Discussion paper

Further Unbundling Institutions

BY
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Further Unbundling Institutions

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Abstract

This paper analyzes the effects of institutions on economic development, and focuses on separating political institutions from contracting and economic institutions. For a sample of former European colonies, I find that differences in income levels are strongly affected by political institutions, which regulate political accountability and constrain political elites. There is some evidence for a positive effect of economic institutions, which protect property rights, but no evidence for positive effects of contracting institutions, which facilitate contracting among individuals. A decomposition of GDP reveals that political institutions work through the channel of physical and human capital accumulation. Economic institutions have a positive impact on total factor productivity. To identify and unbundle effects, I exploit exogenous variation in each of the three institutions using instrumental variables based on colonial history and geographic endowments. The application of a recently developed test for weak instruments in the multiple endogenous variables setting shows that the effects of institutions can be separated. The paper adds to the literature by identifying the fundamental importance of political institutions for economic development, and provides an inside into the channels through which specific institutions affect income levels.

Keywords: Institutions, Economic Development, Political Economy, Property Rights, Checks and Balances

JEL Classification: O11, E02, O17, O43

1 Introduction

Separating the effects of distinct institutions on economic development is crucial to a better understanding of the large income differences across countries. The overall quality of institutions is widely considered to be a principal determinant of economic development.[1] In their pioneering work Acemoglu and Johnson (2005) point to the importance of distinguishing types of institutions. They unbundle the effects of contracting institutions and economic institutions, but also mention political institutions, the organization of politics, as a third type. Political institutions are central in the recent theory of institutions and development of North et al. (2009), and in the works of Daron Acemoglu, Simon Johnson and James Robinson (e.g., Acemoglu et al. 2005; Acemoglu and Robinson 2012). However, the empirical literature offers little guidance about the role of political institutions relative to other types of institutions.

This paper analyzes the role of *political institutions* for economic development relative to *contracting institutions* and *economic institutions*. The paper contributes to the literature on several levels. First, I unbundle institutions further into three types and focus on the political dimension. Second, in order to advance on identification of causal effects, I exploit exogenous variation in each of the institutions with an instrumental variable strategy based on colonial history, building on Acemoglu and Johnson (2005), and introduce a third instrument using variation in geographic endowments. Third, to show that the effects of the three institutions can be statistically distinguished, I apply a recently developed test for separate identification in the multiple endogenous variable setup (Sanderson and Windmeijer 2016). To the best of my knowledge the present paper is the first to use the test to provide evidence for separate identification of multiple endogenous variables. Fourth, I analyze how institutions affect physical capital, human capital and total factor productivity (TFP), in order to understand through which of these channels different institutions affect income levels.

Institutions are defined as "the humanly devised constraints that structure political, economic and social interaction" (North 1991, p.97). Types of institutions can thus be distinguished by the domain they structure. *Political institutions* provide structure for the interplay of political actors. They regulate how elites within the state interact, e.g., to what extent the executive branch is subject to checks and bal-

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[1]For comprehensive accounts of the relation between institutions and economic development see Acemoglu et al. (2005), Besley and Persson (2011), and Acemoglu and Robinson (2012). For empirical evidence see Knack and Keefer (1995), Hall and Jones (1999), La Porta et al. (1999), Acemoglu et al. (2002), Easterly and Levine (2003), Djankov et al. (2003), and Rodrik et al. (2004) among others.

ances, but also how citizens may participate in politics, e.g., by voting or competing for office. Political institutions hence regulate accountability in political decision-making processes. More accountability leads to policies that are in the common interest and conducive to long term economic development. *Economic institutions* protect property rights of private parties against powerful elites. Economic institutions reflect the state's ability to provide property rights protection as a public good that encourages investment and enables economic activity.[2] Finally, *contracting institutions* structure contracts between private citizens. Good contracting institutions can support economic development through efficient contract enforcement and the reduction of transaction costs.

Although political, economic, and contracting institutions are connected, there are fundamental differences. Political institutions regulate accountability of politicians. While these rules sometimes affect the legal system, they cover a much broader area. Where political decisions concern property laws and the organization of the legal system, they can be seen as an input (into property rights production). In contrast, economic institutions structure how the legal system interprets and executes laws - and generate property rights as an output. Moreover, economic institutions capture the protection of citizens against any elite, not only political actors. To summarize, political institutions regulate elites at the state level and the bottom up influence of citizens in the state, economic institutions regulate the top down relation by protecting citizen's property from various powerful elites, and contracting institutions regulate the contractual interaction of private parties.

