Direct and indirect effects between individualism, institutions and the homicide rate[1]

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ABSTRACT

The present paper evaluates whether people in highly individualistic cultures have a lower propensity to commit violent crimes in a cross-section of 74 countries. Several previous papers report a significant negative correlation between these two variables, but it is not well established whether the effect of culture on crime is direct or indirect. Including data from the World Justice Project, we find that the relation is only indirect because the quality of institutions has a moderating effect on crime. The data also show that individualistic nations generate a more effective juridical system which is mainly responsible for the variation in homicide rates across countries. These findings remain robust when we control for several confounding factors, such as income, inequality, the use of guns or alcohol, and even when we use instrumental variables for the individualism index.

Keywords: culture, individualism, homicides, institutions, juridical system.

JEL classification: C26, H73, P37, P48

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1. Introduction

Crime is the result of a behavioral distortion between individuals and community. Although there are laws, crime is an event noticed in all countries and at all levels of income. Crime has a perverse weight on society, slowing economic growth, causing inefficiency and generating persistent social costs (Detotto & Otranto, 2010). Laws, regulations, and sanctions are ways of dissuading people from committing an offense, but such factors are not the only ones to restrain crime, as the literature also points to the importance of the psychological, social and cultural aspects of committing a crime, Yamen et al. (2017). Recognizing the effect of culture on individual's behavior is widespread, and culture is responsible for a series of social phenomena (Hofstede, 1983, House et al., 2002, and Seleim & Bontis, 2009). Thus, one would expect that culture has an influential role on crime as well. Lappi-Seppälä and Lehti (2014) and Yamen et al. (2017) both provide an extensive analysis of correlations and potential links between different cultural dimensions and several types of crimes. However, in-depth studies of culture on crime and especially violent crime are still rare. A reason for the relative scarcity of papers on this aspect is that culture is a broad term with several dimensions, while a concise measurement is essential for an econometric evaluation. One of the most frequently used cultural indicators is the individualism-collectivism measure compiled by Hofstede (2011), which will also be used in the present study.

A series of recent studies show that individualism has a causal relation to innovation rates (Gorodnichenko & Roland, 2017), educational outcomes (Figlio et al., 2016), altruism (Chamlin and Cochran, 1997), and entrepreneurial activity (Dheer, 2017). The reason, according to these authors, lies in the fact that more individualistic cultures produce institutions that are more protective of private property, allowing greater individual gains and, consequently, stimulus to innovation, human capital, and economic activity. Moreover, individualistic societies place greater emphasis on individual freedoms and personal advantage over the collective, leading to a psychological barrier to carry out the crime (Yamen, Al Qudah, Badawi, & Bani-Mustafa, 2017). Certain cultures attach an intrapersonal derogatory role to the criminal act, meaning people with this barrier will prefer not to commit crimes, even if they remain undiscovered. Observations by Lappi-Seppälä and Lehti (2014) confirm that individualism is negatively correlated with the homicide rate and with its development over time.

The present paper is dedicated to estimating the effect of individualism on the homicide rate using Hofstede’s individualism measure in a cross-section of 74 countries. In contrast to most of the previous literature, we explicitly account for the quality of the juridical system, i.e., how well institutions work in a given country. We thus combine two strings of literature. The one on crime and

culture referred to above and a second, more extensive research area on institutions and culture. In this context, Licht et al. (2007) note that even though it might appear as a truism that the law on the books reflects cultural values, analyses in law and economics are lacking.

More specifically, the present paper evaluates two opposing hypotheses. (H1) People in highly individualistic countries are less likely to commit homicides for intrinsic reasons. (H2) More individualistic countries generate better institutions that curb crime more efficiently. Therefore, the observed correlation between individualism and criminality may probably represent an indirect effect which is moderated through a country's legal institutions. In the present case, we proxy for legal institutions using an aggregate measure of criminal justice efficiency from the World Justice Project (2018). This measure can be decomposed into seven components, allowing us to assess the relative importance of each of them on the homicide rate. To overcome a potential reverse causality between institutions and culture, we follow Gorodnichenko & Roland (2017) and instrument for the individualism measure. According to the authors, pathogen prevalence and the blood distance between each country and the UK (the most individualistic country in the sample) are two highly exogenous and credible instruments for individualism.

Our data show strong support for the hypothesis of the indirect relationship between individualism and the homicide rate (H2). The positive correlation between individualism and homicides disappears once we control for the quality of legal institutions. This finding is robust to other confounding factors such as income, human capital, inequality, gun ownership, and drug use. Through the instrumental variable regressions, we confirm that individualistic countries tend to produce better institutions. Our results thus show that culture itself is not the determinant variable for the propensity to commit crimes, but rather that the quality of legal institutions has an essential influence to repel crime. This idea was previously formulated by Hall (2009). Our empirical findings are also in line with the theoretical arguments in Haney (1982), Thome (2001) and Messner et al. (2008), who have claimed that a more individualistic society tends to push for better institutions and form laws that are more effective to preserve private property, reduce uncertainties in commercial transactions. According to these authors, institutions and laws also lead to more severe punishments that curb crime.

To strengthen the generalizability of our findings we repeat the main estimations with different indicators for the quality of institutions. Regarding hypothesis 2, we find that individualism positively impacts all of these institutional measures in a similar way. However, regarding hypothesis 1, the type of institutional measure makes a crucial difference. Using the three comprehensive institutional variables from Kuncic (2014) reveals that only the quality of legal institutions significantly reduces the number of homicides across countries. The absence of significance

regarding economic and political institutions can be understood as a placebo test and thus corroborate our previous interpretations. Finally, we also provide evidence that our results are not specific to violent crimes but also apply to other forms of criminal behavior. Neither does the composition of countries drive our results. Excluding countries in Latin America or Africa which might show a particular behavior because they have particularly been affected by European colonization or because they are on average more violent, even increases the effect of institutions on crime, while individualism itself remains without statistical significance in those regressions.

A major reason why we prefer to analyze homicides is because in traditionally violent nations with weakened police presence, other forms of crime such as thievery and robberies are not always registered because they are considered of less importance and little probability to be solved (Soares, 2004). Thus, using these variables to measure crime in a cross-section of countries would lead to measurement error problems. The record of these minor crimes is compromised in places where crime is most pronounced. On the other hand, we believe that this problem occurs at a less relevant scale when it comes to the case of homicides.

