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# An empirical examination of institutions and cross-country incarceration rates

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## Abstract

Research converges upon institutional explanations for why some countries incarcerate more prisoners than others. The types of institutions that are particularly important are less well understood. This paper investigates empirically the associations between economic, political and legal institutions and incarceration rates in a large cross-section of countries. Using data from 2001 to 2011, we find that countries with smaller prison populations have civil legal origins and fewer years under communism. Our findings also suggest that economic institutions and other economic factors related to economic performance do not correlate with incarceration rates. Collectively, the results indicate that institutions cannot be considered in isolation, but need to be examined simultaneously, with a focus on historical, political and legal factors.

**Keywords** Prisons · Incarceration · Institutions · Legal origins · Communism

**JEL codes** K14 · K33 · P5 · F55

## 1 Introduction

Mass incarceration is a global phenomenon (Mauer 1995; Newman 1999; Walmsley 2003). As of 2010–2011 more than 10.1 million humans were held as inmates around the world. Almost half were within the combined prison populations of the United States (2.29 million), Russia (0.81 million), and China (1.65 million). At the other extreme, Canada detains about 39,000 inmates, El Salvador has roughly 24,000 prisoners, and Hong Kong confines approximately 10,000. That tremendous cross-country variation in incarceration warrants explanation. We attempt to shed light on the issue by asking whether different types of social institutions correlate empirically with incarceration rates and, if so, which institutions ‘dominate’ the findings.

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Broadly speaking, institutions are the rules of the game and the processes of enforcing those rules that shape individual behavior and structure political, economic and social choices (North 1990). Institutions often are categorized into political, economic and legal rules that influence various social outcomes, including economic development, government efficiency, and social conflict. In general, countries with similar institutions also have relatively similar social outcomes (La Porta et al. 2008).

Institutional explanations likewise are linked to criminal justice and punishment trends, including the use of incarceration.<sup>1</sup> Durkheim (1895) and Weber (1922) were among the first sociological thinkers to posit crime and imprisonment as outcomes of institutional structures. Foucault (1975) popularized the perspective arguing that social changes surrounding the Industrial Revolution instigated the development and growth of incarceration. Recent works expand on institutional explanations offering various, sometimes conflicting, answers as to how particular institutions shape incarceration rates around the world.

The literature tends to separate institutional explanations into three main categories. Economic institutional explanations posit a relation between capitalism and neoliberal market policies with imprisonment. Political institutional theories focus on the importance of political systems, such as democratic quality, and how different political rules have direct consequences for incarceration rates. Legal institutional theories examine incarceration from the quality of a nation's legal system and the types of legal rules therein.

The available empirical literatures provide no conclusive answer as to which theoretical institutional framework best explains incarceration patterns or which specific institutional types shape incarceration rates most. Thus, we provide a comprehensive investigation of available theories and evidence of cross-country incarcerations classified by three institutional types: economic, political and legal. In order to understand more deeply whether or not institutions relate to incarceration, we provide a comprehensive empirical analysis by examining proxy variables for each type of institution separately as well as collectively. Our analysis, therefore, asks not only if institutions matter, but more specifically, which institutional types relate most to incarceration rates across countries.

The literature's aforementioned ambiguity, in part, is explained by a lack of cross-country data. To build from previous works, a cross-country dataset is constructed to examine the associations between different types of social institutions and incarceration rates. Incarceration rates are collected for a relatively large cross-section of countries beginning in 2001, and continuing through 2011 (United Nations Office on Drugs and Crime UNODC). Variables are selected to represent each type of institution. Economic institutions are measured by two variables, economic freedom and the regulatory burden on starting a new business. Political institutions are measured by democracy, the level of corruption, and the duration of communist rule. Legal institutions are represented by a country's legal origin, a law and order index, and rule of law. Those are variables emphasized in the current literature as appropriate measures of institutional quality.

We investigate the association between prison population rates and each institutional type independently and simultaneously. We first ask if economic, political, or legal rules correlate with incarceration rates separately. We find no statistical association between economic institutions and incarceration rates. We do, however, document significant correlations between several measures of political and legal institutions and imprisonment. We also test the claim that economic freedom's impact on incarceration is contingent on

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<sup>1</sup> Cavadino and Dignan (2006a, pp. 3–30, 2006b), Brodeur (2007) and Lacey (2008, pp. 3–55, 2012) provide thorough surveys.

controlling for the level of democracy in a country. We do not find any evidence supporting the argument that, for a given level of democracy, more economic freedom increases prison populations.

Next, the analysis runs a 'horse race' between political and legal institutions in order to determine whether one dominates the other empirically. The results suggest that both political and legal institutions continue to associate with cross-country incarceration rates. Specifically, a history of communist rule (a political institutional type) and inheritance of a common-law legal system (a legal institutional type) correlate with higher rates of imprisonment. The result is robust to the inclusion of a variety of controls, including crime rates, criminal justice resources, economic factors, and cultural variables.

To provide perspective, going from no experience to the longest experience with communism increases incarceration rates by 87%. That is more than a one-standard deviation increase and represents the difference between the Ukraine and Hong Kong. Switching from a civil law country, like France, to a common law legal origin, New Zealand for example, increases incarceration by 46%. That is a 0.60 standard deviation increase.

By way of comparison, a country that has adopted the death penalty is associated with a 52% higher incarceration rate; a 10% increase in homicide rates leads to a 16% increase in incarceration rates. Thus, both political and legal rules have an economically significant impact on cross-country incarceration rates. In addition, according to the adjusted coefficients of multiple determination ( $R^2$ s), our models explain over half of the variation in incarceration rates across countries.<sup>2</sup>

These particular institutional variables, legal origins and communist legacies, correlate more strongly than any other variable included in the analysis. The only institutional category that does not relate robustly to incarceration rates is economic institutions, which typically have been argued to correlate substantially with prison populations through neoliberal ideologies (see, e.g., Cavadino and Dignan 2006a). Little or no evidence is found showing that wealthier or higher growth countries host larger prison populations. In addition, democratic institutions do not correlate robustly with incarceration rates. Most cultural variables, such as ethnicity or religion, do not appear to be relevant empirically.

The present article provides two unique contributions. First, we are unaware of any study providing a comprehensive institutional approach to explaining incarceration rates across a large cross-section of countries.<sup>3</sup> Our evidence suggests that institutional explanations cannot be examined in isolation. Political institutions, measured by communism, and legal institutions, measured by legal origins, relate robustly to incarceration rates. In line with existing theoretical and empirical literatures related to political and legal institutions, we interpret our findings as suggesting that institutions should be considered jointly instead of separately.