The main finding of this paper is that political institutions have a large positive effect on cross country income differences, which can be unbundled from the effects of economic, and contracting institutions. The effect of political institutions is statistically and quantitatively significant. A one standard deviation improvement in political institutions, as measured by the index of constraints on the executive branch, explains roughly a 1.2 standard deviations, or 120%, higher GDP per capita. This corresponds, for example, to the difference in GDP per capita and executive constraints between Mexico and New Zealand in the year 1995. In contrast, I find no evidence for an effect of contracting institutions and only limited evidence for an additional positive effect of economic institutions. The results are robust to the use of a variety of different measures for institutions and to controlling for other potential determinants of income levels.

My results shed new light on the relative importance of different types of institu-

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[2]The terminology economic institutions, rather than property rights, is consistent with the literature (e.g., Acemoglu et al. 2005; Besley and Persson 2011), and emphasizes their economic side as well as the distinction from political institutions.

tions for economic development. In particular, the empirical analysis lends support to the recent theoretical literature that assigns a fundamental role to political institutions (c.f. North et al. 2009; Acemoglu et al. 2005; Acemoglu and Robinson 2012). In their assessment Acemoglu and Johnson (2005) focus on contracting and economic (property rights) institutions, inspired by North (1981) who argues that both affect economic development. However, Acemoglu and Johnson (2005) also emphasize the importance of constraining political elites.[3] The present paper builds on their argument and considers political institutions separately. This enables me to identify the fundamental role of political institutions for economic development, while the evidence for conditional effects of other types of institutions is not as strong. The results are thus in accordance with the statement "that while economic institutions are critical for determining whether a country is poor or prosperous, it is politics and political institutions that determine what economic institutions a country has" (Acemoglu and Robinson 2012, p.43).

In order to understand the channels by which colonial history and institutions affect income levels, I present two additional sets of results. First, I decompose GPD into physical capital, human capital and TFP, following the tradition of classical development accounting, and analyze the effects of institutions on each of these components. Second, I estimate the reduced forms between instruments and the outcomes of interest (GDP and its components). The second part reveals that the effects of institutions are driven by the settler mortality instrument. The GDP decomposition shows that political institutions work through physical and human capital. In contrast economic institutions are found to have an impact on TFP. In sum these findings indicate an essential role for political institutions, first, and economic institutions, second, in creating incentives for the accumulation of production factors and innovation (c.f. Acemoglu and Robinson 2012) leading to high income levels.

The distinction of three types of institutions and their effects on economic development is an empirical challenge. First, institutions are likely to be determinants as well as outcomes of economic development. To overcome this problem of endogeneity, I apply an instrumental variable approach that exploits exogenous variation in each of the three institutions. The instrument for economic institutions is based on a new variation of differences in geographic endowments: the percentage of a country's land area within tropical and subtropical climate zones. Tropical and subtropical climates are ideal for growing cash crops and plantation agriculture which,

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[3]Acemoglu and Johnson (2005) recognize the special role of constraints on the executive as political institutions, but continue to use the executive constraints index as an alternative proxy for property rights. Section 6 discusses the differences of their approach in more detail.

during colonization, lead to an economic structure with high concentration of resources and power that persisted in bad economic institutions (c.f. Sokoloff and Engerman 2000; Acemoglu and Robinson 2006). The instruments for political and contracting institutions are the settler mortality rate and legal origin (indicating a common or civil law tradition). The latter two instruments are used by Acemoglu and Johnson (2005) to unbundle two types of institutions, and are well established in the literature.

Second, even with three instruments at hand, it is a priori not clear if the instruments contain enough information to separately identify the effects of three institutions. Intuitively, the instruments have to be correlated in different ways with each of the institutions. This may not be the case even if first stage F-statistics are high. An important part of the present paper is therefore the application of a recently developed test (Sanderson and Windmeijer 2016) for weak instruments in the multiple endogenous variable setup, to show that the effects of political, economic and contracting institutions can be distinguished.