Durkheim (1957) already argued that the long-term decline in homicide rates in France may crucially be related to the rise of modern individualism. Eisner (2001) confirms this secular tendency for whole Europe and cites either individualism, religion or the increase in the state's institutional quality and comprehensiveness as the main explanations. Yet, Blickle (2006) finds no statistical significance effect of individualism on white-collar crimes. Le and Stockdale (2005) even observe a positive relation between individualistic attitudes and delinquency among adolescents. The empirical results on the relation between individualism and crime is thus not yet conclusive.

Our paper is also related to the following contributions on other types of crime and cultural dimensions. Zheng et al. (2013) found that companies in collectivist countries perceive a higher level of loan corruption than companies in individualist countries. In relation to financial crimes, Sanyal (2005) investigates the impact of culture on bribery, while Appel et al. (2014) verify its influence on creating an advantageous system for committing crime. In a similar analysis, Davidson et al. (2015) assess how the culture-related behavior of executives impacts the risk of fraudulent reporting. In addition, Yamen et al. (2017) test the importance of culture on dissuading financial crimes.

These authors all find evidence of cultural influence on their types of crimes. Regarding violent crimes, Rossow (2001) evaluates the culture of alcohol consumption and Grosjean (2014), the culture of honor. Both find evidence that these cultural characteristics increase the likelihood of a person committing murders. Violent profiles seem to be transmitted over generations and are especially present in places with low-quality institutions characterized by less formal law enforcement. The latter paper is a notable exception that relates cultural differences between Scottish

and Irish immigrants in the US to the local institutions and the following differences in violent behavior.

Following the seminal work of Acemoglu et al. (2001), many papers attempt to extend the econometric approach to measure the effect of institutions on the (long-run) development and growth in a cross-section of countries incorporating other related aspects, such as the distinction between formal and informal institutions (Williamson, 2009), trust in state institutions (Becker, Boeckh, Hainz, & Woessmann, 2016), or the transmission of cultural traits over generations and the interaction of immigration with local institutions (Grosjean, 2014); (Ehrl & Monasterio, 2017). See Alesina and Giuliano (2015) for a complete review of this literature. Our findings complement this string of literature and particularly Kyriacou (2016), who finds that the positive effect of individualistic cultures on institutions may in fact be responsible for the observed positive long-run development in nations with high-quality institutions. In other words, the positive correlation between GDP per capita and individualism disappears once governance, as measured by four different variables from the International Country Risk Guide (ICRG), is controlled for. Campos and Giovannoni (2017) and Mullings (2018) are two additional examples that test the mediating effect of institutions. The former finds a mediating effect on the probability of firms engaging in lobbying, while the latter obtains a mediating effect of institutions on growth in developing countries.

Using different cultural traits and a broader set of governance variables that include the rule of law and corruption, Licht et al. (2007) scrutinize the interrelations between culture and governance. They focus on the concepts of autonomy versus embeddedness, but also include Hofstede's cultural dimensions. As in our case, they apply 2SLS estimations using different instruments and obtain a positive effect of autonomy on institutional quality. Bjørnskov (2010) analyzes whether trust, i.e., a component of social capital and a nation's informal institution, affects the quality of governance; see also Knack and Keefer (1997). He also uses instrumental variables for trust and thus interprets the positive effect on governance as causal. In contrast to these and the present results, Garoupa (2018) observes the absence of cultural bias in the juridical system. Finding no statistical difference between the decisions of national and foreign appointed judges may be related to studying a single country with high institutional quality as opposed to a sample of countries with large variation in culture and institutions.

Our article is divided into three more sections besides this introduction. In the second section we present the data and the empirical strategy used to test our two hypotheses, in chapter three we expose the empirical results of each hypothesis and several robustness checks. The final section contains the main conclusions found in the present analysis.

2. Empirical strategy and data

The primary purpose of this study is to evaluate the relationship between individualism and crime, as measured by the homicide rate. We will empirically test the following two hypotheses:

Hypothesis 1 (H1): There is a direct negative relation between the degree of individualism and the probability to commit violent crimes.
Hypothesis 2a (H2a): Individualistic populations create better institutions to protect individuals' rights, restraining the occurrence of crimes.
Hypothesis 2b (H2b): Individualism indirectly affects crime through institutions.

Hypothesis 1 is the usual conclusion in the current literature on the economics of crime, Basically, Hypothesis 2 assumes that individualistic societies have different impacts on creating institutions and once we can confirm that the quality of institutions is relevant to explaining crime, one can conclude that individualism indirectly plays an important role in determining violence in a country.

Since individualism is a latent variable, we exploit the frequently used indicator of individualism constructed by Hofstede (2011). According to Hofstede's most recent definition, individualism and its opposite collectivism are understood as follows[5]:

a. Individualism: "defined as a preference for a loosely-knit social framework in which individuals are expected to take care of only themselves and their immediate families";
b. Collectivism: "represents a preference for a tightly-knit framework in society in which individuals can expect their relatives or members of a particular group to look after them in exchange for unquestioning loyalty". A society's position regarding this dimension is reflected in whether people's self-image is defined in terms of 'we' instead of 'I'.

There are arguments both in favor of a positive and negative relation between individualism and criminality. On the one hand, one might imagine that since individualistic people do not have strong group ties, their sense of society is impaired. Thus, their actions would be based on their maximum needs, not caring about the repercussion for others. In this situation, the psychological barrier to not committing crimes would be lower. Moreover, collectivistic people may have a greater

[5] The definitions stem from the online resources https://www.hofstede-insights.com/models/national-culture/.

ability to put themselves in the position of another individual and thus, have greater ability to understand the harmful effects of their acts on others. On the other hand, it is also possible to argue that people with collectivist characteristics would be concerned only with people in their interest group, not caring about the impacts on strangers. The empirically more relevant case will be evaluated through the test of our hypothesis 1.

Greif (1994) emphasizes that collectivist and individualistic systems imply differentiated patterns of wealth distribution and efficiency, suggesting that the individualistic system may be more efficient in the long run. In particular, Greif (1994) theoretically demonstrates that individualistic societies rely to a greater extent on external enforcement mechanisms, so that one would expect that the juridical system be more efficient. In fact, culture and institutions are related in many different ways and their interaction may also be of importance for the occurrence of crimes, as suggested by our hypothesis 2. According to the definitions in Williamson (2000), the first level of his notional model encompasses informal institutions, that is, customs, culture, traditions, and religion. Formal institutions like law and property rights are located one level below. Both levels are complementary and affect the behavior of firms and consumers, located at the third and fourth levels of analysis. In virtue of Williamson's model, the causes of economic growth, criminal behavior, etc., thus, should be rooted at the first and second level, i.e., in the nation's institutions. Consequentially, people with individualistic profiles tend to create institutions that better protect private law, which could lead to a more energetic punishment of any kind of transgression. Therefore, the perception of a more severe punishment discourages any principle of criminal act.

