cross-country pattern this is usually understood as the prediction that economic development creates the incentives to provide higher quality property rights, but this claim is highly debated. This paper tries to take various property rights scholars’ arguments seriously and see property rights quality as a two dimensional concept, the two dimensions being the definition and the assignment of property rights. The paper derives a measure for these two dimensions of property rights and shows that it is the assignment dimension which is determined by development, while the definition dimensions is rather determined by cultural factors, especially those deeper factors that seem to reflect a long-run effect of Western European culture. According to the paper, the main reasons behind this may be the difference in the expropriability of income generated by an improvement of each dimension, and the way such improvements may or may not affect countries’ catching up process.

JEL: P14, P16, O11

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### 1. Introduction

Once it is accepted that property rights security is the most important determinant of economic development, it is obvious we need to immediately raise the question, what are the most important determinants of property rights security? In this paper I will focus on one of the explanations which have been developed to answer that question, the so-called economic approach to property rights, or the efficient institutions view. The efficient institutions hypothesis is understood as the claim that economic development will create incentives for governments to provide a higher security of property rights. The empirical tests of this hypothesis are usually cross-country regressions with property rights security on the left-hand side and a measure of economic development on the right-hand side.

The paper argues that, on the one hand, property rights quality is a two-dimensional concept, because property rights should be considered as the result of two constitutional decisions: one is concerned with the definition of property rights while the other is concerned with the assignment of property rights. Definition and assignment will be considered as two dimensions of property rights quality. On the other hand, property rights in the “economic” approach must be understood in a broader sense than it usually is by the empirical papers. It must also include those rights that are considered to be in the political sphere of human actions as opposed to the economic.

The “economic approach”, when carefully applied, does not imply that the one single determinant of property rights is economic development. As this view suggests that institutions are created to minimize transaction costs, culture as an important

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determinant of transaction costs should be considered, too. The two dimensions of property rights, however, might not equally well be determined by development and culture. We can expect that development has a greater effect on the assignment dimension while culture has a greater effect on the definition dimension. First, even if the assignment dimension is improved by economic development, the definition dimension can only be improved if economic development is based on innovation. When imitation is the main driving force, the government will not have an incentive to widen the definition of property rights beyond the level of what is needed for the markets for goods in order to reach the level which would be needed for a market for ideas. Second, the less the definition of property rights is in line with cultural understanding, the more costly it will be to enforce them.

To test these claims empirically one needs a measure of the two dimensions of property rights. To follow the bundle of rights definition of property rights we need a broader measure than that used in the literature. I use measures of economic and civil freedom in order to derive measures for the two dimensions of property rights. The cross country regressions which are run with the measures of the two dimensions of property rights as dependent variables show that, controlled for cultural determinants, economic development proxied by GDP per capita and education have a much stronger effect on the assignment dimension than on the definition dimension, while the cultural variables affect the definition dimension more. Generally, the definition dimension is less “efficient” and better explained by deeper cultural factors.

## 2. The efficient institutions view on property rights

The ancient political economy problem of having a government that enforces but does not violate property rights was reformulated as a key dilemma for comparative economics by Djankov et al. (2003). They develop a framework in which society faces a trade-off between the cost of private and public expropriation, and is supposed to choose the institutional mix with the lowest social cost given the institutional possibility frontier set by “civic capital”. This framework reflects the “constrained efficient” view of institutions, which is the proposition that “the distribution of property rights is chosen in order to maximize wealth net of transaction costs.” (Allen 2012, p. 399)<sup>1</sup>

This general claim implies, first, that “[t]he pressure to change property rights emerges only as a resource becomes increasingly scarce relative to society’s wants” (North and Thomas 1973, p. 19). That is, as explained by Demsetz (1967) in his classic paper, an increase in demand will create an incentive to solve externality problems intensified by a higher demand, that is, to define and enforce private property rights, and create a market of the good which has become sufficiently scarce. Developing this line of reasoning further, Demsetz (2002) argues that the main driving force is specialization, which reduces the personal character of exchange relations (“compactness”) within the community, improves technology, and increases the complexity of social organizations. These processes are the deeper roots of the motivation to create private property.

Second, the constrained efficient view of property rights implies that if transaction costs change, the distribution of property rights will probably change as well. This is, indeed, the argument that Allen (2012) makes to explain the emergence of different

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<sup>1</sup> See also the interesting debate in the blogosphere between Leeson (2013a,b) and Acemoglu and Robinson (2013a,b).

institutions in pre-modern Britain. The most important element of transaction costs is the cost incurred to “make and enforce a claim” (Holcombe 2014, p. 476) or the “costs of policing the institutions” (Barzel 1989, p.84), that is, the costs of enforcing property rights. When transaction costs become low enough, defining and enforcing property rights becomes profitable.

The idea that higher demand and lower transaction costs of exchange will create incentives for defining and enforcing property rights implies that economic development creates incentives to increase the quality of property rights protection.<sup>2</sup> That is why in empirical and cross-country quantitative analyses of the determinants of property rights this hypothesis is usually formalized as a test of whether per capita income is a statistically significant independent variable in a regression in which property rights quality is the dependent one. A higher income means a higher demand and a better technology for enforcement. Discussing the reasons why development leads to an institutional system characterized by more democracy and less corruption, Paldam and Gundlach (2008, p. 68) emphasize, for example, that with development “demand for capital and skills rises” and the “increasing opportunity cost of time provides incentives for transactions to become more effective”, which finally “forces administrations to become transparent and incorrupt”.

The efficient institutions view of property rights can be contrasted with others. La Porta et al. (1999) provide a test, a very similar to which is conducted by Mijiyawa (2013) with a larger database. The evidence of La Porta et al. (1999) supports the efficient institutions view and so does that of Mijiyawa (2013), although his main conclusion is that what he calls the political approach (tested as the effects of democracy, income inequality, and the abundance of natural resources) is the most relevant and robust in explaining property rights when it is contrasted with three other approaches; the cultural (tested as the effect of the share of Protestants within the population), the historical (tested as the effect of common law legal origin), and the economic (tested as the effect of GDP per capita). He finds that in the sub-sample of rich countries, as well as in the sub-sample of African countries GDP is not a relevant explanatory variable (*ibid.*, pp. 154, 176), while in the sub-sample of poor countries the relevance of the cultural approach, that is, the significance of the share of Protestants, is lost (*ibid.*, pp. 154, 177).

Other cultural variables, however, are usually found to affect property rights significantly. Norton (2004) evaluates whether dimensions of culture in the data of Hofstede et al. (2010) affect property rights security and the rule of law. He concludes that they do, but not all of them. The most important dimension is that of “individualism” which “reflects people’s identity as individuals or as members of groups” (*ibid.*, p. 91). He finds that cultural dimensions together can explain roughly half of the cross-country variation in property rights and rule of law data.

There is an extensive literature focusing on the role of culture in determining the cross-country differences of institutions. In these papers, however, the dependent variable is not property rights but a more general measure of institutions (Klasing 2013,

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<sup>2</sup> The question that can be raised immediately, as was done by the anonymous referee of this paper, is what is it that causes economic development, then? This paper focuses only on the determinants of property rights, not on the determinants of economic development, but it is worth noting that both the claim that higher quality property rights lead to development and the claim that development leads to higher quality property rights can be right at the same time. That would imply a virtuous circle of property rights security and development. A model of this kind is developed by Gradstein (2004).

Licht et al. 2007). This does not make them irrelevant from the point of view of this paper because property rights security accounts for a significant part of the quality of institutions, and there is a strong correlation between different factors of institutional quality (Langbein and Knack 2010, Kunčič 2014). Those papers therefore that conclude that culture has an explanatory power over institutions (e.g., Tabellini 2008, 2010, Licht et al. 2007, Maseland 2013, Williamson and Mathers 2011a,b) give some support to the claim that property rights are determined by culture to some extent.

The main factors and theories that have been developed in the past decades to explain cross-country differences in property rights quality are well summarized by the three papers of Levine (2005), Hansson (2009), and Mijiyawa (2013)<sup>3</sup>. The aim of these three papers is the same: to evaluate different explanations of property rights quality or security. There is of course a substantial overlap between the theories they test and the explanatory variables they use, and the conclusion they draw: it is difficult to drop any one of the different explanations. Interestingly, it is only Mijiyawa (2013) of these three who considers the “economic approach”; cultural factors and determinants of colonization receive much more attention. As I will try to show, this approach may deserve much careful scrutiny.

In the rest of this paper I will address two shortcomings of the literature reviewed above. First, this literature is exclusively concerned with the determinants of how rights are assigned. As we will see, besides the question of who owns what, property rights institutions must answer another question, the question of what it means to own something. The quality of property rights institutions are determined by both decisions. A cross-country test of the determinants of property rights should therefore check the determinants of both of these constitutional dimensions of property rights.