Second, given the robust correlations with both legal origins and communism, our work may indicate that incarceration rates represent a social outcome derived from long-run historical experiences. This conclusion also is consistent with related works arguing that economic outcomes have deep historical determinants (Boettke et al. 2008, 2013; Nunn 2009). If that observation is correct, contemporary reform strategies may face limited success since modern prison populations largely are shaped by deeply ingrained institutional patterns that evolved amidst historical experiences. Such insights may require changing the

<sup>2</sup> These calculations are based on the average coefficients in Table 5.

<sup>3</sup> D'Amico and Williamson (2015) rely on a similar dataset, but focus on the association between legal institutions and incarceration rates.

focus of prison population reform away from traditional policy efforts and towards a more institutional approach.

## 2 Economic, political, and legal institutional theories

Institutional theories of incarceration tend to focus on individual types of institutions as primary causes. However, empirical attempts to test such theories have yet fully to identify any particular institutional framework as an explanation of global patterns. We survey the previous literature and classify work into three main institutional categories: economic, political and legal. It is plausible that each institutional category relates to incarceration rates simultaneously. As a result, focusing on only one institutional type as a sole cause is unlikely to shed additional light. Therefore, we translate the implications of the existing literatures into testable hypotheses explicating how each type of institution may impact imprisonment. We are agnostic as to which specific institutional type matters most, as we are interested in understanding whether institutions broadly underpin prison populations.

### 2.1 Economic institutional theories

Some scholars argue that the economic rules structuring society, not only determine economic outcomes, but also shape crime and punishment. Economic institutions, such as neoliberal capitalism (measured by economic freedom indices), may relate to incarceration directly through their effects on wealth creation, employment opportunities, or cultural underpinnings of individualism and vengeance. We explain each rationale further below.

Freer markets are shown to increase economic development and living standards around the world (La Porta et al. 2008; Hall and Lawson 2014). Thus, market liberalization may provide more job opportunities, thus reducing incentives for criminal activity by raising its opportunity cost. Supporting that argument, Stringham and Levendis (2010) find that more economically free countries experience less violent crime and, thus, presumably have fewer criminals to incarcerate. As a result, one may expect more economically free countries (and their wider employment opportunities) to have lower rates of imprisonment.

Wealthier countries, however, have additional resources to punish criminals through incarceration. Foucault (1975) links mass incarceration to the Industrial Revolution and the subsequent modern era. His argument seems reasonable since both crime detection and incarceration are costly endeavors that wealthier nations can more easily afford. Empirically, results relating economic conditions to prison populations are mixed. Cavadino and Dignan (2006a, b) find the highest incarceration rates within market liberal countries. In addition, globalization and the use of anonymous trading networks may promote incarceration to reduce economic turmoil (North et al. 2009; Harcourt 2012).<sup>4</sup> However, Neapolitan (2001), Sutton (2004) and Ruddell (2005) report no consistent cross-national evidence to support a direct association between economic performance and prison populations.<sup>5</sup>

In addition to direct effects, economic freedom may exhibit an indirect association with incarceration. For example, Rusche and Kirschheimer (1939) posit that economic volatility

<sup>4</sup> Mayhew and White (1997), Kangaspunta et al. (1998) and Barclay et al. (2001) find similar incarceration rates across developed and developing nations.

<sup>5</sup> See also Shelley (1981), Neuman and Berger (1988) and Heiland and Shelley (1992).

amidst unregulated markets shapes punishment outcomes. A similar line of reasoning suggests that wealth creation destabilizes social order by creating cyclical unemployment and social tensions. As such, a greater need for incarceration may be expected as a means of social control (Shelley 1981; Neuman and Berger 1988; Heiland and Shelley 1992). Supporting such indirect employment effects, it is shown that higher employment rates significantly reduce the number of new prison entrants (Chiricos and Delone 1992; Cappell and Sykes 1991). Sutton (2004), however, shows that high labor force participation increases prison populations significantly. Providing an alternative narrative, Soares (2004a,b) argues that countries with better economic performance have better crime reporting, suggesting a spurious correlation between previously documented economic factors and incarceration.

Other economic theories stress the indirect effects associated with class conflicts and cultural attitudes towards social welfare programs. Unfettered market economies, possibly prone to income inequality, unemployment and volatility,<sup>6</sup> allow wealthy elites and political decision makers to leverage incarceration as a means of social control over minority groups (Garland 2001; Wacquant 2009). In addition, economically free countries may not support strong commitments to social entitlements and welfare spending, which may lead to additional crimes and, thus, more incarceration (Lappi-Seppälä 2008). Providing empirical support for that claim, Downes and Hansen (2006) show that larger prison population rates correlate with smaller welfare payments. Beckett and Western (2001) likewise find that state unemployment spending and prison populations are inversely related.

Combining the arguments above, it is theoretically difficult to predict conclusively how economic institutions will affect incarceration. If the employment benefits from market liberalization reduce crime more so than the potential harm caused by volatility, economic freedom could lower incarceration rates on net, or vice versa. Alternatively, unemployment and restricted welfare benefits associated with economic freedom may increase crime, thus increasing incarceration.

Collectively, the impact of economic institutions on imprisonment is theoretically ambiguous. In the analysis below, we do not distinguish between the possible direct and indirect effects. In order to disentangle those effects empirically, we do control for various economic outcomes, such as income per capita, growth, and labor force participation, as a way of distinguishing economic rules from economic outcomes. Thus, we are testing the straightforward implications of arguments that economic institutions correlate with prison population rates. In so far as some theories suggest a positive correlation, while others hypothesize a negative one, we test such general claims empirically.

## 2.2 Political institutional theories

Other theories typically focus on the type of political system or structure of the political process within a nation. Imprisonment rates are argued to be reflective of political efforts to maintain social control above what crime rates dictate (Bottoms 1995; Beckett and Sasson 2004; Tonry 2004; Beckett and Godoy 2008). Incarceration rates, therefore, are related to the sources and control of political authority.

A democratic political system constrains executive power more so than autocratic systems, providing better protection of civil rights and liberties (De Mesquita et al. 2005).

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<sup>6</sup> De Giorgi (2006) argues that high unemployment recessions in market-based, volatile economies will lead to prison growth over time.

Thus, in a democratic country, legitimate activities are less likely to be criminalized, wrongful imprisonment is less likely to occur, and corruption and abuse of power is minimized (Saha et al. 2009). Complementing this view, Acemoglu and Robinson (2012, p. 43) list incarceration as an opportunity for arbitrary abuse of political power. As a result, democratic checks and balances may reduce the use of incarceration.

Providing an alternative argument, democracies may use incarceration more often as a form of punishment owing to punitive public opinions (McBride 2007; Clarkson and Morgan 1995; Zimring et al. 2001). If voters favor severe penalties and demand that politicians be ‘tough on crime’ (Scheingold 1984; Pratt 2007), then democratic political incentives may encourage candidates to pander to such preferences. Sobel et al. (2010), for example, show empirically that sentence severity correlates with election cycles. Bandyopadhyay and McCannon (2014) find that reelection pressure leads to more convictions, but lighter sentencing. Mungan (2017) demonstrates theoretically that the vote motives produce harsher sentencing as law enforcers choose sentencing based on reelection prospects. Disenfranchisement amplifies that effect since ex-convicts are removed from the voting pool, leading to further incarceration growth.