Two basic equations will be used to test these hypotheses. The first one is presented as follows:

$$homicides_i = \alpha_0 + \alpha_1 individualism_i + \alpha_2 law_i + X_i'\gamma + \varepsilon_i \quad (1)$$

Regarding the first model, the homicide variable is regressed on the index of individualism, the quality of institutions related to the juridical system in country i (law), and a series of control variables X_i in order to distinguish between the effects of the first two variables of interest on homicides. A positive and significant coefficient α_1 verifies the direct effect of individualism (H1). Observing $\alpha_1 = 0$ and a significant α_2 supports hypothesis 2b, but in order to confirm the indirect effect, the following second model needs to be estimated:

$$law_i = \beta_0 + \beta_1 individualism_i + \beta_2 income_i + \varepsilon_i \quad (2)$$

Thus, we will evaluate the impact of individualism on the behavior quality of the criminal justice system, controlling for country i's average income level. Observing $\beta_1 > 0$ supports hypothesis 2a and allows conclusion of H2b, given that we also encounter $\alpha_1 = 0$ and $\alpha_2 > 0$ in the previous estimation. The models used to analyze Hypotheses 1 and 2 will be multiple regressions with robust standard errors applied in a cross-section of 74 countries (see Appendix 1) for the year 2012.

Because some countries do not have exact data for the chosen year 2012 regarding murder rates, we consider the average homicide rate between 2010 and 2015. Therewith, we lose fewer observations and maintain a sample with sufficient variation at all income and individualism levels. In fact, we observe that despite the extended period, the murder rate has little variability. The same applies to Hofstede's cultural dimension. The latest available data stems from the year 2010, but since cultural traits are highly persistent, this does not pose a problem for our identification strategy (Alesina & Giuliano, 2015).

In addition to the OLS estimations exposed above, one may be concerned that the relation between individualism and institutions could be simultaneous. We will therefore also apply instrumental variables using the efficient two-step GMM estimation of model 2 in order to avoid a potential endogeneity bias. Note that even if the interrelation between culture and institutions occurs only in the long-run, a biased or even spurious effect of individualism on crime would be contrary to the hypotheses under evaluation in the study.

We follow Gorodnichenko & Roland (2017) and use the blood distance between each country and the United Kingdom, as well as the predominance of nine pathogenic agents[6] as instrumental variables for the individualism index. To be more specific, the blood distance variable is calculated as the Mahalanobis distance of frequency of blood types A and B in a given country relative to the frequency of blood types A and B in the UK because British society is recognized as the most individualistic in the world. This frequency of blood types is also genetically transmitted through generations.

In the case of pathogens, Murray and Schaller (2010) argue that the strong prevalence of pathogens led communities to adopt more collectivist values as a defense mechanism designed to deal with the increased incidence of diseases, emphasizing tradition, placing stronger limits on behavior, and showing less openness towards foreigners. Both the frequency of blood types and pathogens are clearly unrelated to the income level, productive abilities, the propensity of criminal

[7] Leishmanias, trypanosomes, malaria, schistosomes, filariae, leprosy, dengue, typhus, and tuberculosis.

behavior, or any type of other economic variable. Given the relevance, exogeneity, and the recurring use in the literature, both variables are highly suitable instruments for our purpose.

Regarding the crime rate, since we seek to address violent crimes in this paper, we opt to use the homicide rate published by the United Nations Office on Drugs and Crime (2018) as proxy. As mentioned in the introduction, although robberies, rapes and assaults are also considered violent crimes, the published data could expose measurement errors, since in places where homicides are more common, these crimes could be underreported.

Figure 1 – Individualism and homicide rates

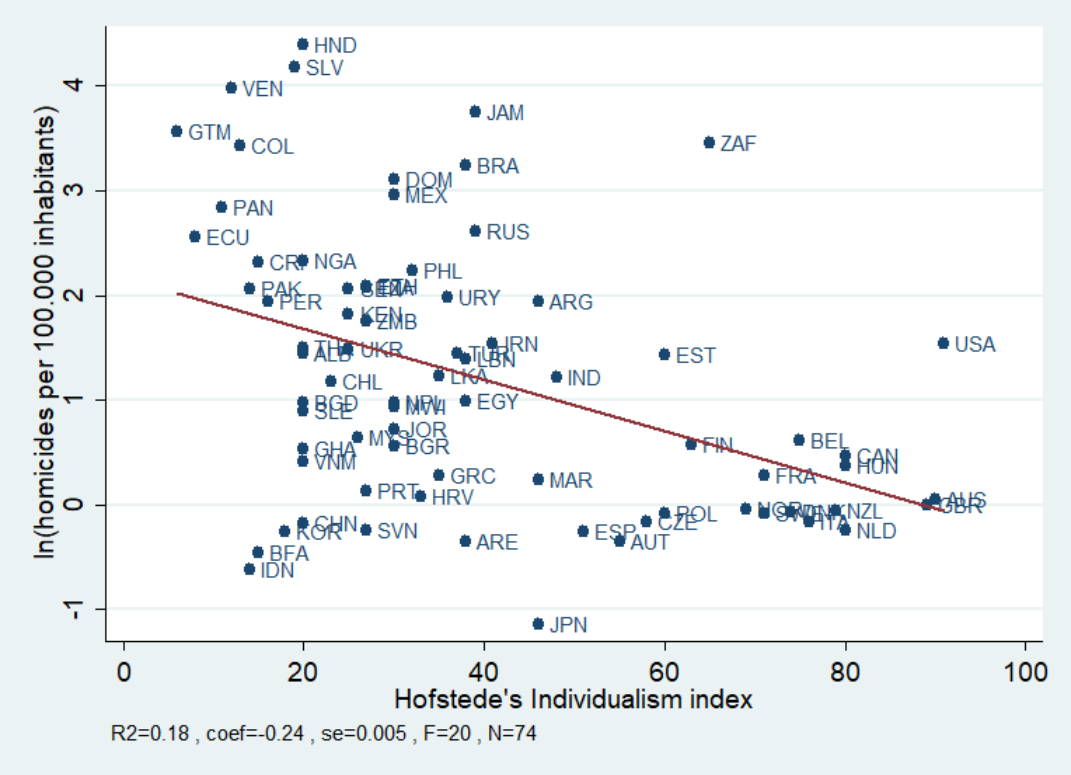


Figure 1 provides a first indication for a direct negative effect of individualism on the homicide rate. The log of homicides per 100.000 inhabitants varies from -1.2 in Japan to 4.5 in Honduras. The individualism index, displayed on the other axis covers values from 0.06 to 0.91. On the top of this individualism scale are the UK and its former colonies, Australia and the USA. The two former are among the least violent countries in the world, while many of the most violent and collectivistic countries are located in South and Central America.