Second, the claim that culture has an effect on property rights security is usually seen as an alternative to the “constrained efficiency” view. Culture, however, is a crucial determinant of transaction costs and is thus a determinant of the efficient assignment of property rights. That is, a discussion of the efficient institutions approach to property rights should include the role of culture.

### **3. Two dimensions of property rights**

#### **3.1. Assignment and definition as two dimensions of property rights**

Property rights are defined here in the traditions of the property rights school (Alchian (1977[1965], Barzel 1989, Holcombe 2014)<sup>4</sup> as “socially recognized rights of action” (Alchian and Demsetz 1973, p. 17), or a bundle of “rights to use resources, including one's body and mind” (ibid.). The literature concerned with the factors that determine property rights security in a cross-country setting seems to neglect two conclusions stemming from this definition.

The first neglected aspect is the difference between the social recognition of what any owner can do with what she owns and the social recognition of who the

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<sup>3</sup> A more detailed examination of the factors they use will follow in section 4.

<sup>4</sup> For a more detailed understanding of the “property rights approach” than what follows, see Alchian (1977[1965]), Alchian and Demsetz (1973), or Barzel (1989). Colombatto (2004) provides more recent original contributions to, and an overview of, property rights economics. See Holcombe (2014) for a recent theoretical contribution to this literature.

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owner of a certain asset is. This is implicit in the definitions used in the literature but is neglected. For example, Levine (2005, p. 62, italics added) defines the term “property rights” as the “degree to which a broad set of policies, legal and political systems, and informal norms *define and protect* private property”. Similarly, Norton (2004, p. 88, italics added) refers to the same set of institutions as those which “*specify and enforce* property rights.” These two different aspects of property rights are made explicit by Vanberg (2001), who explains that there are “two constitutional decisions” to be made about property rights. One is the definition of property rights, which answers the question “what does it mean to own something?”, while the other is the assignment of property rights, which answers the question “who owns what?” The empirical literature does not make this difference, and, consequently, the possibility does not arise that these two decisions regarding property rights are not affected in the same way by the factors under scrutiny.<sup>5</sup>

The claim that the system of property rights is determined by two separate constitutional decisions means that property rights security has two orthogonal dimensions. This is because property rights can be expropriated in two ways: either by redefining property rights or reassigning property rights without the consent of the owner. Property rights security is then not to be measured with a one-dimension scale but with two different scales or dimensions, which I will call the definition dimension and the assignment dimension. The definition dimension describes what the bundle of rights that is given to the owner of a resource includes, while the assignment dimension describes the certainty that the owner will not be deprived of her resource.

The second neglected aspect of property rights is that the resource the property rights of which can be defined and assigned may mean “one's body and mind” (Alchian and Demsetz 1973, p. 17). As Furubotn and Richter (2005, p. 95) say, “[t]o economists, every right can be interpreted as property right”. This means that the definition dimension of property rights should be understood more broadly than it usually is. The fact that some property rights are “property in one's own person” (Furubotn and Richter 2005, p. 91) does not make them fundamentally different from those rights which are defined over resources that can be sold or expropriated. This approach to property rights implies that freedom and property rights are just two sides of the same coin, which is clearly reflected in Allen's (2007, p. 312) definition of an “economic property right” as “one's ability to freely exercise a choice”. As we have just seen, there is nothing in this “economic” approach to property rights that excludes civil liberties, or human rights more generally speaking, such as free speech<sup>6</sup>.

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<sup>5</sup> Hodgson (2015) criticizes the economic approach towards property rights for not realizing the importance of property as a legal concept. Although Allen (2015) claims that Hodgson (2015) simply renames legal and economic rights for property right and possession, Hodgson (2015) does more than that. He argues convincingly that “freedom to exercise a choice” is not the same when it is the result of only (a lack of) enforcement (possession), as when this freedom is a legitimated by the community (property). This distinction is rather between how and whether the property rights are defined and how and whether they are enforced (assigned). Thus, Hodgson's argument seems to support the claim that property rights security is not one-dimensional, but possibly two: whether a right is accepted by the community (definition) and whether it is enforced (assignment) are two different aspects.

<sup>6</sup> Barzel (1989, p. 2., footnote 1) makes it explicit: “[h]uman rights are simply part of people's property rights. Human rights may be difficult to protect or to exchange, but so are rights to many other assets.”

Empirical studies usually make a difference between economic and civil freedoms as separate elements of individual liberty<sup>7</sup>. Although these two kinds of freedom are not identical with the two dimensions of property rights, the definition dimension of property rights arguably has a larger role in determining civil freedom than it does in determining economic freedom. The reason lies in the nature of the resource over which property rights are defined. As the human body and mind are not expropriable, the more important question about them is not who the owner of these resources is but what the owner is allowed to do with them. What makes civil freedom different from economic freedom is that the activities that are associated with civil freedom use these non-expropriable resources more intensively. Consequently, a change in the definition of property rights, which changes the bundle of rights of actions the owner of a resource is allowed to make, will have a greater effect on civil freedom than on economic freedom. Similarly, a change in the assignment of property rights, which makes the assignment of property rights over expropriable resources more or less uncertain, has a greater effect on economic freedom than on civil freedom. We can expect, then, that differences in the definition of property rights are reflected better in civil freedoms, and differences in the assignment of property rights are reflected better in economic freedoms.

In sum, if we follow the economic approach to property rights we should apply the economic definition of property rights, which leads to the conclusion that individual freedom can be restricted in two ways: either by narrowing down the bundle of rights of the owners, a decision on the definition of property rights, or by changing the ownership of the resource without the owner's consent, a decision on the assignment of property rights. All "kinds" of individual freedom, such as civil and economic freedom, can be seen as the freedom to exercise different actions made possible by these two constitutional decisions. Since different human actions are produced with technologies that are more or less intensive in expropriable and non-expropriable resources, they are not affected by the two constitutional dimensions to an equal degree.

### **3.2. Development and the two dimensions of property rights**

We can expect that economic development is more important in determining the assignment dimension of property rights than the definition dimension of property rights, while the case with culture is just the reverse. The reasons are concerned, on the one hand, with the expropriability of the benefits which a better definition or assignment of property rights leads to, while on the other hand they are concerned with the effect of culture on transaction costs.

An improvement in the assignment of rights means that the return on productive activities becomes higher as compared to rent seeking (Murphy et al. 1993). With a weaker enforcement, then, more resources will be devoted to socially wasteful rent seeking. A more secure assignment will increase the value of an expropriable resource that can be sold, which creates incentives for a third person to provide a more secure assignment for a return. Widening the definition of property rights, however, as we saw, will lead to a disproportionately large increase in the freedom of those activities which

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<sup>7</sup> Political liberties are usually considered a third freedom besides the above-mentioned two. Since political liberties are usually concerned with public decisions, not with individual ones, I ignore them. When it comes to the quantitative measures of civil and political liberties, the differences between them are small.

will yield inappropriable benefit. The rents created by civil liberties (first and second generation human rights) as Ben-Yishay and Betancourt (2014) argue are much more difficult to expropriate because they are “dispersed in space, time and individuals to whom they accrue than the ones generated through political rights” (ibid., p. 556). As a result, although it would be efficient to change the definition dimension of property rights, it may not pay off for a third person to do so because the rent generated as a result cannot be expropriated. The incentive to improve the assignment of property rights in the hope of a higher return is stronger than the incentives to widen the definition of property rights.

The second reason to think that the definition dimension is less related to economic development than the assignment dimension is the relation between innovation and the civil freedoms. A broader definition of rights that makes it possible to exercise actions of the civil freedom “bundle” creates a market for ideas – a market for activities such as “speech, writing, and the exercise of religious beliefs (Coase 1974, p. 384)”. Coase and Wang (2013, p. 190) apply this idea when arguing that the lack of a free market for ideas prevents technological and social innovation from becoming a major force behind economic development, which may slow down economic growth when the steam provided by the potential of catching-up runs out. It is because “[t]he lack of a market for ideas is directly responsible for the lack of innovation” (ibid., p. 193), and further because the market for ideas “determines what kind of consumers (as well as entrepreneurs, politicians, and lawyers) we find in the economy, their characters and value, and thus ultimately decides what the market for goods is and how effectively it works” (ibid., p. 194).

This means that the relation between economic development and the definition of property rights depends on whether the country’s economic development is the result of “producing ideas” or “using ideas” (Romer 1993). The more important the first strategy is, the more important is the role of the market for ideas, and this makes the definition dimension more strongly connected to economic development. Since it is developed countries whose economic growth is based on the “producing idea” strategy while those lagging behind are “using ideas” rather than producing them, the prospect of development does not create an incentive to introduce a broader definition of property rights until the “using ideas” strategy is working.