Prior contributions provide evidence that voters do in fact demand harsher punishments regardless of real crime trends (Cullen et al. 1985; Walker and Hough 1988; Flanagan and Longmire 1996; Cullen et al. 2000; Enns 2014).<sup>7</sup> Politicians respond to public opinion by imposing harsher penalties, which may include higher incarceration rates (Caplan 2001, 2007; Berdejo and Yuchtman 2013).<sup>8</sup>

That argument complements public choice perspectives wherein democratic structures concentrate the benefits of inefficient policies while dispersing costs. For example, it is argued that aggregate US incarceration rates are a product of state policymakers gaining deterrence value from enforcement resources while shifting costs to the federal level (see Avio 2003 for a review).<sup>9</sup> Barker (2009) claims that democracies may utilize incarceration more often, not because of public opinion, but because political behaviors are not checked effectively by voters. She argues that low voter participation, combined with social inequality, explains variations in imprisonment.

No clear direction predicting how different political systems relate to imprisonment patterns has yet been found. Varying democratic structures around the globe do not provide unambiguous patterns of crime and criminal justice, and they do not converge on similar penal punishment rates (Cavadino and Dignan 2006a). However, Karstedt (2006, 2011) contends that democratic values have a comparative advantage in reducing violent crime, organized crime, and political corruption. Such reductions in crime could lower the necessity to incarcerate; however, Karstedt also argues that while democratic values shape penal systems, those values do not have an impact on imprisonment rates.

For the reasons discussed above, it is unclear whether a more democratic system would raise or lower incarceration rates as a means of social control. For example, if voters do not prefer harsher punishments for criminals, and democracies constrain government power, incarceration rates should be lower in democratic countries. However, if voters demand

<sup>7</sup> Butler et al. (2013) argue that a demand for retribution is a pervasive behavioral trait.

<sup>8</sup> Different electoral rules and legislative competition within democratic system may have direct consequences for incarceration rates (Huber and Gordon 2004; Stucky et al. 2005; Lacey 2008, 2012; Stuntz 2011).

<sup>9</sup> Nardulli (1984), Giertz and Nardulli (1985), Benson and Wollan (1989) and Benson (1990, 1994) support this argument.



harsh criminal punishments, or corrupt politicians are not checked by voters, incarceration rates are likely to be higher in democracies. Given our dataset and empirical techniques, we aim to test each of these alternative inferences.

### 2.3 Legal institutional theories

The prior literature suggests a strong relation between a nation's legal system and its incarceration outcomes.<sup>10</sup> A country's legal origin, whether founded by British common law or a civil law system, is shown to relate to incarceration rates (Sutton 2004). D'Amico and Williamson (2015) find that common law countries have higher incarceration rates than civil law nations (also see DeMichele 2013, 2014; Spamann 2015). Common law nations may find imprisonment a more affordable means of social control given their comparative lack of bureaucratic infrastructures, which are more pervasive under the civil law. Related, countries with more bureaucratically organized systems tend to avoid mass incarceration (Savelsberg 1994; Sutton 2000; Jacobs and Kleban 2003).

As presented by Shughart (2018), Tullock (1997) argued that civil law judges have less discretion than common law judges leading to less error rates in the judicial process. In addition, the adversarial nature of common law trials results in higher error rates in jury convictions. If so, the observed inverse correlation between civil legal origins and incarceration rates may stem from fewer erroneous criminal convictions.<sup>11</sup>

In addition to legal origins, we consider how the fairness and impartiality of the legal system impact incarceration rates. A more just and fair legal system may incarcerate fewer individuals because of fewer erroneous convictions and less discriminatory sentencing. Countries that adhere more to the rule of law provide better protections of property, possibly incentivizing against crime. Thus, higher quality legal systems may be correlated with fewer incarcerations. Overall, we expect common law countries and countries with lower quality judicial systems to rely more on incarceration.

Lastly, we consider the possibility that political institutions may condition how economic institutions affect incarceration rates. While several previous studies have failed to confirm any significant empirical correlation between economic performance and imprisonment (Neapolitan 2001; Sutton 2004; Ruddell 2005), most conceptual and qualitative reports of the American experience emphasize the concentration of mass imprisonment in the United States, a country that comparatively is both economically and politically free. Perhaps economic liberalization has unique effects on incarceration within democracies. Hence, economic freedom's impact on incarceration rates may be biased unless the analysis also includes some control for the general quality of political institutions. Thus, we examine whether greater economic freedom conditional on political institutional quality relates to imprisonment.

<sup>10</sup> For research exploring how legal institutions affect other various social outcomes, see Becker (1968), Cheung (1972), Skarbek (2011, 2014), Leeson (2013), Leeson et al. (2014), Posner (2014) and Leeson and Pierson (2016).

<sup>11</sup> In contrast, the United States implemented large-scale sentencing guidelines in 1984, with substantial reforms in 2003 and 2005. Such policies constrained the discretionary powers of judicial authority. Though initially implemented to reduce mass imprisonment, recent scholars have argued that sentencing guidelines were biasing judges towards punitive severity (Klein 2005). To mitigate concerns that the United States is biasing our results, we retest our models dropping the United States. The results are unchanged.

To summarize, we test four related hypotheses: (1) economic institutions significantly correlate with prison population rates, (2) democratic institutions significantly correlate with prison population rates, (3) legal institutions relate to imprisonment; specifically, common law positively correlates with prison population rates, and (4) controlling for the level of democracy, economic freedom correlates with higher incarceration rates. Prior empirical research focuses on one particular aspect of institutions (see, as one exception, Lacey 2008). We, however, ask whether economic, political, or legal institutions relate to incarceration, separately and jointly. We do so in part to reexamine previous findings across a larger dataset, but also to discover if one institutional type empirically dominates the others.

### 3 Data description

To measure incarceration rates (our dependent variable), we rely on the United Nations Office on Drugs and Crime, Survey of Crime Trends and the Operations of Criminal Justice Systems.<sup>12</sup> Prison population is measured as total persons held in penal institutions per 100,000 inhabitants, in log form.<sup>13</sup> Data are collected for 110 countries from 2001 to 2011. In order to maximize sample size, we average over that period, as data are not available for most countries in every year.<sup>14</sup>

To control for economic institutions, we rely on two variables that capture rules governing economic activities in a country. First, we utilize a measure of economic freedom, which is an overall measure of economic institutions. The Economic Freedom of the World (EFW) index measures economic freedom on a scale from zero to ten, ten representing greatest freedom (Gwartney et al. 2013). The index includes size of government, price stability, security of private ownership, freedom to trade with foreigners, and regulation of credit, business and labor. The existing literature finds that more economic freedom increases economic growth, income per capita and life expectancy, while it reduces income inequality and violent crime (for a review, see Hall and Lawson 2014).