In order to analyze the effects of the rule of laws, we choose institutions directly linked to crime and concern about existing violations. To this end, we adopted the *Criminal Justice Factor,* which is one component of the Rule of Law Index released annually by the World Justice Project (2018). The Criminal Justice Factor evaluates how the population considers its national criminal

justice system. It includes specific aspects of the juridical system such as the effectiveness of an investigation process, how long it takes to come to the final judgment, whether the process is impartial and free of government influence, among others. The Criminal Justice Factor is particularly suited for the present study because it evaluates individuals' views about the efficiency of institutions that are intended to fight crime. Thus, this index indicates how efficient the criminal system is in practice to deter crime rather than how well certain laws and procedures are defined on paper. Another advantage is that the Criminal Justice Factor can be disaggregated, allowing us to explore its subcomponents separately in the regressions to assess whether some items have a greater influence than others on the homicide rate. The seven individual components are listed in Table 1.

Table 1 – Criminal Justice Factor's subcomponents

Variable	**Description**
Law1	Criminal investigation system is effective
Law2	Criminal adjudication system is timely and effective
Law3	Correctional system is effective in reducing criminal behavior
Law4	Criminal system is impartial
Law5	Criminal system is free of corruption
Law6	Criminal system is free of improper government influence
Law7	Due process of law and the rights of the accused

Besides culture and the quality of institutions, other elements may obviously also have direct influences on the local crime rate. In order to isolate the effect of individualism and institutions on homicides, we include several confounding factors in the regressions, such as income, human capital, social inequality, possession of fire arms, drug and alcohol consumption; Thereby, we evaluate the existence of a comprehensive model that addresses various points that could explain the observed differences in crime rates across countries. Table 2 describes the main variables used in the following, as well as their definitions and sources, while Table 3 presents their descriptive statistics.[7]

Table 2 – Overview of variables

Variable	**Description**	**Source**
Homicides	Intentional homicides per 100,000 inhabitants	United Nations Office on Drugs and Crime
Income	GDP per capita (PPP)	International Monetary Fund

[7] The main limitation of our sample size comes from the availability of Hofstede's individualism data. Table 3 confirms that the index is defined for 74 countries and we limit the remainder variables to this basic sample. The human capital index and the inequality variable present also present gaps but to avoid a further reduction of sample size we complement these two variables with highly correlated, similar indicators from different sources. To impute values for the human capital index we use the years of schooling from the UNDP, run a simple regression involving these two variables and then use the predicted values for countries where human capital is unavailable. The same procedure is applied with the Coefficient of Human Inequality and the Gini index from the WIID.

Individualism	Hofstede's Index	Hofstede
Human capital	Index based on years of schooling and returns to education	Penn World Tables (version 8)
Inequality	Coefficient of Human Inequality	United Nations Development Program
Guns	Guns per 100 people, civilian ownership	Small Arms Survey
Share of men	Percentage of men in the total population	World Bank
Law	Rule of Law Index – Criminal Justice Factor	World Justice Project
Alcohol	Alcohol consumption per capita	World Health Organization

The most reliable measure for the number of weapons per country was found in the Small Arms Survey (2007), which includes both registered and unregistered weapons. Despite the temporal difference for our sample, we see two reasons that justify the use of this information. First, we believe that the number of weapons in a country has little change year after year, depending on significant changes in public policy or in weaponry, which take a long time. Second, the time lag in the guns variable eliminates a possible reverse causality problem since it would be possible that the amount of murders in a nation could lead people to buy more weapons for personal protection.

Table 3 – Descriptive statistics

Variable	**Obs.**	**Mean**	**Std. Dev.**	**Min.**	**Max.**
Homicides	74	8.67	15.03	0.32	81.55
Individualism	74	0.39	0.23	0.06	0.91
Income	74	19,878.59	15,603.82	1,024.88	64,699.88
Human capital	74	2.69	0.64	1.19	3.72
Guns	74	11.73	13.29	0.40	88.80
Law	74	0.51	0.17	0.16	0.85
Share of men	74	49.76	3.08	46.16	74.30
Inequality	70	19.25	9.68	5.30	41.20
Alcohol	74	5.95	3.94	0.00	15.70

Regarding the expected results in model 1, which has the homicide rate as dependent variable, we expect positive signs for the estimated coefficients of inequality and alcohol, because greater social inequality, and drug consumption tend to increase criminal incidents; consequently, the homicide rate should also be higher. These results would be in line with the work of Tardiff (2005), Lappi-Seppälä & Lehti (2014), and Fajnzylber et al. (2002). On the other hand, we expect negative effects for the variables individualism, income, human capital, and law. According to Gorodnichenko & Roland (2017) and Figlio et al. (2016), the more individualistic a population is, the greater its income and the better its education outcomes. Moreover, a higher quality of criminal institutions should also lead to a lower murder rate. With regard to the amount of men and weapons in a country, we do not have any priors regarding the sign and significance of these variables on crime.

Regarding the expected results in model 2, individualism and income should have positive coefficients. The more individualistic the population and the higher their income, the more efficient the criminal institutions should be. Regarding income, we expect that the wealthier nations with more financial resources impose structures (such as the budget of the police and the judicial system), that lead to a better performance in the fight against crime.

Since the homicide variable represents a rate and accumulates many values close to zero (see Figure 1), a logistic transformation was performed so that its distribution approaches a normal one. The same technique was used for guns and income. An identical transformation was applied to the variable of criminal institutions (law), but since there were no significant differences in their results, we preferred to keep this variable unaltered. A substantial advantage of the logistic distributions is that our regressions readily capture a possible non-linearity of the transformed variables.

3. Results

3.1 Testing H1: the direct effect of individualism

In the following, we test the first hypothesis that individualism has a direct influence on crime estimating equation (1). The results are presented in Table 4, where we subsequently add more and more control variables.

The estimation shown in the first column is a simple OLS regression of the individualism index on the logistic transformation of the log homicide rate per 100.000 inhabitants, including controls like the share of males, the relative quantity of fire arms in the population and the consumptions of alcohol. The negative and highly significant coefficient suggests that more individualistic countries suffer less from violent crimes.