### **3.3. Culture and the two dimensions of property rights**

Culture is a part of the process of the defining and assigning of property rights because they affect the transaction costs. First, the cost of enforcing property rights can be reduced by culture, because “[m]oral and cultural constraints that encourage people to honor contracts and property rights ... discourage opportunistic behavior” (Anderson and Hill 2004, p. 15). Consequently, the lesser the extent to which the informal rules are in line with the formal rules, the more costly enforcement will be. That is, if the informal assignment of property rights is not the same as the formal assignment, enforcement costs will be higher.

Ethics is thus a factor in enforcement and therefore a determinant of the enforcement of property rights. But ethics has a more crucial role for property rights than determining the technology of enforcement; ethics and culture determine what is to be enforced in the first place. Basing his thoughts on experimental research, Wilson (2015) explains the emergence of property rights as a moral convention. The experimental results he presents give support to the claim that the notion of property is

based on morals concerning what is right, which is, roughly speaking, inarticulate knowledge of the abstract rules, not the concrete ones. That is, property in the abstract is a moral concept: informal rules including culture provide the background for the emergence of property rights, and not only for the enforcement of property rights once they have emerged. This is line with the critique that McCloskey (2015) formulates on new institutional economics, and that Hodgson (2015) formulates on the economic approach of property rights. One line of criticism is common: institutions (property rights) are not only constraints; they do not only provide incentives. Institutions and property rights have meaning and interpretations; that is to say they have an ethical foundation.

Deciding to accept a definition of rights in the abstract seems to be different from the decision to follow or not to follow the rules defined. Precisely because human motivation is not one-dimensional, the two dimensions of property rights will have a more or less ethical foundation. If the definition of property rights is a decision about 'what is right', it is the assignment of property rights that will rather be affected by efficiency consideration because the decision to respect property rights results from a trade-off between the moral and the economic value of (non)compliance.

#### 4. Determinants of the two dimensions of property rights

The empirical test of the theoretical considerations seems to be clear: we should first have a measure of the definition and the assignment dimension of property rights, and see in a cross-country setting whether they are differently affected by culture and development. The theory thus suggests an empirical test that can be summarized by two general regression equations as follows:

$$(\text{definition})_i = \beta_0 + \beta_1(\text{ec.dev.})_i + \beta_2(\text{culture})_i + \beta_3(\text{controls})_i + \varepsilon_i, \quad (1)$$

$$(\text{assignment})_i = \gamma_0 + \gamma_1(\text{ec.dev.})_i + \gamma_2(\text{culture})_i + \gamma_3(\text{controls})_i + \eta_i, \quad (2)$$

where *definition* and *assignment* are the two dimensions of property rights, and *ec. dev.* and *culture* are certain measures of economic development and culture. The regressions include some other variables, too, which are called *controls*;  $\varepsilon$  and  $\eta$  are the error terms, and  $i$  denotes a country.

The implication of my argument can be summarized as the hypothesis that  $\beta_1 < \gamma_1$  and  $\beta_2 > \gamma_2$ . How this can be tested with the available cross-country data will be examined in the remaining sections.

##### 4.1. Measuring the two dimensions of property rights

To create quantitative measures of the two dimensions of property rights I will use two indexes of freedom that are widely used in the literature (Bologna and Hall 2014, Paldam 2007): the Economic Freedom of the World Index of the Fraser Institute (Gwartney et al., 2013), and the index of Civil Liberties of Freedom House (Freedom House 2014a). The reason for choosing these two only, and not using the index of



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Political Rights, too, which is also a part of Freedom House’s Freedom in the World Report, is that the approach presented above deals only with the property rights of individuals, not with the way public decisions are made, which is what the index of Political Rights is about.

To put it simply, I suppose that these two types of freedom - civil and economic - describe both the definition and the assignment of property rights but these two dimensions are not identical with the categories of economic and civil freedom. That is why I will use the sub-scores of these two indexes<sup>8</sup> (see Table 1) in a factor analysis to arrive at a measure for each of the two dimensions. As even the names of these categories show, there is a substantial overlap between what these two indexes measure. This supports my argument: both indexes reflect a combination of the definition and assignment dimension of property rights<sup>9</sup>, and the aim is to extract these two dimensions.

To do this a factor analysis is conducted with the “sub-categories” of civil liberties and the “areas” of economic freedom. This means that we have nine sub-scores of freedom on which each country is evaluated. Running the factor analysis on these nine components and picking the first two factors will hopefully give us quantitative measures for the two dimensions of property rights.

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<sup>8</sup> In the case of the Civil Liberties index there are four sub-scores called “sub-categories”, such as Freedom of Expression and Belief, Associational and Organizational Rights, Rule of Law, and Personal Autonomy and Individual Rights (see Freedom House, 2014a). In the case of the Economic Freedom of the World Index there are five areas which include Size of Government, Legal Structure and Property Rights, Sound Money, Freedom to Trade Internationally, and Regulation (see Gwartney et al., 2013, p. 4).

<sup>9</sup> This overlap is clearly shown by the fact that one of the subcomponents of civil liberties, the rule of law, is very close, even in name, to one of the areas of economic freedom, legal structure and property rights. This reinforces my argument: these indexes include the same elements which we have to disentangle and re-group in order to have a meaningfully two-dimensional description of institutions. I thank an anonymous referee for bringing this into my attention.

Table 1. Rotated Factor Matrix of the Factor Analysis

	Civil Liberties sub-component/ Economic Freedom areas	Factor	
		1	2
civil rights subcategories	Freedom of Expression and Belief	0.819	0.367
	Associational and Organizational Rights	0.893	0.299
	Rule of Law	0.879	0.413
	Personal Autonomy and Individual Rights	0.817	0.472
economic freedom areas	Size of Government	-0.291	-0.035
	Legal Structure and Property Rights	0.407	0.615
	Sound Money	0.330	0.675
	Freedom to trade internationally	0.152	0.864
	Regulation	0.187	0.633

*Notes: The table shows the loadings for each sub-score, which describe how the two factors can “explain” the nine sub-scores. Note that in the case of the Economic Freedom of the World index a higher value always means more economic freedom. Consequently, a higher value for “Regulation” means less regulation, and a higher value for the “Size of Government” means a smaller government. The positive loadings on “regulation” thus means that a higher value of both factors imply a freer regulatory environment, although factor 2 is more important. The negative loadings for the size of government mean that a higher value of each factor implies a bigger government, although factor 1 is much more important.*

Running this factor analysis with the data of 122 countries for the year 2010<sup>10</sup> shows that the two factors derived explain overall roughly 66 percent of the total variance, with 37 percent being explained by the first and the remaining 29 by the second (see Table 7 in the Appendix). The question is, which factor can be called the definition and which one the assignment of property rights. These two factors are described in Table 1 by the rotated factor matrix giving the loadings for each sub-score. The general picture is that factor 1 loads more strongly on the sub-scores of civil freedom while factor 2 loads more strongly on the sub-scores of economic freedom. The argument in section 3.1 can be applied to answer the question: the activities associated with economic freedom use expropriable resources more intensively, therefore economic freedom, which is mostly about the freedom to exercise a choice over expropriable resources, will be determined by the assignment dimension to a greater extent. Indeed, the definition of economic freedom (Gwartney and Lawson 2003, p. 406)<sup>11</sup> suggests that it is concerned with the enforcement of some predefined rights, while civil liberties are defined by naming the rights to be enforced<sup>12</sup>. Therefore, I will call factor 1 the definition of property rights and factor 2 the assignment of property rights.

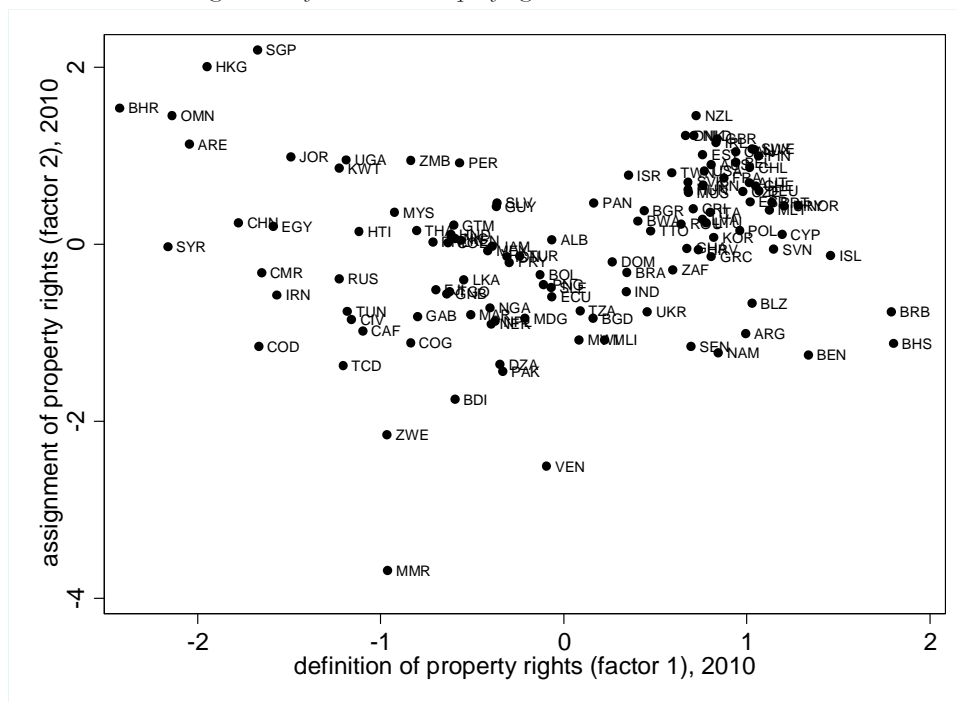
As a result of this analysis, we have a cross-country dataset with each country having a score on the definition of property rights (factor 1) and a score on the assignment of property rights (factor 2). These data are illustrated by the scatterplot in Figure 1.