The second variable measuring economic institutions is the regulatory burden on starting a business legally. The variable counts the number of days required to obtain a license registering a new business entity (Doing Business 2017). The previous literature finds that a lengthening of the time to start a business is associated with less economic growth, productivity, entrepreneurship and more corruption (Djankov et al. 2006; Djankov 2009).

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<sup>12</sup> UNODC provides global statistics on crime, criminal justice, drug trafficking and prices, drug production, and drug use. Data collected by UNODC have multiple sources. Member states submit to UNODC statistics on drugs (through the Annual Report Questionnaire) and crime and criminal justice (through the Crime Trend Survey). The data set compiled by the International Center of Prison Studies collects incarceration rates across countries (Walmsley 2011). Other data are collected through national surveys implemented by UNODC in cooperation with national governments or are compiled from scientific literature.

<sup>13</sup> The UN definition: “Prisons, Penal Institutions or Correctional Institutions” means all public and privately financed institutions where persons are deprived of personal freedom. The institutions may include, but are not limited to, penal, correctional, and psychiatric facilities under the prison administration.

<sup>14</sup> We recognize that panel estimation is preferred; however, all data are not collected annually, creating an unbalanced panel dataset. Therefore, we choose to average over the period to maximize observations. We have retested our results on an unbalanced panel wherein the majority of our results hold. We do not report those results, but they are available upon request.

The theoretical arguments discussed above indicate that economic institutions may relate to incarceration. If economic freedom and less time to start a business legally expand economic opportunities and reduce crime, we expect economic freedom to relate negatively to incarceration rates and time required to start a business to associate positively with incarceration. However, both economic freedom and ease of starting a business are positively linked to income per capita. Thus, in order to isolate the effect, income per capita is included as a baseline control variable.

We proxy political institutional variables with several measures. First, we include a measure of democracy, *polity2*, taken from *Polity IV's* database (Marshall and Jaggers 2000). *Polity2* captures autocracy versus democracy, ranging from  $-10$  to  $10$ , with  $10$  being most democratic. Our next variable, corruption control, captures the assessment of corruption and the intrusiveness of the country's bureaucracy (Worldwide Governance Indicators 2013). Lastly, we use a historical measure of a country's political institutions—a country's history of communism since 1925 (Barro and McCleary 2003).

As outlined above, democratic quality can be linked theoretically to both higher and lower incarceration rates. Thus, our a priori empirical prediction is ambiguous. We would expect that more democratic and less corrupt countries may incarcerate at lower rates. However, a country with experience under a communist system is more likely to use harsher sentencing and may incarcerate more often (see, for example, Belova and Gregory 2009).

We measure legal institutions with legal origins, a law and order index, and rule of law. Legal origin controls for whether a country inherited a common law or civil law system. We enter a dummy variable equal to 1 if a country has English common law and 0 represents countries that have civil legal origins, including French, German, or Scandinavian. Data are collected from La Porta et al. (2008). Common law countries are shown to incarcerate more often than civil legal origin countries (D'Amico and Williamson 2015).

An index called law and order is taken from Gallup WorldPoll and measures personal security and incidence of crime. Rule of law captures confidence in the rules of society, specifically the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence (Worldwide Governance Indicators 2013). Both measures indicate higher quality legal systems, including impartial courts and legal rules; thus, countries with better legal systems may incarcerate less often.<sup>15</sup>

In order to isolate the effects of institutions on incarceration rates, we control for crime rates and criminal justice resources, as more crime and the ability to catch and prosecute criminals may lead to higher incarceration rates. We include the homicide rate to capture the level of violent crime and the number of judges per capita to represent resources devoted to the criminal justice system (collected from the United Nations Office on Drugs and Crime).

Appendix 1 provides a detailed list of all variables, including data and source information. Appendix 2 provides a list of countries included in the analysis. Summary statistics are provided below in Table 1. The dataset covers 110 countries for which information is available on prison populations. The average incarceration rate is 196 per 100,000 with a standard deviation of 180 per 100,000. Guinea and Burkina Faso record the lowest incarceration rates (approximately 28 per 100,000). Saint Vincent has the highest incarceration

<sup>15</sup> Alternatively, in order to promote law and order, use of incarceration may be socially desirable (Garland 2001; Brown 2009). That conjecture implies a positive association between judicial quality and incarceration.

**Table 1** Summary statistics

Variable	Obs.	Mean	SD	Min	Max
<i>Dep. var.</i>					
Prison pop (log)	110	4.98	0.76	3.34	7.16
<i>Economic institutions</i>					
Economic freedom	72	7.13	0.80	4.90	8.90
Starting business	83	3.09	0.72	1.03	4.47
<i>Political institutions</i>					
Democracy	76	6.91	4.85	−7.00	10.00
Control corruption	74	0.51	0.21	0.15	1.00
Communism	68	0.20	0.31	0.00	0.83
<i>Legal institutions</i>					
Common law	83	0.25	0.44	0.00	1.00
Law and order	70	70.22	11.04	47.34	95.68
Rule of law	74	0.70	0.22	0.26	1.00
<i>Control variables</i>					
Log gdp pc	110	9.43	1.13	6.57	11.71
Homicide	98	8.51	12.67	0.48	61.04
Judges	83	12.73	10.46	0.69	50.57
Growth	65	3.17	1.73	−0.36	10.39
Male labor force part	65	79.20	5.44	64.86	90.21
Education	65	104.14	6.16	92.21	129.16
Urban	65	0.64	0.19	0.10	0.97
Ethnic frac	55	0.34	0.22	0.00	0.86
Protestant	55	14.80	25.76	0.00	97.80
Catholic	55	42.55	40.17	0.00	96.90
Death penalty	55	0.28	0.43	0.00	1.00

rate, imprisoning almost 1,300 per 100,000; the United States has the second highest rate, incarcerating 733 per 100,000. In order to smooth extreme variation in incarceration rates and ease interpretation of the results, we take the log of prison population rate. The mean of log prison population (per 100,000) is 4.98, with a standard deviation of 0.76. Per capita incomes across countries vary from \$715 to \$122,545, with a mean of \$21,120 and a standard deviation of \$21,173.<sup>16</sup>

## 4 Empirical methodology and results

### 4.1 Which institutions?

We implement OLS cross-sectional analysis (2001–2011) to maximize the number of observations. Ideally, time series would be available across a large enough sample of

<sup>16</sup> Recorded crime rates also vary considerably. For example, homicide rates average 8.43, with a standard deviation of 12.56. Japan has the lowest recorded homicides (0.48 per 100,000) and Honduras has the highest (61 per 100,000).

countries to implement panel analysis; however, data are limited. That is a common issue when analyzing international prison and crime data (Soares 2004a, b). Most studies analyzing international incarceration rates limit their analyses to advanced democracies or OECD countries (Sutton 2004). We include as many countries as possible, but, as a result, we are limited in our time span and implement only cross-sectional analysis.