A third challenge is to find measures that are close counterparts to the three types of institutions. The measure for political institutions that best captures checks and balances on political decision makers is the Polity IV index of constraints on the executive. The index measures the extent to which the executive branch of government is subject to control exercised by an accountability group. This focus on elites at the state level provides the clearest conceptual differentiation from other types of institutions. In addition I use various measures for accountability in the broader sense, such as the degree of democracy, autocracy, or political rights, to test for the robustness of results. Economic institutions are measured by several property rights indices. The most comprehensive index is provided by the Economic Freedom of the World (EFW) project. The index captures the overall *de facto* protection of property rights. Alternative measures for economic institutions are the Political Risk Services' (PRS) index of risk of expropriation of foreign direct investment by the government, and the Heritage Foundation's index of private property rights protection. Finally, I employ three indices for contracting institutions following Acemoglu and Johnson (2005): legal formalism (Djankov et al. 2003), complexity of legal procedures, and number of legal procedures necessary to collect on a commercial debt (both World Bank 2004).

The paper contributes to a yet very small literature that unbundles the effects of detailed institutions. The most closely related study is Acemoglu and Johnson (2005), which provides the first empirical assessment of the relative effects of distinct institutions. While Acemoglu and Johnson (2005) focus on contracting and

economic (property rights) institutions, the present paper builds on their approach, separates the political dimension and identifies its fundamental role for economic development. More broadly, the present paper contributes to a well established literature that finds that institutions explain cross country differences in development. This literature focuses typically on overall institutional quality, or specific institutions without controlling for other types (e.g., Knack and Keefer 1995; Hall and Jones 1999; La Porta et al. 1999; Acemoglu et al. 2002; Djankov et al. 2003).

Institutions are not the only factor that provides potential explanations for development differences across countries. Several studies evaluate the importance of institutions relative to geography (Easterly and Levine 2003; Rodrik et al. 2004; Auer 2013). They provide strong evidence of an indirect effect of geography through institutions, but only limited evidence for a direct effect of geography. Nevertheless, a particular concern remains regarding potential direct effects of a country's disease environment which is related to geography (Rodrik et al. 2004; Auer 2013). I address this issue by controlling for the disease environment while using geography (climate zones) as instrument for economic institutions. This has no effect on my main findings.

Another important factor for long term economic development is human capital (c.f. Galor 2011). The debate on the relative effects of institutions and human capital is still ongoing. While some evidence points to an effect of education rather than institutions (Glaeser et al. 2004), others find that the effect of institutions is robust to controlling for education (Ang 2013), in particular when accounting for the endogeneity of human capital (Acemoglu et al. 2014a). Overall the literature indicates that both factors are drivers of long term development (Baten and Zanden 2008; Jones and Romer 2010; Easterly and Levine 2016). Due to the high correlation between human capital and institutions the empirical framework of the present paper does not allow to address the question of relative effects directly. However, the results of the decomposition exercise suggest that human capital is one channel by which political institutions affect development. The evidence presented in this paper thus also points to the importance of both factors and suggests a fundamental role of political institutions in determining cross country differences in income levels.[4]

The next section discusses the difference of political, economic and contracting institutions in concept and data. Section 3 introduces the empirical model and the test for separate identification. Section 4 presents and discusses the main results, and demonstrates their robustness. Section 5 explores the channels from colonial

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[4]The effects of political institutions are quantitatively so large that this would leave a significant role of political institutions, even if the effects are partly due to human capital.

history and geography via institutions to income, using reduced forms and decomposing GDP into physical capital, human capital, and TFP. Section 6 discusses the differences to Acemoglu and Johnson (2005), and section 7 concludes.

2 Unbundling Political, Economic, and Contracting Institutions.

The definition of institutions as "the humanly devised constraints that structure political, economic and social interaction" (North 1991, p.97) provides a natural starting point for distinguishing institutions. It implies a conceptual distinction by the domain that institutions structure. Three types of institutions are most prominent in the literature. North (1981) combines the theory of the state as a provider of contracting institutions and of the state as a predator that redistributes resources. He emphasizes the importance of contracting institutions in reducing transaction costs and the role of economic institutions, that protect property rights, for economic development. More recently, North et al. (2009) and Acemoglu and Robinson (2012) shift the focus to the organization of the state itself, the political institutions, as the fundamental dimension that determines long term development. In the present paper I build on this literature and unbundle institutions along the political, the economic, and the contracting dimension. Only when specific dimensions are distinguished can we understand which of them are most important for long term development.