<sup>10</sup> See Table 5 in the Appendix for summary statistics of the nine sub-scores.

<sup>11</sup> “Institutions and policies are consistent with economic freedom when they provide an infrastructure for voluntary exchange, and protect individuals and their property from aggressors seeking to use violence, coercion, and fraud to seize things that do not belong to them” (Gwartney and Lawson 2003, p. 406).

<sup>12</sup> The index of the Freedom House is based on the Universal Declaration of Human Rights of the United Nations (Freedom House 2014b, United Nations 1948), which defines the bundle of rights every person should be able to exercise.

Figure 1. Enforcement and scope of rights in 122 countries in 2010



Notes: The Figure shows the cross-country pattern of the two factors, the factor matrix of which is shown in Table 1. Both factor scores are standardized.

The scatterplot describes a y-shaped pattern. Although there is a positive relationship between these dimensions for a large number of countries, a substantial number of countries have a relatively high level of property rights enforcement while they have a very narrow scope of rights, even narrower than that of many countries in which the enforcement of property rights is much weaker. That is why when looking at all the countries, there is no correlation between the two dimensions. The next section will examine how the determinants of these two dimensions differ.

#### 4.2. Cross-country regressions on the dimensions of property rights

Having quantitative measures of the two dimensions of property rights makes it possible to run regressions of the kinds of equations (1) and (2) in order to see in a cross-country setting whether development and culture affect these dimensions in different ways. The dependent variables of these cross-country regressions are thus those measures of the dimensions of property rights just derived and plotted in Figure 1.

The independent variables are those usually found as determinants of property rights in the literature. The choice of independent variables is thus based on empirical papers aimed at testing different theories of property rights. Levine (2005), Mijiyawa (2013), and Hansson (2009) review and test roughly the same theories, allowing me to decide what the most important independent variables are. Based on these three papers and some others I cited in section 2, I will use three groups of independent variables: development variables, culture variables, and controls.

The development variables include GDP per capita in 1970 and primary education. GDP is the obvious proxy of development. As a test variable of the “economic approach” Mijiyawa (2013) applies this, too. Following him I will use the log value of GDP of 1970 to minimize the effect from reverse causality. GDP is the CGDPE variable of Feenstra et al. (2013). CGDPE is chosen since in this case we only use the data from one year, and this type of comparison is the one this measure of GDP is suggested for by Feenstra et al. (2013). As an alternative measure of development I use the 1970 value of years of primary schooling from Barro and Lee (2013). The use of an education variable as a proxy of development is suggested by those papers (e.g. Paldam and Gundlach 2008) that emphasize that it is the demands of a more educated electorate which will create incentives for the government to “modernize”.

To proxy culture I use three different groups of cultural variables including only one of them in separate regressions. The first group includes religious adherence data from Barro (2003). I use only those that any one of three review papers (Levine 2005, Mijiyawa 2013, Hansson 2009) found significant. That is why I only include the fraction of Catholics, Protestant, Muslims, and Other religions<sup>13</sup>.

The second group of cultural variables includes data on culture from Hofstede et al. (2010, 2012). Hofstede’s four dimensions include the following. *Power distance* is “the extent to which the less powerful members of institutions and organizations within a country expect and accept that power is distributed unequally” (Hofstede et al. 2010, p. 61, italics deleted). *Uncertainty avoidance* indicates “the extent to which the members of a culture feel threatened by ambiguous or unknown situations” (ibid., p. 191, italics deleted). *Individualism*, according to Hofstede et al. (2010, p. 92, italics deleted), “pertains to societies in which the ties between individuals are loose: everyone is expected to look after him- or herself and his or her immediate family.” *Masculinity* is about gender roles: “[a] society is called masculine when emotional gender roles are clearly distinct” (ibid., p. 140, italics deleted).

The third group of cultural variables is the data on Schwartz’s dimensions of culture as in Licht et al (2007). Schwartz (2008, pp. 8-10) differentiates between “three bipolar dimensions of culture”: autonomy (affective and intellectual) versus embeddedness, egalitarianism versus hierarchy, and mastery versus harmony. “In cultures with emphasis on embeddedness”, writes Schwartz (2008: 8-9), “people are viewed as entities in the collectivity. Meaning in life is expected to come largely through social relationships ... important values ... are social order, respect for tradition, security, and wisdom.” Hierarchy, on the other hand, “defines the unequal distribution of power, roles, and resources as legitimate and even desirable. ... Values of social power, authority, humility, and wealth are highly important” (ibid., p.9). Finally, harmony “emphasizes fitting into the social and natural world ... important values in harmony cultures include world at peace, unity with nature, and protecting the environment, and accepting one’s portion” (ibid., p.9). Cultural variables that are used as independent variables in the regressions come from a principal component analysis of these bipolar dimensions of culture. *Autonomy-embeddedness* is the first principal component of intellectual autonomy, affective autonomy and the negative of embeddedness; *egalitarianism-hierarchy* is the first principal component of egalitarianism and the negative

<sup>13</sup> This does not mean other than Catholic, Protestant, or Muslim, but other than all those Barro (2003) identifies. In addition to these four, Barro’s (2003) dataset includes adherence to six religions such as Other Christian, Orthodox, Jewish, Hindu, Buddhist, and Other Eastern Religions.

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of hierarchy; *mastery-harmony* is the first principal component of mastery and the negative of harmony.

Controls include other variables which the studies I cited usually find important. In the basic specification these include legal origin dummies from LaPorta et al. (2008), latitude (Gallup et al. 2001) and ethnic fractionalization (Alesina et al. 2003). These controls represent different non-exclusive theories of the evolution of property rights. Legal origins are proxies for the claim that English, French and other continental legal origins have had an impact on the evolution of the legal system, even in those countries where the legal system was transplanted from the outside, mainly by some colonial power. Latitude can be seen as a proxy variable to account for colonization strategy, because this strategy was to a great extent formulated by the conditions determined by climate (Levine 2005). The inclusion of ethnic fractionalization accounts for the idea that ethnic fractionalization makes the political system and institutions less “inclusive” and creates an incentive for policymakers to extract resources from other groups in the society, which leads to a worse property rights system. As Alesina and La Ferrara (2005) argue, a higher level fractionalization lowers the socially optimal level of public goods.

All this means that I run regressions with the two dependent variables, with or without one of the development variables, and with one of the three groups of cultural variables. The controls are included in every regression. This gives eighteen regressions for the basic specification, the presentation of the exact results of which is left to the Appendix (Table 8-10), and a more transparent account of the results is presented as Table 2. The table shows those variables that were found statistically significant at the ten percent level at least. The plus or minus in a parenthesis shows how many times a certain variable was found to be significant and the sign of the effects found. Every row within a category represents three regressions: one without any development variable, one with education, and a third one with GDP per capita as a dependent variable. There are three rows in every category because the same regressions are run with each of the three groups of cultural variables as independent variables.

The first three rows of Table 2 within the development category shows, for example, that with definition of property rights as the dependent variable it is only primary education that was found to be statistically significant at least at the 10 percent level, but only when the second group of cultural variables (that of Hofstede et al. (2010)) were used as independent variables. When it comes to assignment, education is found significant together with any one of the three cultural groups, while GDP per capita is not found significant together with Schwartz’s dimensions (Licht et al. 2007) of culture.