However, from the moment we start considering the Criminal Justice Factor (law), the point estimate of the individualism index loses its significance. Instead, the variable that represents the quality of institutions is now the most relevant one in the estimation, as it not only diminishes the magnitude and significance of individualism, but of all other variables, leaving only the availability of guns significant in column (2). Its significance below the 1% level remains even in the most complete model in column (4), where we included the previous controls plus human capital and inequality. In addition, in column (5) we removed the variable law of the most complete model. The result showed that individualism returned to present significance, as well as its coefficient presented values closer to the one observed in column (1). This may indicate that, even with controls, the institutional factor captures the effect of individualism.

Table 4 - Individualism and homicides

	OLS

	(1)	(2)	(3)	(4)	(5)
Dependent. var.:			Homicides†		
Individualism	-3.241***	-0.077	-0.070	0.091	-2.171**
	(0.723)	(0.794)	(0.807)	(0.914)	(0.823)
Guns†	0.382***	0.300***	0.312***	0.320***	0.372***
	(0.094)	(0.080)	(0.097)	(0.120)	(0.124)
Share of men	-0.120***	-0.020	-0.020	-0.219	-0.328**
	(0.028)	(0.027)	(0.034)	(0.169)	(0.159)
Alcohol	-0.079*	0.025	0.030	0.008	-0.033
	(0.044)	(0.038)	(0.045)	(0.057)	(0.061)
Law		-6.875***	-6.736***	-6.086***	
		(1.086)	(1.221)	(1.507)	
Human capital			-0.064	0.232	0.198
			(0.441)	(0.474)	(0.589)
Income†			-0.017	0.137	0.177
			(0.274)	(0.333)	(0.364)
Inequality				0.055*	0.097***
				(0.028)	(0.032)
Constant	5.430***	1.863	1.904	10.279	13.374
	(1.704)	(1.530)	(3.484)	(9.339)	(8.929)
Adjusted R^2	0.26	0.50	0.49	0.48	0.34
F	11.47	20.61	14.25	11.00	9.31
Observations	74	74	74	70	70

† Logistic transformation

White-Huber robust standard errors in parentheses: * p < 0.10, ** p < 0.05, *** p < 0.01

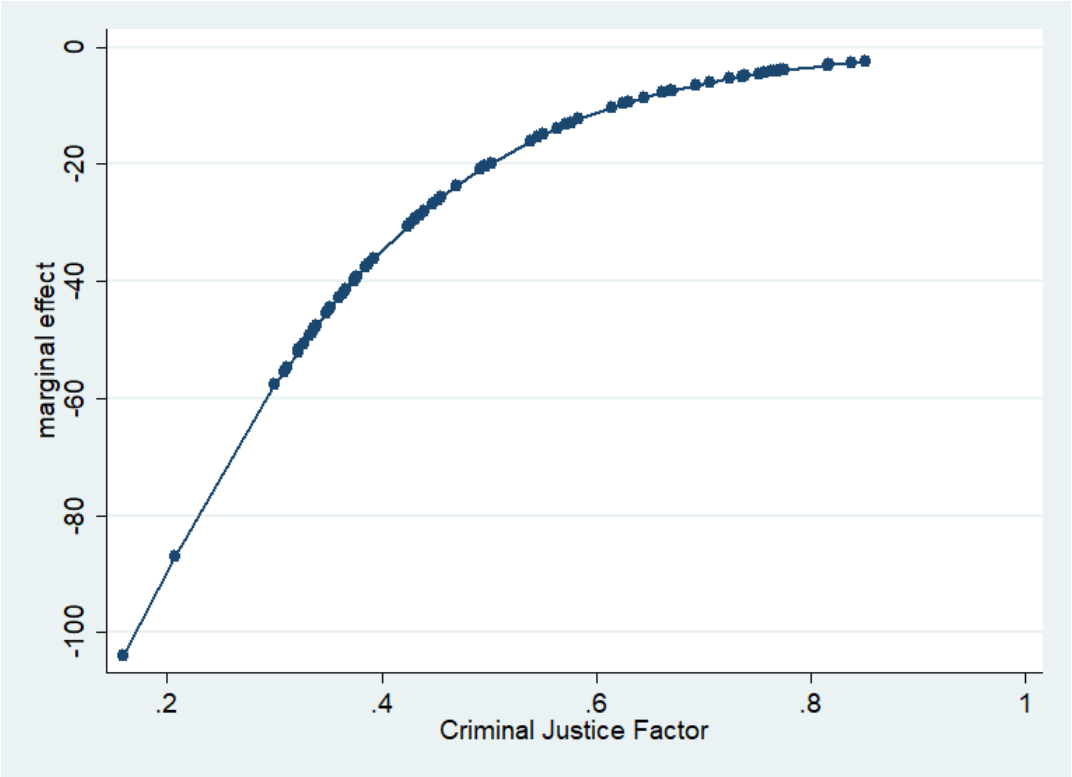
In sum, the results in Table 4 provide evidence against hypothesis 1. In other words, the data indicates that there is no direct relation between individualism and homicides, because the effect of individualism is close to zero once the quality of legal institutions is considered simultaneously. However, the relative dominance of the Criminal Justice Factor still allows for the possibility of an indirect effect of individualism on crime transmitted through the functioning of institutions. Thus, these observations still do not invalidate Hypothesis 2.

For the interpretation of the estimated coefficients, one needs to recall that the relation between the covariates and the homicide rate is non-linear. Thus, the marginal effects need to be calculated separately. Figure 2 provides the implied marginal effects of the Criminal Justice Factor on the homicide rate per 100.000 inhabitants based on the estimation in column (4), Table 4. Besides the coefficient α_2, the marginal effect also depends on all other estimated coefficients and on the actual values of the respective variables. Since our main interest is in the quality of institutions, we provide the marginal effects for each specific value of the Criminal Justice Factor in Figure 2 using the mean of all other variables. The marginal effect clearly depends on the quality of institutions. Specifically,

the negative marginal effect of institutional quality on the homicide rate is stronger for countries with a weak criminal system.