2.1 Classifying Institutions

Political vs. Economic Institutions. Political and economic institutions can be distinguished by focusing on the two domains they structure and regulate: (i) the relation and actions of political actors, and (ii) the actions of participants in the economy. Political are those institutions that regulate political actors and their interaction. Political institutions define, for instance, constraints on the executive branch, rights of political participation, and accountability through forms of election. Institutions that constrain and incentivize economic actions, such as property rights, are defined as economic.

The key characteristics of political institutions are accountability, and checks and balances in the political decision-making process. The most important checks and balances are constraints on the executive branch of government. Stronger constraints improve the representation of different interest groups and constrain despotic be-

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havior, leading to policies that serve the majority, and induce long term stability and development (McGuire and Olson 1996; Acemoglu 2005; Acemoglu 2006; Acemoglu et al. 2014b). Constraints on the executive have moved into the focus of the literature (e.g., Glaeser et al. 2004; Besley and Persson 2011; Besley and Mueller 2015) and can explain differences in development not only between types of regimes (democracy vs. autocracy) but also within the set of autocracies (c.f. Besley and Kudamatsu 2008).

Broader concepts of political institutions, such as the distinction between democracy and autocracy, incorporate further accountability mechanisms placed on political actors. For instance, forms of election provide additional checks and balances in which citizens exercise bottom up control on politicians. Similarly, open recruitment into office, i.e., the possibility to run for office, increases political competition and therefore accountability of politicians.[5] Voting and recruitment account for mechanism that regulate bottom up control of political elites by citizens, and constraints on the executive structure interactions between actors at the state level.

Good economic institutions provide a productivity-enhancing, and investment-incentivizing playing field for economic activity. An essential aspect of economic institutions that is connected to economic development is the protection of property rights (e.g., Knack and Keefer 1995; Acemoglu et al. 2005; Brunt 2011; Besley et al. 2012). Property rights protection leads for example to a reduction of inefficient guard labor and increases investment, due to certainty about the ownership of returns (c.f. Besley and Ghatak 2010). Economic institutions define the bottom down relation from elites and powerful individuals to citizens, they protect the latter from the former.

A challenge for separating economic and political institutions is the close relation and potential overlap of the two. For example, an independent judiciary is important for good economic institutions, but may also act as an elite that places certain constraints on the executive branch of government. However, there are crucial differences between economic and political institutions. Most importantly, each of them covers dimensions the other does not. Political institutions place checks and balances on all kinds of political decisions. This includes, but goes far beyond, decisions concerning the legal system and property rights. Economic institutions, on the other hand, are the outcome of the interpretation, upholding, and enforcement of laws by the legal system. Where government decisions concern the legal system they can be seen as inputs into the production of property rights. In contrast, actual

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[5]Political competition can prevent despotic behavior and rents for state actors in the same way that economic competition prevents monopolistic behavior and eliminates rents of firms.

property rights protection is an output of the legal system.

Contracting Institutions. Contracting institutions define how private citizens can contract with each other. Good contracting institutions allow for efficient contract enforcement, which reduces transaction costs and thereby facilitates economic activity and development (Coase 1960; Djankov et al. 2003; Acemoglu and Johnson 2005). As much as contracting institutions regulate efficient contract enforcement there is potential overlap with economic institutions that define overall property rights protection. However, economic institutions protect not only against individuals but also against elites. Bad contracting with private citizens can more easily be insured against, by adapting the contract or buying protection, while this is not possible against powerful elites.[6] In summary, the distinctive characteristic of contracting institutions is that they regulate relations between private parties, while economic institutions structure the top down relation by protecting citizens from elites and powerful individuals, and political institutions define the interaction of elites at the state level and the bottom up control of the state by citizens.