Religious variables are much more important statistically in the case of definition as is shown in the “culture” section of Table 2. The other two groups of cultural variables are significant in both cases, although those dimensions that are usually found to be significant such as individualism (Norton 2004) or autonomy (Licht et al. 2007) affect significantly only the assignment dimensions. One important point to note is the strong effect of uncertainty avoidance on the definition dimension with a positive sign. This might be explained by the fact that some rights included in the Civil Liberties index, such as workers’ rights to engage in strikes or granting asylum for refugees, are rather “entitlements” than property rights as understood by the approach I take (Holcombe 2014, pp. 473-474), or require government intervention against private players such as in the case of gender equality in economic matters. These rights provide

a shield against different risks on the market. Uncertainty avoidance is relatively high in some Eastern and Southern European countries, for example.

Within the controls latitude is more important in the case of definition than in the case of assignment, although it is not totally insignificant with the assignment dimension, either. The fact that it is only significant with one group of culture (religious) variables shows that culture may mean something similar to latitude, maybe because colonization is affected by geography and colonization indicates a strong cultural effect. This cultural effect, it seems, is more important in the case of the definition of rights than in the case of the assignment of rights. Ethnic fractionalizations has the “expected sign” only with assignment as the dependent variable; it has no effect on the definition dimension. Similarly, “non-English” legal origins has a negative sign as can be expected based on the literature.

**Table 2. Summary of the results: basic specifications**

	Dependent variable	
	definition of property rights	assignment of property rights
<b>Development</b>		Primary education (+) Log GDP p. c. (+)
	Primary education (+)	Primary education (+) Log GDP p. c. (+)
		Primary education (+)
		Primary education (+)
<b>Culture</b>	Catholic (+,+,+) Other Religions (+,+,+)	Other Religions (+)
	Power distance (-,-) Individualism (+,+,+)	Masculinity (-,-) Uncertainty avoidance (-,-)
	Uncertainty avoidance (+,+,+) Egalitarianism-hierarchy (+,+,+)	
<b>Controls</b>	French legal origin (-,-) Socialist legal origin (-) Latitude (+,+,+)	French legal origin (-) Socialist legal origin (-,-) Latitude (+) Ethnic fractionalization (-,-)
		French legal origin (-,-) German legal origin (-) Ethnic fractionalization (-)

*Notes: The table shows a summary of the results of the eighteen regressions described in detail in Table 8-10. The variables in the table are those that were found significant at the ten percent significance level at least once out of these 18 regressions. One cell represents three regressions: one without the development variables, one with log GDP per capita, and one with education. All three include the same cultural and control variables. That is, the number of pluses or minuses can only be one for a development variable and can be three at the maximum for cultural and control variables. For a description of the variables see the text and the notes to Table 8-10 in the Appendix.*

In sum, these results seem to give support to the idea that development has a more important effect on the assignment dimension of property rights, while culture has a larger effect on the definition dimension. As is usual with regressions, the results are not crystal clear. Trying some alternative specifications may make them more “robust”.

#### 4.3. Robustness tests: alternative controls and “colonial” variables

One approach to see whether this conclusion is robust is to try other controls – different proxies for roughly the same factors. Legal origin dummies that reflect a sort of European influence are replaced with different well-known proxies of European

influence: the fraction of the population speaking English and that speaking one of the major western European languages as a first language from Hall and Jones (1999). Latitude is not replaced with anything, but ethnic fractionalization is replaced with an alternative measure of fractionalization created by Fearon (2003).

Table 3. Summary of the results: alternative controls

	Dependent variable	
	definition of property rights	assignment of property rights
<b>Development</b>	Primary education (+)	Log GDP p.c. (+) Primary education (+) Primary education (+) Primary education (+)
	Muslim (-,-)	
	Other Religions (+,+)	
	Power distance (-)	Individualism (+)
<b>Culture</b>	Uncertainty avoidance (+,+,+)	Masculinity (-,-,-) Autonomy-embeddedness (+)
	Egalitarianism-hierarchy (+,+)	Mastery-harmony (-)
	English lang. frac.(-)	English lang. frac.(+)
	European lang. frac. (+,+,+)	
<b>Controls</b>	Latitude (+,+,+)	Latitude (+)
	European lang. frac. (+,+)	
	Latitude (+,+)	
	Latitude (+,+,+)	English lang. frac.(+,+)

Notes: The table shows a summary of the results of the eighteen regressions described in detail in Table 11-13. The variables in the table are those that were found significant at the ten percent significance level at least once out of these 18 regressions. One cell represents three regressions: one without the development variables, one with log GDP per capita, and one with education. All three include the same cultural and control variables. That is, the number of pluses or minuses can only be one for a development variable and it can be three at the maximum for cultural and control variables. For a description of the variables see the text and the notes to Table 11-13 in the Appendix.

The main difference is thus that these alternative European influence controls seem to be more of the cultural kind. English or French legal origins do not necessarily imply a higher share of the population speaking these languages, although in practice there is a correlation. But clearly the information they reflect is different: Malaysia and the US, for example both have English legal origins but they are clearly different culturally which is better reflected in the share of the population speaking English or European languages in general as a first language (0.89 as opposed to 0 and 0.97 as opposed to 0).

Table 3 summarizes the results of the regression with these controls in a similar way as before. The difference in the effect of development is similar to what it was before: development variables are more important with the assignment variable as the dependent one. There is not much difference, however, in the strength of effect of the cultural variables with the exception of religious ones, which may be because of the fact that the new controls are much more “cultural” than they were in the previous regressions. It seems that the cultural controls are more important in the case of

definition than in the case of assignment. Uncertainty avoidance retains its effect on the definition of property rights.

It is important to note that some controls such as latitude and European language fraction are much more significant with definition than with assignment, while English language fraction is more important and has a positive sign as a determinant of assignment (European language fraction held constant). On balance however, the European influence seems to be much more important for the definition dimension of property rights than for the assignment dimension.

To sum up the results of the first robustness test, the two predictions of the paper, namely that culture is more important for definition and development is more important for assignment, cannot be rejected with these alternative controls, especially when it is recognized that the alternative controls reflect cultural effects, too.

Although the results of the basic specification and the robustness tests have not rejected the basic ideas of this paper, they shed new light on them, because it seems it is especially “deep” elements of culture that are more important for definition than for assignment. To see this from a different angle I run another kind of robustness test here, which focuses only on those variables that are usually seen as proxies of the different ways colonization may have affected the development of property rights. What is important about these theories and proxies from the point of view of this paper is that with the help of these proxies it is possible to differentiate between a probable cultural effect of colonization and the effect that is derived only from the strategy of colonization and not from the identity of the colonizers. This may help check whether deeper cultural effects are really more important for the definition dimension than for the assignment dimension.

Three relatively well-known variables are used as independent ones in these robustness tests. One is the settler mortality data from Acemoglu et al. (2001). According to their argument, settler mortality was crucial for colonizers in choosing the kind of colonization strategy they would follow. In areas where it was hard for Europeans to live because different diseases caused high mortality, the Europeans followed an extractive strategy, which lead to insecure property rights. In this argument, therefore, it is not the identity or culture of the colonizers that matter but the natural conditions they encountered.

To proxy “European influence” I will use three variables. Two of them are the English fraction and European language fraction from Hall and Jones (1999) I used above. As an alternative to these two I will also use the “Euroshare” variable of Easterly and Levine (2014) which measures the share of the European population during the time of colonization. The reason for using these four particular variables is that we can see settler mortality as the one that accounts for the technology of enforcement, while the other three proxies can be seen as those that account for the European cultural effect. This interpretation is suggested by the construction of these variables and the results they inspired.

Using these four variables as independent variables provides us with another way to separate the “deeper” cultural effect on the definition and on the assignment of property rights. Easterly and Levine (2014) themselves examine the relation between their Euroshare measure and the settler mortality variable of Acemoglu et al. (2001). Although their result that even small minorities of European populations matter positively for economic development seems to contradict that of Acemoglu et al. (2001), Easterly and Levine (2014, p. 5) concludes that their measure reflects some



“countervailing forces, such as the transmission and dissemination of human capital skills and technology” that “overcame any adverse effects from small European settlements”. The mechanism transmitted by this measure is therefore different from what the settler mortality measure accounts for. Empirically they show that there is no independent effect running from settler mortality to Euroshare (ibid., p.15). Another relevant result of Easterly and Levine (2014) is that their Euroshare measure does not significantly affect development when it is included together with either education or with government quality as a dependent variable. This suggests that both settler mortality and Euroshare may exert their effects on development through institutions, but that they represent two different mechanisms.