In the case of Brazil, where the quality of its criminal institutions is equal to 0.37 and the marginal effect is equal to -27, an increase to the level of Portugal (0.67) would imply a reduction of 8.1 homicides per 100.000 inhabitants, which corresponds to a 32% drop in its homicide rate. If this improvement (+0.30 points in the Criminal Justice Factor) were applied to the Mexican institutions (31.1), Mexico would be similar to Spain (61.5), and ceteris paribus the murder rate in Mexico would fall by 10.5 or 54%. For the USA, which has a homicide rate far below its Latin American peers and much higher institutional quality (0.64), an institutional improvement of the same magnitude would reduce deaths per 100,000 inhabitants by merely 2.4, but this reduction still corresponds to a relative drop of 52%. Note however, that the improvement in institutional quality by 0.3 would be quite expressive, as this change corresponds to almost two standard deviations.

Figure 2 – Marginal effects of the Criminal Justice Factor on the homicide rate



Notes: Each dot in the graph represents one observation from the sample, i.e. one country. For each observation and its specific value of the Criminal Justice Factor displayed on the horizontal axis, we calculate its specific marginal effect of the Criminal Justice Factor on the homicide rate per 100,000 inhabitants according to the estimated coefficient in Table 4, column (4).

Regarding the other significant variables in our preferred estimation, we observe that the possession of guns has a positive sign, indicating that a higher incidence of weaponry in a nation implies a higher homicide rate. However, we emphasize that since the variable captures the number of licit and illicit weapons, the result should not be seen as a definite justification for anti-gun policies. In our view, such a policy would only be effective if it also and expressively reached the illegal arsenal. Moreover, despite the time lag between homicides and gun possession, some endogeneity concerns remain and we caution the reader to interpret this as a causal effect. For more elaborate studies, see Levitt & Miles (2006), Duggan (2001), or Lott (1998).

The complete model in column 4 also suggests that social inequality tends to increase the homicide rate in a given country, as expected. Thus, individuals may be more motivated (or encouraged) to commit crimes not because of the precarious condition in which they live, but rather due to a psychological impression of injustice as they compare the amount of their resources to those of other citizens. Finally, the coefficients for alcohol consumption and the percentage of men were not significant, indicating that they are not of first-order relevance for the explanation of cross-country differences in homicide rates. The same applies to human capital and personal income since these variables have likewise lost their significance in the presence of individualism or the quality of institutions.

Before we proceed to evaluate the second hypothesis, we present some evidence for the robustness of the result in column (4). First, we use a different dimension of crime from the Global Competitiveness Report by the World Economic Forum (2018). The "Business costs of crime and violence" is based on the opinion of businessmen and represents to what extent the incidence of crime and violence impose costs on the economy. This alternative dimension of crime presents minor incidents, such as thefts and robberies, which are often not registered in official statistics. Second, we extracted from the original sample (Homicides) African and American countries. These countries could distort our results by presenting internal conflicts, whether for political reasons, or for drug trafficking. Appendix table A4 shows that neither the definition of crime (nor our specific focus on homicides), nor the composition of our sample is driving the main results here. The beta coefficient of the Criminal Justice Factor is almost the same as in the previous estimation on the number of homicides and interestingly its effect is even stronger once we include countries where the homicide rate per capita tends to be higher.

As another extension to these baseline results, we re-estimate the full model in column 4, Table 4, subsequently replacing the Criminal Justice Factor for each its components. The purpose of this exercise is to determine which of the factors of the criminal justice system are more relevant in the fight against murder. Table 5 shows that almost all subcomponents are statistically significant.

Comparing their magnitude to the aggregate index in column (1) shows that the first two subcomponents also excerpt a stronger effect on the homicide rate. These first two components reflect the people's perception of whether the crime will actually be investigated and whether the trial will occur in a timely and effective manner. Therefore, the components of the criminal system most linked to the probability of punishment are, in fact, the most relevant to explain differences in crime rates.

The third and fourth components also show statistical significance below 1%, with about half of the magnitude of the aggregate Justice factor. The third factor represents the efficiency of the corrective component which is apparently less decisive than whether the individual responsible for the crime is actually punished or not. The fourth component related to the impartiality of the juridical system is thus also important, even though only slightly and much less than the ones related to efficiency. Despite the different significance levels, the point estimates of all Criminal Justice subcomponents are negative, which confirms the inverse relation between institutional quality and homicides.

Table 5 – Subcomponents of criminal justice

				OLS				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent var.:				Homicides†				
Individualism	0.091	-0.081	0.414	-0.364	-1.454*	-1.134	-1.526*	-1.266
	(0.914)	(0.717)	(0.841)	(0.781)	(0.743)	(0.829)	(0.865)	(0.864)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Law	-6.086***	-6.539***	-6.675***	-4.536***	-3.483***	-2.413**	-1.030	-3.863**
	(1.507)	(1.438)	(1.372)	(1.220)	(1.198)	(1.090)	(0.865)	(1.490)
Law Variable	Law	Law1	Law2	Law3	Law4	Law5	Law6	Law7
Observations	70	70	70	70	70	70	70	70
R-squared	0.542	0.576	0.603	0.546	0.479	0.442	0.427	0.481
F	11	9.760	11.21	10.50	9.230	8.290	8.500	9.260
law (beta)	-0.693	-0.617	-0.719	-0.628	-0.357	-0.329	-0.188	-0.507

† Logistic transformation

All estimations include the full set of control variables, as in column 4, table 4. The definitions of the 7 components of the Criminal Justice Factor analyzed here are given in table 2. White-Huber robust standard errors in parentheses: * p < 0.10, ** p < 0.05, *** p < 0

3.2 Testing H2: the indirect effect of individualism

Once the influence of the institutional environment on homicides is confirmed and the absence of a direct relationship between individualism and crime is registered, we proceed to evaluate whether individualism is indirectly responsible for some of the disparities in the homicide rate across countries through an effect on the quality of legal institutions. By these means, we evaluate if hypotheses 2a and 2b are true.

Table 6 shows that individualism is apparently a determining factor for the quality of institutions as well as all its subcomponents. The first estimation shows that individualism alone is responsible for an impressive 49% of the variation in the institutional quality across the 74 countries in our sample. The relation to each of the subcomponents is somewhat lower, but still considerably high. Table 6 thus generally shows that the more individualistic the people of a country, the better their criminal institutions will be. This observation confirms our second hypothesis.

However, as previously discussed, it could be possible that there is a reverse relation between individualism and institutions. In addition to individualistic peoples generating more efficient institutions, these institutions could also foster a more individualistic attitude within the country. In order to avoid this simultaneity, we estimate the model with the use of instrumental variables.