To test our theories, we use the following basic specification:

$$I_i = \mu + \beta_{1i} \text{GDP} + Z_i' \delta + \varepsilon_i,$$

where  $I$  equals log incarceration rates,  $\text{GDP}$  is log GDP per capita and  $Z$  represents the control vector. Our baseline control variables are homicide rates and numbers of judges per capita. Owing to potentially high correlations and the limited availability of observations on our control variables, we introduce each sequentially to reduce multicollinearity and endogeneity. In all specifications, we enter log GDP per capita, homicide rates, and judges per capita. Unless otherwise noted, all controls are averaged over the 2001–2011 period.

First, we investigate the relation between incarceration and economic institutions. To establish a benchmark, column (1) controls only for log GDP per capita. Its coefficient is positive, but insignificant, suggesting that income does not correlate with prison populations. The variable remains insignificant in most specifications. Column (2) adds homicide rates, and column (3) establishes our benchmark specification, controlling for log GDP per capita, homicides, and judges.

Only homicides relate significantly to incarceration rates. Based on the benchmark specification, a 10% increase in homicide rates increases incarceration rates by approximately 16%. That is equivalent to a 20% of one standard deviation increase, indicating that violent crime does not explain a large fraction of the variation in prison populations. That conclusion also is indicated by the small low adjusted  $R^2$ s in the first three columns.

Columns (4)–(6) introduce our measures of economic institutions. Neither measure relates to incarceration significantly. Economic freedom enters negatively in both specifications. Time to start a business is negative, but turns positive once economic freedom is entered as an explanatory variable. According to the  $R^2$ s, including economic institutions does not raise the explanatory power beyond the benchmark model. Overall, the results suggest that economic institutions do not associate with incarceration levels across countries.

Table 3 turns to political institutions and incarceration rates. All three measures, democracy, controlling corruption and communism, are statistically significant and independently correlate with prison population rates. As reported in column (1), countries that are more democratic tend to incarcerate fewer individuals per 100,000 populations. Countries that curb corruption, as reported in column (2), also imprison fewer people. For example, a one-standard deviation increase in controlling corruption reduces incarceration by 32%. Moving from the most corrupt (Zimbabwe) to the least corrupt country (Finland), lowers incarceration rates by about 150%, almost two standard deviations. Furthermore, a country's history of communism relates positively to cross-country incarceration. As reported in column (3), a one-standard deviation lengthening of communist history is associated with a 37% larger prison population rate, which is equivalent to an increase of about 0.50 standard deviation.

Column (4) includes all three measures of political institutions simultaneously. Democracy loses its significance. Controlling corruption and communism retain their respective signs and significances, but the magnitudes of both coefficients fall.

Based on the adjusted  $R^2$ s, including democracy does not raise the explanatory power over the benchmark model. Controlling corruption and communism explain more of the

**Table 2** Incarceration and economic institutions

	(1)	(2)	(3)	(4)	(5)	(6)
Economic freedom				-0.020 (0.163)		-0.008 (0.163)
Starting business					-0.007 (0.131)	0.090 (0.122)
Log gdp pc	0.039 (0.072)	0.073 (0.091)	-0.026 (0.105)	0.037 (0.190)	-0.028 (0.105)	0.062 (0.188)
Homicide		0.019** (0.007)	0.016** (0.007)	0.015** (0.007)	0.016** (0.008)	0.014** (0.007)
Judges			-0.006 (0.006)	-0.005 (0.006)	-0.006 (0.006)	-0.006 (0.006)
Constant	4.613*** (0.704)	4.140*** (0.909)	5.255*** (1.065)	4.702*** (1.242)	5.298*** (1.190)	4.126** (1.258)
#Observations	110	98	83	72	83	72
Adj. R <sup>2</sup>	-0.01	0.07	0.08	0.04	0.06	0.04

Dependent variable: log prison population per 100,000. OLS model with robust clustered (by country) standard errors in parentheses

\*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.1$ . See Appendix 1 for all variable descriptions

cross-country variation in incarceration rates. Adding communism in column (3) explains about 33% of the variation in incarceration rates across countries. Collectively, these results suggest that democracy is not associated strongly with incarceration; however, the extent of a country’s history of communism and corruption do so.

Next, we include legal institutional factors in our model by entering legal origins, perceptions of law and order, and rule of law. In column (1), we control for common law origins. A common law country imprisons approximately 51% more people than a civil law country does. This specification explains about 15% of the variation in cross-country prison populations. The only other significant legal control is law and order. A one-standard deviation increase in the perception of law-and-order quality reduces incarceration rates by approximately 27%.

In column (4), we include all three legal institutional variables simultaneously. Rule of law remains insignificant. Common law and law and order are both significant. According to this specification, legal institutions explain about 29% of the variation in incarceration rates.

Collectively, the results presented in Tables 2, 3 and 4 suggest that political and legal institutions are determinants of incarceration rates across nations. Specifically, corruption, the extent of a country’s history of communism, and common law legal origin lead to higher incarceration rates, while law and order reduces prison populations. Economic institutions do not seem to explain imprisonment.

Next, we investigate whether political or legal institutions matter more and, in particular, which institution dominates. In Table 5, we combine the significant measures of political and legal institutions, controlling corruption, communism, common law, and law and order.

As shown in column (1), controlling corruption and law and order no longer are significant. Communism and common law origins are both positive and significant. Going

**Table 3** Incarceration and political institutions

	(1)	(2)	(3)	(4)
Democracy	-0.026* (0.013)			-0.015 (0.017)
Control corruption		-1.503** (0.445)		-1.098** (0.499)
Communism			1.289*** (0.243)	0.878*** (0.245)
Log gdp pc	0.008 (0.112)	0.184 (0.155)	0.250** (0.117)	0.401** (0.174)
Homicide	0.014** (0.007)	0.011* (0.006)	0.027*** (0.007)	0.023*** (0.006)
Judges	-0.003 (0.006)	-0.010* (0.006)	-0.012** (0.005)	-0.010 (0.006)
Constant	5.061*** (1.119)	4.055** (1.390)	2.248* (1.185)	1.573 (1.519)
#Observations	76	74	68	61
Adj. R <sup>2</sup>	0.07	0.18	0.33	0.31

Dependent Variable: Log prison population per 100,000. OLS model with robust clustered (by country) standard errors in parentheses

\*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.1$ . See Appendix 1 for all variable descriptions