**Table 4. Variables of colonial heritage and the two dimensions of property rights**

	<b>Dependent variable:</b>			
	<b>definition dimension</b>	<b>dimension</b>	<b>assignment dimension</b>	
	<b>(1)</b>	<b>(2)</b>	<b>(3)</b>	<b>(4)</b>
constant	-0.635 (0.442)	-0.561 (0.559)	0.855 (0.560)	0.788 (0.625)
log settler mortality	0.021 (0.081)	0.049 (0.113)	-0.272 (-2.92)***	-0.241 (0.125)*
Euroshare		2.200 (0.553)***		0.666 (0.601)
English lang. frac.	0.615 (0.336)*		0.133 (0.326)	
European lang. frac	0.843 (0.249)***		0.311 (0.336)	
R <sup>2</sup>	0.308	0.316	0.231	0.198
adj. R <sup>2</sup>	0.278	0.285	0.197	0.161
number of obs.	73	46	73	46

*Heteroscedasticity robust standard errors are in parentheses. Letters in the upper index refer to significance: \*\*\*: significance at 1 %, \*\*: significance at 5%. Standard errors without an index mean that the coefficient is not significant even at the 10 % level.*

*The dependent variables are the two dimensions of property rights derived from the factor analysis detailed in section 3.1. Log settler mortality is the log mortality rates of soldiers, bishops, and sailors stationed in the colonies between the seventeenth and nineteenth centuries from Acemoglu et al. (2001). Euroshare is the European share of the population during colonization from Easterly and Levine (2014). English lang. frac. and European lang. frac are the fraction of the population speaking English and the fraction of the population speaking one of the major languages of Western Europe: English, French, German, Portuguese, or Spanish.*

The results of the regressions that are run with these insights in mind are shown in Table 4. The two dependent variables are the same as before, the independent ones are those which I have just described. Since the language fraction variables and the Euroshare variable are alternative measures of the same, I do not include them together. The prediction does not seem to be rejected again. European and English language and the Euroshare variables are only significant at the usual level when it is the definition dimension that is to be “explained”. Log settler mortality has no significant effect in this case. When, however, it is the assignment dimension which the regressions are run on, the exact opposite is true: log settler mortality matters at the usual statistically significant level, while the European influence variables do not.

To sum up the regression results, as we have seen and as is usually the case with regression results they are not crystal clear. The predictions are not rejected, however, since a balanced evaluation of the cross-country regressions above is that the variables

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of economic development have a larger and a statistically more significant effect on the assignment dimension than on the definitions dimension. The regressions results even add something to the theoretical prediction because they show that although cultural variables are more important for the definition dimension in general, it is especially true for the “deeper” cultural variables – those that measure religious adherence and European influence in the very long run.

## 5. Conclusions

This paper has tried to take the “economic approach” to property rights seriously as a guide to understanding cross-country variation of property rights security. Taking such a close look at the implications of this approach reveals that to simply see it as the prediction that higher GDP leads to better property rights security is mistaken for three reasons. First, because property rights quality is a two-dimensional concept: the definition of property rights and the assignment of property rights are two separate constitutional decisions. Second, the effect of economic development may be different on these two dimensions of property rights. Third, as a determinant of transaction costs, culture should be considered; culture does not exist outside the box of the economic approach to property rights.

Trying to apply these insights consistently has led to the conclusion that the definition dimension is affected by development less strongly and by culture more strongly than the assignment dimension is. Results of the cross-country regressions have not rejected these predictions, but they also have shown that the effect of culture may be even more complicated than the theoretical argument implies. Deeper layers of culture seem to have a greater effect on the dimension of property rights and a lesser effect on the assignment of rights.

All in all, following the economic approach in order to understand cross country variance of property rights security is fruitful. It might help us understand the different causal mechanisms through which a higher level of economic development leads to more secure property rights, and can help us see how different layers of culture may affect them through changing the transaction costs of the assignment and definition of property rights.

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## Appendix 1. Statistics from the factor analysis used in section 4.1.

Table 5. Descriptive Statistics of freedom components

	<b>Civil Liberties sub-component/ Economic Freedom areas</b>	<b>Mean</b>	<b>Std. Dev.</b>	<b>No. of countries</b>
civil rights subcategories	Freedom of Expression and Belief	12.16	3.78	122
	Associational and Organizational Rights	8.58	3.43	122
	Rule of Law	9.03	4.54	122
	Personal Autonomy and Individual Rights	10.28	3.77	122
economic freedom areas	Size of Government	6.34	1.38	122
	Legal Structure and Property Rights	5.90	1.93	122
	Sound Money	8.14	1.51	122
	Freedom to trade internationally	6.97	1.36	122
	Regulation	6.77	0.95	122

Table 6. Communalities

	<b>Civil Liberties sub-component/ Economic Freedom areas</b>	<b>Initial</b>	<b>Extraction</b>
civil rights subcategories	Freedom of Expression and Belief	0.890	0.805
	Associational and Organizational Rights	0.896	0.887
	Rule of Law	0.921	0.944
	Personal Autonomy and Individual Rights	0.877	0.891
economic freedom areas	Size of Government	0.203	0.086
	Legal Structure and Property Rights	0.701	0.544
	Sound Money	0.572	0.564
	Freedom to trade internationally	0.610	0.770
	Regulation	0.435	0.436

Table 7. Total Variance Explained

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Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	5.277	58.637	58.637	5.045	56.051	56.051	3.327	36.968	36.968
2	1.239	13.770	72.407	0.882	9.803	65.854	2.600	28.887	65.854
3	0.956	10.620	83.027						
4	0.583	6.475	89.503						
5	0.415	4.606	94.109						
6	0.275	3.050	97.159						
7	0.135	1.501	98.660						
8	0.066	0.730	99.390						
9	0.055	0.610	100.000						

*Extraction Method: Principal Axis Factoring.*

## Appendix 2. Regression results of the basic specification

Table 8. Cross-country regressions: basic specifications with religious adherence variables

	Dependent variable:					
	definition dimension			assignment dimension		
	(1)	(2)	(3)	(4)	(5)	(6)
constant	-0.830 (0.357) <sup>***</sup>	-1.563 (0.847) <sup>*</sup>	-1.120 (0.425) <sup>***</sup>	0.206 (0.406)	-3.172 (0.950) <sup>***</sup>	-0.344 (0.395)
log of GDP p.c.		0.105 (0.114)			0.458 (0.135) <sup>***</sup>	
log of average years of primary schooling			0.222 (0.148)			0.473 (0.108) <sup>***</sup>
Catholic	0.800 (0.302) <sup>**</sup>	0.739 (0.302) <sup>**</sup>	0.743 (0.291) <sup>**</sup>	0.136 (0.265)	-0.220 (0.287)	0.063 (0.258)
Protestant	0.642 (0.431)	0.336 (0.464)	0.688 (0.443) <sup>**</sup>	0.095 (0.608)	-0.631 (0.579)	-0.009 (0.535)
Muslim	-0.459 (0.356)	-0.451 (0.363)	-0.177 (0.408)	-0.226 (0.367)	-0.233 (0.313)	0.098 (0.325)
Other religions	1.121 (0.560) <sup>**</sup>	1.342 (0.662) <sup>*</sup>	1.598 (0.658) <sup>**</sup>	-1.053 (0.487) <sup>**</sup>	-0.283 (0.446)	-0.278 (0.466)
French legal or.	-0.354 (0.196) <sup>*</sup>	-0.353 (0.187) <sup>*</sup>	-0.223 (0.214)	-0.391 (0.217) <sup>*</sup>	-0.212 (0.200)	-0.277 (0.209)
German legal or.	-0.088 (0.249)	-0.153 (0.276)	-0.052 (0.246)	-0.173 (0.208)	-0.031 (0.202)	-0.277 (0.209)
Scandinavian legal origin	-0.321 (0.266)	-0.262 (0.286)	-0.306 (0.274)	-0.225 (0.522)	0.070 (0.536)	-0.142 (0.492)
Socialist legal origin	-0.646 (0.203) <sup>***</sup>		-0.322 (0.295)	-3.899 (-0.239) <sup>***</sup>		-3.312 (0.231) <sup>***</sup>
latitude	2.396 (0.437) <sup>***</sup>	2.313 (0.540) <sup>***</sup>	2.165 (0.455) <sup>***</sup>	0.985 (0.516) <sup>*</sup>	0.005 (0.772)	0.575 (0.498)
ethnic fractionalization	-0.173 (0.316)	-0.205 (0.340)	-0.133 (0.327)	-0.397 (0.369)	-0.464 (0.366)	-0.234 (0.342)
R <sup>2</sup>	0.511	0.518	0.506	0.382	0.416	0.452
adj. R <sup>2</sup>	0.464	0.463	0.450	0.323	0.349	0.390
number of obs.	115	99	110	115	99	110

Heteroscedasticity robust standard errors are in parentheses. Letters in the upper index refer to significance: <sup>\*\*\*</sup>: significance at 1%, <sup>\*\*</sup>: significance at 5%. Standard errors without an index mean that the coefficient is not significant even at the 10% level.