Table 6 – Individualism, instrumental variables and institutions

	Efficient two-step GMM estimation							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent var.:	Law	Law1	Law2	Law3	Law4	Law5	Law6	Law7
Individualism	0.671***	0.412***	0.586***	0.705***	0.473***	0.775***	0.895***	0.880***
	(0.070)	(0.067)	(0.072)	(0.102)	(0.088)	(0.087)	(0.111)	(0.101)
Constant	0.239***	0.291***	0.265***	0.134***	0.304***	0.281***	0.200***	0.195***
	(0.028)	(0.029)	(0.032)	(0.042)	(0.037)	(0.039)	(0.050)	(0.041)
Observations	74	74	74	74	74	74	74	74
R-squared	0.494	0.390	0.418	0.415	0.248	0.467	0.425	0.323
1. F-stat	46.73	46.73	46.73	46.73	46.73	46.73	46.73	46.73
1. R2-part.	0.543	0.543	0.543	0.543	0.543	0.543	0.543	0.543
weak iv F	46.73	46.73	46.73	46.73	46.73	46.73	46.73	46.73
AR	98.85	39.10	76.48	59.07	40.96	71.44	51.58	148
AR-p	0	0	0	0	0	0	0	0
Hansen J	2.949	3.621	5.469	6.426	3.024	0.704	0.126	1.535
Hansen J-p	0.086	0.057	0.019	0.011	0.082	0.401	0.722	0.215
Individ. (beta)	0.879	0.540	0.768	0.923	0.620	1.016	1.173	1.153

Individualism is instrumented the blood distance and the frequency of pathogens in all estimations.
White-Huber robust standard errors in parentheses: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

According to the results presented in Table 6, we observe that the instrumented second-stage coefficients do not differ much from those found in the OLS estimations (not showed). The test statistics at the bottom of the table confirm that both instruments are highly relevant for the explanation of individualism. The Anderson-Rubin test indicates a rejection of the instruments' weakness and endogeneity. Finally, a test for the supposed endogeneity of the individualism variable indicates that this hypothesis can be rejected in half of the cases, confirming that reverse causality is not a major problem and that the previous estimations already yield reliable estimates. We are nevertheless now more confident to conclude that individualism is a highly relevant determinant of institutional quality, as well as of all of its subcomponents.

Finally, we provide one more robustness check in order to fortify the previous confirmation of Hypothesis 2. This time, we add income as a control variable. The reason for including this variable lies in the argument that a richer nation would have more resources for the police and judicial system and, therefore, its criminal system would be more efficient. Since this claim seems quite plausible, the omission of this variable could harm our specification. Note that when we add the income variable, the tests did not reject the null hypothesis of exogeneity, indicating that OLS would be an adequate method, and instrument uses were no longer necessary. The results are presented in Table 7.

Table 7 – Individualism, income and institutions

	OLS							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent var.:	Law	Law1	Law2	Law3	Law4	Law5	Law6	Law7
Individualism	0.333***	0.261***	0.334***	0.348***	0.190**	0.363***	0.588***	0.246***
	(0.079)	(0.071)	(0.087)	(0.111)	(0.076)	(0.094)	(0.132)	(0.079)
Human capital	0.070	0.069	0.090*	0.080	0.085	-0.010	0.081	0.097**
	(0.047)	(0.045)	(0.051)	(0.055)	(0.052)	(0.054)	(0.095)	(0.044)
Income†	0.034	0.007	-0.003	0.043	0.007	0.107***	0.017	0.057**
	(0.031)	(0.030)	(0.033)	(0.038)	(0.036)	(0.031)	(0.063)	(0.026)
Observations	74	74	74	74	74	74	74	74
R-squared	0.637	0.463	0.510	0.540	0.370	0.643	0.473	0.667
F	53.33	31.16	35.39	31.46	12.87	62.62	37.98	50.62
Individualism (beta)	0.436	0.408	0.458	0.375	0.280	0.394	0.499	0.289

† Logistic transformation

White-Huber robust standard errors in parentheses: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

By and large, even when we control by income and human capital, individualism remains significant in explaining the quality of institutions, although the magnitude of the coefficients decreased. The coefficients of income and human capital are positive, albeit rarely significant.

In order to reinforce the results from the tables 6 and 7, we perform robustness checks for other variables that measure institutional quality. We use the *Rule of Law* components of two indicators, the Worldwide Governance Indicator (World Bank, 2018) and the Index of Economic Freedom (The Heritage Foundation, 2018). According to the World Bank the former index captures perceptions of the extent to which agents have confidence in and abide by the rules of society. At the same time, the index provided by the Heritage Foundation assesses the level of quality of countries to protect property rights as well as the effectiveness of the judiciary and the integrity of government. Both of these indices are thus highly similar to the previously used Criminal Justice Factor. Furthermore, we use data provided by Kuncic (2014) who condenses more than 30 established institutional indicators into three homogeneous groups: legal, political and economic.

According to table A3 in the Appendix, all five alternative institutional indices seem to be directly influenced by the level of individualism of the local population, confirming the previous

results regarding hypothesis 2a. Both in the OLS and the GMM models individualism is highly significant and its positive effect is similar to the one on the Criminal Justice Factor. These observations indicate that countries with a more individualistic culture have been able to develop more efficient institutions of any kind: economic, political or of legal nature.

Table A2 tests hypothesis 2b, i.e., we regress the homicide rate on individualism, one of the five alternative institution indices and the full set of control variables. The World Bank Rule of Law index and Kuncic's legal institutions index clearly reduce crime, as expected. The effect of the Heritage Foundation Rule of Law / Economic Freedom index is considerably lower and only significant at the 10% level. Most interestingly, we do not observe any statistical significance for the economic and political institutions. Although, one would expect that they are correlated with the quality of legal institutions they seem to capture a different dimension that is unrelated to the effectiveness of institutions in the fight against crime. A direct consequence of the absence of legal institutions in these estimations is that individualism turns out be significant, as observed previously in the estimations without the Criminal Justice Factor in table 4. In fact, the estimations in table A2 with the economic and political institutions should be seem as a successful placebo test, since our main hypothesis is that only institutions that are directly related to the juridical system can be able to reduce crime in an effective manner.

4. Conclusion

The present paper evaluated whether there is a relation between a country's degree of individualism and its homicide rate. Our preferred estimation is able to explain more than half of the variation in the homicide rates in a cross-section analysis for 74 countries in the year 2012. The data show that culture and specifically the individualism-collectivism dimension do have an influence on the propensity to commit crimes. The more individualistic a nation is, the lower the number of murders will be. However, this influence turned out to be an indirect one, because it is moderated through the quality of the criminal system. Our results thus confirm the theoretical predictions regarding the positive relation between individualism and the quality of institutions in Greif (1994).