**Table 4** Incarceration and legal institutions

	(1)	(2)	(3)	(4)
Common law	0.505** (0.239)			0.634** (0.201)
Law and order		-0.023** (0.011)		-0.026** (0.010)
Rule of law			-0.533 (0.502)	0.092 (0.414)
Log gdp pc	-0.089 (0.121)	0.061 (0.161)	-0.044 (0.130)	-0.080 (0.127)
Homicide	0.014* (0.007)	0.009 (0.007)	0.007 (0.007)	0.006 (0.006)
Judges	0.003 (0.006)	-0.007 (0.005)	-0.006 (0.005)	0.003 (0.006)
Constant	5.637*** (1.178)	6.059*** (1.371)	5.856*** (1.166)	7.351*** (0.978)
#Observations	83	70	74	66
Adj. R <sup>2</sup>	0.15	0.14	0.08	0.29

Dependent variable: log prison population per 100,000. OLS model with robust clustered (by country) standard errors in parentheses

\*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.1$ . See Appendix 1 for all variable descriptions

**Table 5** Incarceration, political and legal institutions

	(1)	(2)	(3)	(4)
Control corruption	−0.846 (0.524)	−0.629 (0.577)	−0.393 (0.672)	−0.521 (0.761)
Communism	0.959*** (0.224)	0.654** (0.312)	1.298*** (0.240)	1.044** (0.306)
Common law	0.548** (0.212)	0.480* (0.238)	0.431* (0.256)	0.460* (0.265)
Law and order	−0.014 (0.010)	−0.019 (0.013)	−0.008 (0.012)	−0.006 (0.015)
Log gdp pc	0.284 (0.199)	0.286 (0.217)	0.261 (0.159)	0.307 (0.190)
Homicide	0.019** (0.006)	0.018** (0.007)	0.016* (0.008)	0.014 (0.010)
Judges	−0.005 (0.006)	−0.001 (0.007)	−0.002 (0.009)	0.000 (0.008)
Growth		0.051 (0.038)		0.082 (0.073)
Male labor force part		−0.010 (0.009)		−0.016 (0.010)
Education		−0.000 (0.017)		0.011 (0.020)
Urban		0.274 (0.668)		0.354 (0.710)
Ethnic frac			0.617 (0.392)	0.549 (0.419)
Protestant			−0.000 (0.004)	0.002 (0.005)
Catholic			0.001 (0.003)	0.003 (0.003)
Death penalty			0.525* (0.261)	0.523* (0.276)
Constant	3.328* (1.762)	3.917 (2.339)	2.483 (1.526)	1.482 (2.861)
#Observations	59	58	53	52
Adj. R <sup>2</sup>	0.44	0.43	0.55	0.54

Dependent variable: log prison population per 100,000. OLS model with robust clustered (by country) standard errors in parentheses

\*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.1$ . See Appendix 1 for all variable descriptions

from a country that never experienced communism, Brazil, for example, to a country with the longest experience under communist rule, the Ukraine, increases incarceration rates by 80%. That is more than a one-standard deviation increase. A common law country, as opposed to civil law, increases incarceration by 55%, representing over a 0.70 standard deviation increase.



To provide additional robustness, we include other controls. To mitigate concerns about overemphasis of economic factors, we enter country-specific growth rates (PPP, constant 2011 international dollars), percent urban population, male labor force participation, and education, all collected from World Development Indicators (WDI 2014). The results are presented in column (2). As shown, common law and communism remain significant. None of the additional economic controls are significant.

An additional concern is that cultural factors may contribute to cross-country prison population rates (Taggart and Winn 1994; Smith 2008; Di Tella and Dubra 2011). One criticism is that our measures of institutional quality simply proxy for cultural attitudes and preferences. For example, some research investigates whether ethnicity (Greene 2007; Houser et al. 2008; Guala 2012) and public opinion (Mocan 2008, 2013) may contribute to a propensity to punish criminals more severely than otherwise. Thus, we include several additional controls to capture such effects.

First, we enter a measure of ethnic fractionalization, which captures ethnic heterogeneity among the population (Alesina et al. 2003). We also enter the percentage of the population that is Protestant and Catholic (La Porta et al. 1999). A more ethnically fractionalized country is expected to incarcerate more, whereas a more religious population may prefer to incarcerate less.

Next, we include a proxy for stronger preferences for punishment, the death penalty. It is suggested that the association between common law and incarceration may operate through death sentences (Greenberg and West 2008; Spamann 2008).<sup>17</sup> Thus, we control for that potential bias in order to isolate the legal institutional association between common law origins and incarceration. We enter a death penalty dummy variable equal to 1 if a country allows for the death penalty in its criminal law (regardless of actual use); equal to 0 otherwise. The observations are collected from Amnesty International. As a proxy for punitive preferences, we expect the death penalty to increase incarceration rates.

Column (3) includes the additional cultural controls. The results remain the same. Communism and common law significantly correlate with cross-country imprisonment rates. The death penalty also is significant, indicating that a country imposing the death penalty imprisons approximately 53% more people than countries without it. This result suggests that common law's association with incarceration is not driven by its correlation with the death penalty.

Lastly, in column (4), we enter economic and cultural controls simultaneously. The results are unchanged. Communism, common law, and the death penalty positively and significantly associate with incarceration rates. Going from no history to the longest experience with communism and from a civil law to common law legal origin country, increases incarceration by 87% and 46%, respectively. For comparison purposes, a country with the death penalty is associated with 52% more incarceration.<sup>18</sup> According to the adjusted coefficients of multiple determination, our models explain more than half of the variation in cross-country incarceration rates.

<sup>17</sup> However, Ruddell (2005) shows a correlation between the death penalty and incarceration rates across both common and civil law countries.

<sup>18</sup> Switching from logged values to prison population per 100,000 provides the following results: a country with the longest experience with communism imprisons approximately 275 more prisoners per 100,000, a death penalty country increases prison rates by about 157 inmates per 100,000, and a common law country incarcerates about 116 additional inmates per 100,000.

We conducted several additional robustness tests. We drop potential outliers, such as the United States and Russia, and the results still hold. We also enter additional control variables, such as income inequality, unemployment rates, theft rates, number of police, preferences for prison as punishment, and public opinion variables on crime and safety. The results are unchanged, and the additional variables are insignificant. We also examine other measures of institutional quality, including property rights, contract enforcement, political stability and judicial independence. Those variables are insignificant, and our main findings are unchanged. Although we do not report the results to save space, they are available upon request.

Collectively, our empirical investigation suggests that, other things equal, countries with civil legal origins and no experience with communism have smaller prison populations than others. Even after controlling for crime, criminal justice resources, economic factors, and cultural influence, those two institutional variables appear to dominate the results.

#### 4.2 Is economic freedom conditional on democracy?

Our final hypothesis argues that economic freedom's impact on incarceration is contingent on controlling for the level of democracy in a country. In order to test that conjecture, we include economic freedom and democracy simultaneously as well as introduce an interaction term between the two variables. The results are presented in Table 6.