The dependent variables are the two dimensions of property rights derived from the factor analysis detailed in section 3.1. Log GDP p. c. is the natural logarithm of CGDPe per capita in 1970 from Feenstra et al (2013), log of average years of primary schooling are from Barro and Lee (2013) and measure the average primary school years of those above the age of 15 for the year 1970. Catholic, Protestant, Muslim, and Other Religions reflect adherence fractions of the population and are from Barro (2003). Legal origins are dummy variables with the value of one if the country's legal system has the origin indicated, English legal origin is the omitted one, and the data are from LaPorta et al. (2008). Latitude is the latitude of the country centroid from Gallup et al. (2001) in absolute value and divided by 90. Data on ethnic fractionalization are from Alesina et al. (2003)



Table 9. Cross-country regressions: basic specifications with Hofstede’s cultural dimensions

	Dependent variable:					
	definition dimension			assignment dimension		
	(1)	(2)	(3)	(4)	(5)	(6)
constant	-0.854 (0.617)	-2.037 (1.250)*	-1.206 (0.625)*	1.518 (0.706)	-1.824 (1.979)	0.874 (0.605)
log of GDP p.c.		0.154 (0.153)			0.469 (0.217)**	
log of average years of primary schooling			0.363 (0.171)**			0.664 (0.132)***
power distance	-0.009 (0.005)*	-0.007 (0.005)	-0.009 (0.005)*	-0.004 (0.004)	0.003 (0.005)	-0.003 (0.004)
individualism	0.016 (0.006)***	0.011 (0.007)*	0.013 (0.006)**	0.012 (0.007)	0.006 (0.008)	0.007 (0.005)
masculinity	-0.002 (0.004)	-0.005 (0.004)	-0.003 (0.003)	-0.009 (0.006)	-0.022 (0.009)**	-0.010 (0.005)*
uncertainty avoidance	0.019 (0.006)***	0.019 (0.006)***	0.018 (0.005)***	-0.007 (0.005)	-0.009 (0.005)*	-0.009 (0.005)*
French legal or.	-0.158 (-0.259)	-0.187 (-0.283)	-0.124 (0.266)	-0.110 (0.294)	-0.211 (0.239)	-0.047 (0.213)
German legal or.	0.239 (0.273)	0.044 (0.282)	0.141 (0.284)	0.130 (0.285)	0.381 (0.281)	-0.049 (0.176)
Scandinavian legal origin	0.471 (0.329)	0.180 (0.323)	0.358 (0.329)	-0.390 (0.439)	-1.064 (0.538)*	-0.598 (0.422)
Socialist legal origin						
latitude	-0.186 (0.907)	-0.208 (0.706)	-0.151 (0.877)	-0.659 (0.756)	-0.703 (0.768)	0.596 (0.544)
ethnic fractionalization	-0.207 (0.405)	-0.256 (0.468)	-0.107 (0.407)	-0.825 (0.502)	-0.766 (0.443)*	-0.642 (0.372)*
R <sup>2</sup>	0.591	0.660	0.630	0.325	0.491	0.477
adj. R <sup>2</sup>	0.524	0.586	0.561	0.215	0.380	0.381
number of obs.	65	57	65	65	57	65

Heteroscedasticity robust standard errors are in parentheses. Letters in the upper index refer to significance: \*\*\*: significance at 1 %, \*\*: significance at 5%. Standard errors without an index mean that the coefficient is not significant even at the 10 % level.

The dependent variables are the two dimensions of property rights derived from the factor analysis detailed in section 3.1. Log GDP p. c. is the natural logarithm of CGDPe per capita in 1970 from Feenstra et al (2013), log of average years of primary schooling are from Barro and Lee (2013) and measure the average primary school years of those above the age of 15 for the year 1970. Power distance, individualism, masculinity, and uncertainty avoidance are cultural dimensions developed in Hofstede et al. (2010), while the data are from Hofstede et al. (2012).

Legal origins are dummy variables with the value of one if the country’s legal system has the origin indicated, English legal origin is the omitted one, and the data are from LaPorta et al. (2008). Latitude is the latitude of the country centroid from Gallup et al. (2001) in absolute value and divided by 90. Data on ethnic fractionalization are from Alesina et al. (2003)

Table 10. Cross-country regressions: basic specifications with Schwartz's cultural dimensions

	Dependent variable:					
	definition dimension			assignment dimension		
	(1)	(2)	(3)	(4)	(5)	(6)
constant	-0.038 (0.667)	-1.021 (1.755)	-0.040 (0.670)	1.216 (0.678)*	-2.262 (2.465)	0.440 (0.635)
log of GDP p.c.		0.051 (0.193)			0.378 (0.274)	
log of average years of primary schooling			0.001 (0.130)			0.535 (0.123)***
autonomy-embeddedness	0.025 (0.112)	-0.114 (0.149)	0.025 (0.113)	0.146 (0.112)	-0.002 (0.179)	0.162 (0.105)
egalitarianism-hierarchy	0.567 (0.191)**	0.435 (0.198)**	0.566 (0.191)***	-0.032 (0.196)	-0.232 (0.196)	-0.154 (0.198)
mastery-harmony	-0.020 (0.183)	-0.050 (0.206)	-0.020 (0.186)	-0.347 (0.213)	-0.391 (0.282)	-0.339 (0.217)
French legal or.	-0.170 (0.354)	0.020 (0.365)	-0.170 (0.358)	-1.053 (0.441)**	-0.867 (0.553)	-0.966 (0.426)**
German legal or.	0.384 (0.405)	0.296 (0.415)	0.384 (0.411)	-0.630 (0.445)	-0.511 (0.536)	-0.794 (0.425)*
Scandinavian legal origin	-0.100 (0.350)	-0.230 (0.359)	-0.100 (0.355)	-0.740 (0.480)	-0.709 (0.655)	-0.717 (0.458)
Socialist legal origin						
latitude	0.516 (1.038)	1.815 (0.931)*	0.516 (1.056)	0.113 (1.029)	0.351 (1.358)	-0.011 (0.990)
ethnic fractionalization	0.526 (0.549)	0.672 (0.608)	0.528 (0.551)	-1.133 (0.608)*	-0.966 (0.630)	-0.808 (0.559)
R <sup>2</sup>	0.557	0.585	0.557	0.343	0.414	0.404
adj. R <sup>2</sup>	0.469	0.475	0.455	0.211	0.258	0.267
number of obs.	49	44	49	49	44	49

Heteroscedasticity robust standard errors are in parentheses. Letters in the upper index refer to significance: \*\*\*: significance at 1 %, \*\*: significance at 5%. Standard errors without an index mean that the coefficient is not significant even at the 10 % level.

The dependent variables are the two dimensions of property rights derived from the factor analysis detailed in section 3.1. Log GDP p. c. is the natural logarithm of CGDPe per capita in 1970 from Feenstra et al (2013), log of average years of primary schooling are from Barro and Lee (2013) and measure the average primary school years of those above the age of 15 for the year 1970. Cultural variables come from principal component analysis of each of the two components Schwartz (2008:8-10) identifies as "bipolar dimensions" of culture. That is, based on the Licht et al. (2007) data autonomy-embeddedness is the first principal component of intellectual autonomy, affective autonomy and the negative of embeddedness; egalitarianism-hierarchy is the first principal component of egalitarianism and the negative of hierarchy; mastery-harmony is the first principal component of mastery and the negative of harmony. Legal origins are dummy variables with the value of one if the country's legal system has the origin indicated, English legal origin is the omitted one, and the data are from LaPorta et al. (2008). Latitude is the latitude of the country centroid from Gallup et al. (2001) in absolute value and divided by 90. Data on ethnic fractionalization are from Alesina et al. (2003)

### Appendix 3. Regression results of the first robustness tests

Table 11. Cross-country regressions: robustness test with religious adherence variables