Using a logistic transformation of the homicide rate, we identified a significant non-linear effect of the juridical institutions. The lower its current value, the larger the marginal reduction of homicides is (in absolute terms) due to an improvement in institutional quality. The identified coefficients are significant throughout our estimations and their socioeconomic relevance is substantial. An improvement in the institutional environment by one standard deviation in Mexico and the USA would lead to a drop in the number of homicides per 100.0000 inhabitants by 6 and 1.4,

respectively. Yet, in relative terms, these improvements would imply a reduction of the current homicide rate by 30%.

In our opinion, the main message is that in order to fight (violent) crime, the country's juridical system needs to work well. Timely and effective investigations and adjunction turned out to be the major components of the juridical system as a whole. Investigations obviously include the performance of police as well as prosecutors. Whether or not the government influences the juridical system is not of first order importance. Besides the effectiveness of institutions, social inequality and the quantity of weapons are decisive in explaining the number of murders in the countries. For both variables, the relation was positive.

We applied our study to the most violent and severe form of crime, murder, because of data reasons. In principal, we see no objections as to why the relations identified in our study should not hold for other forms of crime. A concrete test of this hypothesis, however, is left for future research.

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Appendix

Table A1 – List of countries in the sample

Countries		
Albania	Ghana	Panama
Argentina	Greece	Peru
Australia	Guatemala	Philippines
Austria	Honduras	Poland
Bangladesh	Hungary	Portugal
Belgium	India	Russian Federation
Brazil	Indonesia	Senegal
Bulgaria	Iran, Islamic Rep.	Sierra Leone
Burkina Faso	Italy	Slovenia
Canada	Jamaica	South Africa
Chile	Japan	Spain
China	Jordan	Sri Lanka
Colombia	Kenya	Sweden
Costa Rica	Korea, Rep.	Tanzania
Croatia	Lebanon	Thailand
Czech Republic	Malawi	Turkey
Denmark	Malaysia	Ukraine
Dominican Republic	Mexico	United Arab Emirates
Ecuador	Morocco	United Kingdom
Egypt, Arab Rep.	Nepal	United States
El Salvador	Netherlands	Uruguay
Estonia	New Zealand	Venezuela, RB
Ethiopia	Nigeria	Vietnam
Finland	Norway	Zambia
France	Pakistan	

Table A2 – Homicides and other institutions

	OLS					
	(1)	(2)	(3)	(4)	(5)	(6)
Institutions:	Law	WB	Heritage	Legal	Political	Economic
Dependent var.:	Homicides[†]					
Individualism	0.091	-0.279	-1.324	-0.945	-1.690**	-1.873**
	(0.914)	(0.837)	(0.821)	(0.802)	(0.779)	(0.775)
Institutions	-6.086***	-3.342***	-1.567*	-2.968**	-1.835	-1.335
	(1.507)	(0.862)	(0.850)	(1.239)	(1.425)	(1.750)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	70	70	70	70	70	70
R-squared	0.542	0.529	0.434	0.449	0.426	0.417
F	11	10.26	7.770	8.620	8.050	7.900
Institutions (beta)	-0.693	-0.622	-0.261	-0.358	-0.220	-0.132

[†] Logistic transformation

White-Huber robust standard errors in parentheses: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A3 – Individualism and other institutions

Dep. Var.:	(1) World Bank Institutions	(2) Heritage Institutions	(3) Kuncic legal Institutions	(4) Kuncic political Institutions	(5) Kuncic economic Institutions
Individualism	0.548***	0.514***	0.411***	0.297***	0.210***
	(0.117)	(0.103)	(0.073)	(0.067)	(0.072)
Human capital	0.084	0.049	0.054	0.095**	0.051
	(0.069)	(0.061)	(0.043)	(0.045)	(0.047)
Income†	0.067	0.067*	0.032	0.026	0.040
	(0.042)	(0.037)	(0.026)	(0.029)	(0.027)
Constant	0.401	0.456	0.424*	0.336	0.559**
	(0.354)	(0.313)	(0.221)	(0.244)	(0.231)
Adjusted R^2	0.63	0.61	0.64	0.61	0.53
F	63.01	71.10	56.30	62.31	57.68
Observations	74	74	74	74	74
Individualism (beta)	0.454	0.476	0.526	0.387	0.329

Efficient two-step GMM estimation

Dep. Var.:	(1) World Bank Institutions	(2) Heritage Institutions	(3) Kuncic legal Institutions	(4) Kuncic political Institutions	(5) Kuncic economic Institutions
Individualism	1.115***	1.012***	0.757***	0.789***	0.606***
	(0.108)	(0.087)	(0.068)	(0.080)	(0.062)
Constant	0.118***	0.107***	0.298***	0.287***	0.368***
	(0.044)	(0.036)	(0.027)	(0.033)	(0.030)
Adjusted R^2	0.491	0.483	0.528	0.371	0.309
Observations	74	74	74	74	74
1. F-stat	46.73	46.73	46.73	46.73	46.73
1. R2-part.	0.543	0.543	0.543	0.543	0.543
weak IV F	46.73	46.73	46.73	46.73	46.73
AR	99.93	97.07	100.6	145.4	119.5
AR-p	0	0	0	0	0
Hansen J	0.474	0.786	0.0823	0.161	0.635
Hansen J-p	0.491	0.375	0.774	0.688	0.426
Individualism (beta)	0.924	0.938	0.969	1.027	0.947

† Logistic transformation

In the lower part of the table individualism is instrumented the blood distance and the frequency of pathogens in all estimations. White-Huber robust standard errors in parentheses: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A4 – Robustness checks related to table 4 column (4)

			OLS		
	(1)	(2)	(3)	(4)	(5)
Dep. Var.:	WEF	WEF	Homicides†	Homicides†	Homicides†
Sample:	complete	complete	No Africa	No America	No Africa/America
Individualism	-0.082	-0.069	0.345	1.368	1.165
	(0.619)	(0.618)	(0.880)	(0.883)	(0.767)
Law	-4.986***	-4.678***	-5.086***	-4.046***	-3.598***
	(0.760)	(0.929)	(1.729)	(1.187)	(1.163)
Controls	No	Yes	Yes	Yes	Yes
Observations	74	70	57	52	39
R-squared	0.545	0.577	0.656	0.498	0.645
F	22.95	19.95	13.78	9.670	9.230
law (beta)	-0.763	-0.701	-0.582	-0.689	-0.733

† Logistic transformation

White-Huber robust standard errors in parentheses: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$