As shown in column (1), neither economic freedom nor democracy is significant, which is consistent with prior results. In columns (2)–(4), we enter the interaction term. It is not significant in any specification, suggesting that economic freedom is not conditional on the level of democracy. That conclusion is robust to the inclusion of the economic and cultural control variables.

In the final rows of the table, we present marginal effects for economic freedom at the minimum, mean, and maximum scores, with democracy held at its mean level. None of the marginal effects indicate that economic freedom increases incarceration rates. We do, however, find one negative and significant marginal effect, suggesting that for the mean level of democracy, high levels of economic freedom may *reduce* imprisonment. Overall, we do not find evidence in support of the claim that once democracy is controlled for, economic freedom increases incarceration rates across countries significantly.

### 5 Discussion and policy implications

Our findings support the view that, broadly speaking, some institutions matter for incarceration rates. Similar to previous studies (Neapolitan 2001; Sutton 2004; Ruddell 2005), we find no correlation between incarceration rates and economic institutions, conditions of economic development, or rates of economic growth. This finding persists when controlling for the level of democracy.

Overall, our results challenge economic institutional theories of incarceration. Similarly, the absence of correlations between imprisonment and cultural variables and between incarceration and most political institutions, including democratic quality, are at odds with popular institutional theories. Economic, cultural, and political theoretical frameworks would benefit from explaining why such measures are not associated with incarceration empirically.

**Table 6** Incarceration, economic and political institution conditionality

	(1)	(2)	(3)	(4)	(5)
Economic freedom	0.092 (0.177)	0.229 (0.186)	-0.035 (0.233)	0.227 (0.148)	0.107 (0.251)
Democracy	-0.015 (0.014)	0.172 (0.116)	-0.129 (0.200)	0.131 (0.169)	-0.132 (0.226)
Economic freedom*democracy		-0.026 (0.016)	0.021 (0.031)	-0.013 (0.022)	0.021 (0.035)
Log gdp pc	-0.014 (0.193)	-0.013 (0.193)	-0.004 (0.147)	0.046 (0.189)	0.055 (0.277)
Homicide	0.014* (0.007)	0.012* (0.007)	0.019** (0.006)	0.017** (0.009)	0.019** (0.008)
Judges	-0.001 (0.006)	-0.003 (0.006)	-0.011* (0.006)	0.007 (0.008)	-0.001 (0.008)
Growth			0.167*** (0.044)		0.164** (0.073)
Male labor force part.			-0.042** (0.014)		-0.042** (0.014)
Education			-0.033** (0.013)		-0.014 (0.025)
Urban			-0.166 (0.457)		0.054 (0.758)
Ethnic frac				1.175** (0.456)	0.773 (0.491)
Protestant				-0.004 (0.004)	-0.002 (0.004)
Catholic				-0.003 (0.003)	-0.000 (0.003)
Death penalty				0.607* (0.350)	0.476 (0.349)
Constant	4.480*** (1.260)	3.571** (1.168)	11.421*** (2.371)	2.045 (1.770)	7.322 (5.388)
#Observations	67	67	65	55	53
Adj. R <sup>2</sup>	0.02	0.03	0.31	0.24	0.40
<i>Marginal Effects</i>					
Minimum economic freedom		0.042	-0.024	0.066	-0.028
Mean economic freedom		-0.017	0.023	0.036	0.019
Maximum economic freedom		-0.064**	0.061	0.012	0.056

Dependent variable: log prison population per 100,000. OLS model with robust clustered (by country) standard errors in parentheses

\*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.1$ . See Appendix 1 for all variable descriptions

The strong and robust correlation with a legacy of communism may be seen as a potential challenge to welfare-based theories of crime and incarceration, often highlighted by both political and economic institutional frameworks. If crime and incarceration are observed more frequently in societies with low levels of welfare spending, why do former

communist nations correlate so strongly with high incarceration rates? Factors aside from social spending could contribute to crime and incarceration under ex-communist regimes. These include extreme inequality across party elites and ordinary citizens, the practice of suppressing dissidents, the use of psychiatric hospitals to detain would-be prisoners, and the legacies of labor camps. Alternatively, welfare spending in non-communist regimes may be correlated spuriously with the foundational causes of imprisonment. In either case, the general causation implied by popular theoretical frameworks does not account for the empirical results observed.

Legal origins and communist legacies associate strongly with incarceration rates in our study; however, the correlation is the least developed from a theoretical perspective. Most theories focus narrowly on specific economic policies, partisan group dominations, or legacies of class or racial tensions. Yet, we find robust correlations between incarceration rates and long run, relatively unchanging historical factors. Even our observed correlation with the death penalty can be seen as a historically embedded factor as the available data are coded for the existence of the policy as opposed to its application, which tends to be rare in most jurisdictions (Levitt and Miles 2006). In fact, these correlations are more robust than others stemming from variables inspired by commonly accepted accounts.

It is plausible that legal origins and communist legacies associate with imprisonment since they generally represent how social institutions across countries organize and shape individual incentives and policy choices for social control. Incarceration represents a mechanism to promote order within those incentive structures. As a result, historically embedded institutional structures may limit potential policy reforms. Traditional reforms may be constrained in their abilities to reshape incarceration outcomes if they do not address more deeply embedded incentives fostered by historically rooted institutional structures.

For example, D'Amico and Williamson (2015, p. 596) note that civil law countries utilize penalties endemic to their bureaucratic infrastructures, such as “day-fines, community service, seizure of property, loss of driving rights, psychiatric treatment, drug rehabilitation, and probation”. However, it is unclear whether such penalties are viable for common law countries. Common law is associated with higher levels of economic development and smaller, less bureaucratized governments.<sup>19</sup> Hence, substituting away from prisons toward bureaucratic strategies popular under civil law may carry direct financial and administrative costs in common law countries.

In a follow up paper, D'Amico and Williamson (2018) investigate the relevance of legal origins for prison population rates by identifying alternative organizational patterns across legal regimes. Specifically, they argue that the relevant comparison is the hierarchical nature of criminal justice institutions compared to commercial law. Hierarchically structured institutions encourage political capture, rent-seeking and political profitability. Thus, incarceration rates reflect asymmetric opportunities for rent-seeking across differently organized legal institutions.

Common law systems, compared to civil law, organize commercial legal processes less hierarchically with greater plurality of decision-making centers. Hence, common law is associated with more efficient financial and economic sectors. However, civil law countries are homes to less incarceration rates compared to common law countries, as our results also suggest. To explain this puzzle, D'Amico and Williamson investigate the historical

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<sup>19</sup> On the compatibility of policy strategies across legal origins, La Porta et al. (2008, p. 309) note, “courts or legislators in a country might bring into one domain a set of tools that has been used in another, based on either philosophical outlook or a desire for consistency, with adverse results.”

evolution of the criminal law across different legal origins. They find that criminal legal processes under the common law became more hierarchical while civil law developed protections for individual rights. Criminal legal processes endured histories of essentially inverted organizational patterns compared to commercial law. As a result, these organizational differences generated alternative rent-seeking opportunities across different legal origins.