2.2 Measuring Institutions

Constraints on the executive branch of government are measured by an index established by the Polity IV project. The index captures the extent to which the executive branch of government is constrained in its decision making by an accountability group within the state (Marshall et al. 2013). For example, in most democracies, the executive is a group of ministers lead by a prime minister or president, and the accountability group is the parliament. The executive is constrained in its decision making as it has to pass many, if not all, decisions by the parliament. But accountability groups can also be present in non democratic countries where an autocrat cannot decide independently of the support of a group of powerful warlords, influential families or tribal representatives.

Constraints on the executive represent the central aspect of political institutions and provide for the clearest conceptual difference to other types of institutions. However, in line with broader definitions of political accountability, and in order to test the generality and robustness of my results, I also employ commonly used measures for democracy and autocracy. Specifically, I use the indices for democracy, autocracy, joint democracy-autocracy (labeled Polity 2), provided by Polity IV, and political rights from Freedom House (Freedom-House 2007).

To measure economic institutions I use two alternative property rights indices.

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[6]See Acemoglu and Johnson (2005) for a detailed discussion of the differences between contracting institutions and economic institutions which protect property rights.

The first is an index provided by the Economic Freedom of the World (EFW, see Gwartney et al. 2012) project. The index combines information on property rights protection from several sources and is widely available across countries and over time. For robustness checks I use a measure of property rights protection provided by the Heritage Foundation (HF). The measure is available for a single year only (1997). This provides a disadvantage as it is common practice to generate a cross section by averaging over several years to increase the reliability of the indicator. As a third measure of economic institutions I employ the index of protection of foreign direct investment (FDI) against expropriation from the government, compiled by Political Risk Services (PRS). The index differs in two important aspects from the two other property rights indices. First, the expropriation of foreign capital may follow a different logic than the treatment of domestic property rights. Second, while the PRS index measures property rights as an outcome, it lays the focus on expropriation by the government, and one might suspect that it is less suitable to distinguish effects from political institutions. The latter two indices are employed in Acemoglu and Johnson (2005) among others and I use them to provide robustness checks despite their shortcomings.

Finally, I employ three alternative measures for contracting institutions, following Acemoglu and Johnson (2005): (i) complexity of procedures, and (ii) number of procedures necessary to resolve a legal case concerning collection on a commercial debt, and (iii) legal formalism. Legal formalism is an index of legal formality involved with collecting on a bounced check over 5 percent of the annual per capita income for each country from Djankov et al. (2003). Complexity and number of procedures, respectively measure the overall complexity (index) and the number of legal procedures involved with collecting a commercial debt worth 50 percent of the annual per capita income (source: World Bank 2004).

Correlation of Institutional Measures. The extent to which differences in institutions are reflected in the empirical measures, can be seen in their correlations. Table 1 depicts correlations for the various indices introduced above. The sample is restricted to observations for which all measures are available (pairwise correlations are very similar). The reported correlations confirm that measures of institutions of one type are highly correlated, while the correlation between measures for different institutional types are quite low. For instance the correlation between political institutions as measures by executive constraints, with economic institutions as measure by the EFW property rights index is only 0.31. While correlations between economic and contracting institutions are slightly higher for some indices, they do not exceed a level of 0.56, and correlations between political and

contracting institutions are even smaller. This underlines the contrast of political, economic and contracting institutions and shows that the conceptual differences are reflected in the corresponding empirical measures.

Table 1: Correlation of Institutional Measures

	Political Institutions					Economic Inst.			Contract Inst.	
	Exec. Constr. (1)	Democ. (2)	Autoc. (3)	Polity 2 (4)	Pol. Rights (5)	EFW Prop. (6)	PRS Index (7)	HF Prop. (8)	Legal Form. (9)	No. of Proc. (10)
Political Institutions:										
Democracy	0.97									
Autocracy	-0.89	-0.92								
Polity 2	0.96	0.99	-0.97							
Political Rights	0.90	0.94	-0.89	0.94						
Economic Institutions:										
EFW Prop. Rights	0.31	0.32	-0.16	0.26	0.39					
PRS Index	0.33	0.30	-0.12	0.24	0.29	0.81				
HF Prop. Rights	0.34	0.35	-0.23	0.31	0.43	0.71	0.61			
Contracting Institutions:										
Legal Formalism	0.08	0.11	-0.20	0.15	0.04	-0.56	-0.49	-0.42		
No. of Procedures	0.08	0.13	-0.20	0.17	0.04	-0.36	-0.25	-0.21	0.71	
Proc. Complexity	0.05	0.12	-0.20	0.15	0.07	-0.54	-0.49	-0.37	0.94	0.59
48 Observations										

Notes: The table reports correlations between various indices for the three types of institutions (political, economic, contracting) using Pearson's correlation coefficient. The sample includes only former European colonies for which all listed indices are available. Pairwise correlations are very similar.