	Dependent variable:	
	definition dimension	assignment dimension

	(1)	(2)	(3)	(4)	(5)	(6)
constant	-0.877 (0.302) <sup>***</sup>	-1.591 (1.018)	-1.169 (-3.38) <sup>***</sup>	0.344 (0.477)	-3.004 (0.948) <sup>***</sup>	-1.072 (0.519) <sup>**</sup>
log of GDP p.c.		0.109 (0.126)			0.406 (0.142) <sup>***</sup>	
log of average years of primary schooling			0.244 (0.136) <sup>*</sup>			0.641 (0.196) <sup>***</sup>
Catholic	-0.141 (0.281)	-0.123 (0.265)	-0.110 (0.261)	0.094 (0.407)	-0.192 (0.266)	0.114 (0.364)
Protestant	0.068 (0.335)	-0.038 (0.322)	0.079 (0.323)	0.248 (0.426)	-0.299 (0.335)	0.226 (0.384)
Muslim	-0.908 (0.337) <sup>***</sup>	-0.868 (0.369) <sup>**</sup>	-0.539 (0.396)	-0.159 (0.441)	-0.305 (0.293)	0.398 (0.494)
Other religions	0.971 (0.567) <sup>*</sup>	1.054 (0.656)	1.545 (0.639) <sup>**</sup>	-0.736 (0.628)	-0.440 (0.471)	0.286 (0.707)
English lang. frac.	-0.273 (0.218)	-0.299 (0.208)	-0.406 (0.213) <sup>*</sup>	0.577 (0.259) <sup>**</sup>	0.356 (0.307)	0.216 (0.291)
European lang. frac	0.665 (0.169) <sup>***</sup>	0.566 (0.169) <sup>***</sup>	0.677 (0.151) <sup>***</sup>	0.107 (0.45)	-0.143 (0.264)	0.117 (0.256)
latitude	2.697 (0.362) <sup>**</sup>	2.337 (0.519) <sup>*</sup>	2.466 (0.386) <sup>***</sup>	1.352 (2.29) <sup>**</sup>	0.312 (0.783)	0.767 (0.618)
ethnic fractionalization	0.042 (0.286)	-0.029 (0.29)	0.122 (0.295)	-0.222 (0.347)	-0.342 (0.333)	0.082 (0.328)
R <sup>2</sup>	0.524	0.526	0.534	0.264	0.408	0.385
adj. R <sup>2</sup>	0.485	0.476	0.485	0.200	0.344	0.321
number of obs.	102	94	97	102	94	97

Heteroscedasticity robust standard errors are in parentheses. Letters in the upper index refer to significance: \*\*\*: significance at 1%, \*\*: significance at 5%. Standard errors without an index mean that the coefficient is not significant even at the 10% level.

The dependent variables are the two dimensions of property rights derived from the factor analysis detailed in section 3.1. Log GDP p. c. is the natural logarithm of CGDPe per capita in 1970 from Feenstra et al (2013), log of average years of primary schooling are from Barro and Lee (2013) and measure the average primary school years of those above the age of 15 for the year 1970. Catholic, Protestant, Muslim, and Other Religions reflect adherence fractions of the population and are from Barro (2003). English lang. frac. and European lang. frac are the fraction of the population speaking English and the fraction of the population speaking one of the major languages of Western Europe: English, French, German, Portuguese, or Spanish. Latitude is the latitude of the country centroid from Gallup et al. (2001) in absolute value and divided by 90. Data on ethnic fractionalization are from Fearon (2003).

Table 12. Cross-country regressions: robustness test with Hofstede's cultural dimensions

	Dependent variable:					
	definition dimension			assignment dimension		
	(1)	(2)	(3)	(4)	(5)	(6)
constant	-0.735 (0.338)**	-1.719 (1.255)		1.044 (0.699)	-1.308 (2.112)	0.278 (0.581)
log of GDP p.c.		0.126 (0.149)			0.293 (0.266)	
log of average years of primary schooling			0.340 (0.164)			0.619 (0.134)***
power distance	-0.007 (0.003)*	-0.006 (0.004)	-0.006 (0.004)	-0.003 (0.004)	-0.000 (0.005)	-0.001 (0.003)
individualism	0.008 (0.005)	0.005 (0.006)	0.006 (0.005)	0.013 (0.006)	0.008 (0.008)	0.010 (0.004)**
masculinity	-0.005 (0.003)	-0.005 (0.003)	-0.005 (0.004)	-0.012 (0.005)**	-0.011 (0.006)*	-0.011 (0.005)**
uncertainty avoidance	0.013 (0.004)***	0.012 (0.004)***	0.012 (0.007)***	-0.003 (-0.006)	-0.004 (0.006)	-0.004 (0.006)
English lang. frac.	0.157 (0.244)	0.166 (0.236)	0.011 (0.222)	0.275 (0.366)	0.295 (0.367)	0.009 (0.403)
European lang. frac.	0.349 (0.175)*	0.298 (0.181)	0.344 (0.161)**	0.053 (0.262)	-0.096 (0.241)	0.044 (0.244)
latitude	1.212 (0.622)*	1.123 (0.604)*	1.141 (0.624)*	-0.486 (0.730)	-0.607 (0.744)	-0.615 (0.597)
ethnic fractionalization	-0.335 (0.445)	-0.353 (0.454)	-0.138 (0.409)	-0.543 (0.440)	-0.550 (0.398)	-0.183 (0.308)
R <sup>2</sup>	0.667	0.676	0.706	0.345	0.390	0.480
adj. R <sup>2</sup>	0.610	0.611	0.648	0.233	0.268	0.378
number of obs.	56	55	56	56	55	56

Heteroscedasticity robust standard errors are in parentheses. Letters in the upper index refer to significance: \*\*\*: significance at 1 %, \*\*: significance at 5%. Standard errors without an index mean that the coefficient is not significant even at the 10 % level.

The dependent variables are the two dimensions of property rights derived from the factor analysis detailed in section 3.1. Log GDP p. c. is the natural logarithm of CGDPe per capita in 1970 from Feenstra et al (2013), log of average years of primary schooling are from Barro and Lee (2013) and measure the average primary school years of those above the age of 15 for the year 1970. Power distance, individualism, masculinity, and uncertainty avoidance are cultural dimensions developed in Hofstede et al. (2010), while the data are from Hofstede et al. (2012).

English lang. frac. and European lang. frac are the fraction of the population speaking English and the fraction of the population speaking one of the major languages of Western Europe: English, French, German, Portuguese, or Spanish. Latitude is the latitude of the country centroid from Gallup et al. (2001) in absolute value and divided by 90. Data on ethnic fractionalization are from Fearon (2003).

Table 13. Cross-country regressions: robustness test with Schwartz’s dimensions of culture

	Dependent variable:					
	definition dimension			assignment dimension		
	(1)	(2)	(3)	(4)	(5)	(6)
constant	-0.706 (0.470)	-2.189 (1.449)	-1.102 (-2.17)**	0.486 (0.728)	-2.182 (2.074)	-0.031 (0.778)
log of GDP p.c.		0.170 (0.182)			0.297 (0.264)	
log of average years of primary schooling			0.239 (0.105)			0.312 (0.157)*
autonomy-embeddedness	-0.110 (0.108)	-0.181 (0.126)	-0.136 (0.107)	0.263 (0.151)*	0.128 (0.180)	0.228 (0.148)
egalitarianism-hierarchy	0.313 (0.154)**	0.272 (0.163)	0.287 (0.155)*	-0.015 (0.157)	-0.145 (0.168)	-0.049 (0.154)
mastery-harmony	-0.051 (0.138)	-0.008 (0.140)	-0.023 (0.141)	-0.368 (0.198)*	-0.377 (0.224)	-0.332 (0.204)
English lang. frac.	-0.116 (0.361)	-0.317 (0.339)	-0.313 (0.414)	1.751 (0.522)***	1.465 (0.610)	1.493 (0.582)**
European lang. frac	0.242 (0.247)	0.286 (0.251)	0.323 (0.262)	-0.757 (0.432)*	-0.727 (-0.445)	-0.650 (0.452)
latitude	2.161 (0.916)**	2.183 (0.902)**	2.191 (0.922)**	-0.135 (1.348)	0.105 (1.257)	-0.096 (1.334)
ethnic fractionalization	0.622 (0.502)	0.638 (0.484)	0.778 (0.501)	-0.140 (0.521)	-0.006 (0.549)	0.064 (0.552)
R <sup>2</sup>	0.606	0.617	0.622	0.414	0.442	0.434
adj. R <sup>2</sup>	0.529	0.526	0.536	0.300	0.311	0.305
number of obs.	44	43	44	44	44	44

Heteroscedasticity robust standard errors are in parentheses. Letters in the upper index refer to significance: \*\*\*: significance at 1 %, \*\*: significance at 5%. Standard errors without an index mean that the coefficient is not significant even at the 10 % level.

The dependent variables are the two dimensions of property rights derived from the factor analysis detailed in section 3.1. Log GDP p. c. is the natural logarithm of CGDPe per capita in 1970 from Feenstra et al (2013), log of average years of primary schooling are from Barro and Lee (2013) and measure the average primary school years of those above the age of 15 for the year 1970. Cultural variables come from principal component analysis of each of the two components: Schwartz (2008, pp. 8-10) identifies as “bipolar dimensions” of culture. That is, based on the Licht et al. (2007) data autonomy-embeddedness is the first principal component of intellectual autonomy, affective autonomy and the negative of embeddedness; egalitarianism-hierarchy is the first principal component of egalitarianism and the negative of hierarchy; mastery-harmony is the first principal component of mastery and the negative of harmony. English lang. frac. and European lang. frac are the fraction of the population speaking English and the fraction of the population speaking one of the major languages of Western Europe: English, French, German, Portuguese, or Spanish. Latitude is the latitude of the country centroid from Gallup et al. (2001) in absolute value and divided by 90. Data on ethnic fractionalization are from Fearon (2003).