The overarching implication of the foregoing works and our findings suggest that historically embedded institutions influence current incarceration rates. Thus, policy reform efforts may be limited. Substantial changes in incarceration rates may depend on changes in deeply ingrained institutional structures as opposed to merely implementing specific public policies.

## 6 Conclusion

Our empirical analysis provides support for an institutional approach to understanding cross-country prison populations. Broadly speaking, a nation's institutional makeup strongly correlates with the size of its current incarceration rate. However, not all institutional types matter, and those that do, do not matter equally. Economic institutions, for example, do not correlate with patterns of imprisonment.

Historical factors, such as a legacy of communism and legal origins, indicate that contemporary imprisonment is a function of historical institutional structures. As opposed to prison populations directly resulting from current institutions or policies, our findings suggest that cross-country incarceration rates may be understood from deeply rooted historical evolutions.

Our results provide the first comprehensive empirical analysis of institutional types and incarceration rates, suggesting that institutions should not be considered in isolation; however, additional theoretical and empirical work remains to be done in order to fully account for the institutional causes and consequences of incarceration. For example, in the last few years the prison population rates in former communist states, including Russia, the Baltic States, Belarus, and Ukraine, have experienced dramatic declines. That observation suggests that history may influence a country's path, but current structural reforms can alter that path significantly. We believe that investigating how changes in institutions and policies impact changes in incarceration rates is a fruitful area for future research.

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## Appendix 1

See Table 7.

**Tables 7** Data description

Variable	Variable description	Source
<i>Dep. var</i>		
Prison pop	Total number of adult inhabitants in prisons, penal or correctional institutions per 100,000. Includes all publicly and privately financed institutions where persons are deprived of their liberty. Averaged 2001–2011. In log form	United Nations Office on Drug and Crime
<i>Economic institutions</i>		
Economic freedom	Economic freedom of the World is compiled by the Fraser Institute and measures the level of economic freedom on a scale from zero to ten, with ten representing a greater degree of freedom. The index is grouped in five broad categories: size of government, monetary policy and price stability, legal structure and security of private ownership, freedom to trade with foreigners, and regulation of credit, business, and labor. Averaged 2001–2011	Fraser Institute, <i>Economic Freedom on the World</i>
Starting business	Number of days to legally open a business, in log form. Averaged 2004–2011	Doing Business (2017)
<i>Political institutions</i>		
Democracy	Measured by Polity2, which captures autocracy versus democracy on a scale from – 10 to 10 with 10 being democratic. Averaged 2001–2011	10 Polity IV
Control corruption	Captures the assessment of the intrusiveness of the country's bureaucracy and level of corruption. Averaged 2002–2011	WGI (2013)
Communism	Measures a history of communism. Dummy variables equal to 1 for whether a country is communist at six points, every 15 years starting in 1925. Dummies are averaged to get a measure of the share of the century a country was communist	Barro and McCleary (2003)
<i>Legal institutions</i>		
Common law	Dummy variable coded 0 or 1; 1 indicates that a country was colonized by England and English legal code was transferred; 0 indicates that a country inherited French, German, or Scandinavian legal code	La Porta et al. (2008)
Law and order index	Measures reported security levels, incorporating sense of personal security and incidence of crime. Averaged 2006–2010	Gallup WorldPoll
Rule ofLaw	Captures confidence in the rules of society, including quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence. Averaged 2002–2011	WGI (2013)

**Tables 7** (continued)

Variable	Variable description	Source
<i>Control var</i>		
Log GDP PC	Log GDP per capita, PPP, constant 2011 international dollar. Averaged 2001–2011	WDI (2014)
Homicides	Homicides per 100,000. Intentional homicide is defined as unlawful death purposefully inflicted on a person by another person. Averaged 2001–2011	United Nations Office on Drug and Crime
Judges	Total number of professional judges/magistrates per 100,000. Includes full-time and part-time officials authorized to hear civil, criminal and other cases, including in appeal courts, and to make dispositions in a court of law. Also includes authorized associate judges and magistrates. Averaged 2001–2011	United Nations Office on Drug and Crime
Growth	Growth GDP per capita. Averaged 2001–2011	WDI (2014)
Male LF Part.	Portion of male pop. that is economically active (age 15–64). Averaged 2001–2011	WDI (2014)
Education	Percentage enrolled in primary education. Averaged 2001–2011	WDI (2014)
Urban	Percent of population living in an urban area. Averaged 2001–2011	WDI (2014)
Ethnic frac	Measures the degree of ethnic heterogeneity	Alesina et al. (2003)
Protestant	Percentage of population in 1980 (or for 1990–1995 for countries formed more recently) that belonged to Protestant religion	La Porta et al. (1999)
Catholic	Percentage of population in 1980 (or for 1990–1995 for countries formed more recently) that belonged to Roman Catholic religion	La Porta et al. (1999)
Death penalty	Death Penalty coded 0 or 1: 1 indicates the country has the death penalty in law, 0 suggests otherwise. As of March 2014	Amnesty International

## Appendix 2

See Table 8.

**Table 8** List of countries

All 110 countries

Albania	Dominican Republic	Lebanon	Singapore
Algeria	Ecuador	Lesotho	Slovak Republic
Armenia	Egypt	Luxembourg	Slovenia
Australia	El Salvador	Macedonia	South Africa
Austria	Estonia	Malta	Spain
Azerbaijan	Finland	Mauritius	Sri Lanka
Bahamas	France	Mexico	St. Vincent and Grenadines
Bahrain	Georgia	Moldova	Swaziland
Bangladesh	Germany	Mongolia	Sweden
Barbados	Greece	Morocco	Switzerland
Belarus	Guinea	Mozambique	Thailand
Belgium	Guyana	Nepal	Trinidad and Tobago
Belize	Honduras	Netherlands	Turkey
Bolivia	Hong Kong	New Zealand	Turkmenistan
Bosnia and Herz.	Hungary	Nicaragua	Uganda
Botswana	Iceland	Norway	Ukraine
Brazil	India	Oman	UAE
Bulgaria	Ireland	Panama	United Kingdom
Burkina Faso	Israel	Paraguay	United States
Burundi	Italy	Peru	Uruguay
Canada	Jamaica	Philippines	Venezuela
Chile	Japan	Poland	Yemen
China	Jordan	Portugal	Zimbabwe
Colombia	Kazakhstan	Qatar	
Costa Rica	Kenya	Romania	
Croatia	Korea, Rep.	Russia	
Cyprus	Kuwait	Saudi Arabia	
Czech Republic	Kyrgyz Republic	Senegal	
Denmark	Latvia	Sierra Leone	

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