3 Empirical Approach and Data

In order to investigate which institutions contribute to differences in income levels across countries I estimate a simple linear empirical model, in which the GDP per capita Y_i of country $i = 1, .., n$ is explained by the three types of institutions - contracting institutions CI_i, economic institutions EI_i, and political institutions PI_i:

$$Y_i = \alpha CI_i + \beta EI_i + \gamma PI_i + X_i'\lambda + \varepsilon_i . \tag{1}$$

ε_i is an i.i.d. error term with normal distribution, and I allow for a vector of additional control variables X_i, including an intercept. Estimating the relation between income and institutions is complicated by the fact that institutions are potentially endogenous. In particular, institutions are likely not only a cause but also a result of economic development. Because of this endogeneity concern standard OLS estimation of equation (1) can lead to biased coefficient estimates. This problem can be overcome using suitable instrumental variables.

3.1 Instrumental Variables

With three types of institutions, there are three potentially endogenous variables. Identification thus requires three instruments, one for each of the institutions. For political and contracting institutions I rely on two instruments from the existing literature that are based on variation in colonial history, specifically the identity of the colonizing power and settler mortality rates. For a third instrument I exploit information on geographic endowments, concretely the land area in tropical and subtropical climate zones, which affected economic institutions during colonization.

The first instrument is a measure for the legal origin of a country. Legal origin, the identity of colonizers and their legal framework, is systematically linked to legal institutions today, and in particular to contracting institutions. The UK's common law system is found to be less formal and more efficient contrasted with civil law systems (c.f. La Porta et al. 1999; Djankov et al. 2003; Acemoglu and Johnson 2005). Thus legal origin L_i, a dummy variable equal to one if the UK was the colonizing power, serves as an instrument for contracting institutions.

The second instrument derives from the colonization strategy which differed according to the hostility of the colony's disease environment and corresponding mortality rates. Acemoglu et al. (2001) and Acemoglu et al. (2002) show that in areas with higher mortality rates among early European settlers, the colonizing power set up extractive institutions designed to exploit labor and extract resources. Instead, in environments with more favorable conditions the colonizers imported institutions designed for long term development, such as checks and balances on political elites and good property rights, and settled themselves. These institutions are shown to have long term effects on today's institutions. I build on this literature and use the natural logarithm of settler mortality, denoted M_i, as instrument for political institutions. Legal origin and settler mortality are well established instruments in the literature and Acemoglu and Johnson (2005) demonstrate that they can be used to unbundle two types of institutions.

Unbundling three types of institutions requires one additional, a third, instrument which identifies economic institutions separately from political and contracting institutions. I propose a third instrument based on variation in geographic endowments, using the fraction of a country's land area that lies in tropical or subtropical climate zones (G_i). Geographic endowments, in general, shaped early institutions which persisted over time. Tropical and subtropical climates are ideal for growing cash crops, which was often done in large plantations. These conditions led to an economic structure with high concentration of resources and power that persists in bad economic institutions until the present (c.f. Sokoloff and Engerman 2000;

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Acemoglu and Robinson 2006).

The advantages of using tropical and subtropical land area are the connection specifically to economic institutions and the clear narrative underlying it. The approach builds on a tradition of employing geographic factors, such as latitude (Hall and Jones 1999; Rodrik et al. 2004), as instruments. Latitude is a relevant instrument for overall institutional quality, but does not allow to unbundle types of institutions. The use of latitude has also been criticized for its limited theoretical foundations (Acemoglu et al. 2001). The instrument in the present paper is similar to that in Easterly (2007) who uses information on the suitability of land for sugar cane production relative to wheat production. While the sugar-wheat instrument may use more precise information on land suitability for sugar cane, tropical and subtropical climate zones also cover other cash crops, such as coffee or bananas, which grow in these climates.[7]

Geographic endowments are clearly exogenous to income levels and are, as I will show, related to economic institutions. The instrument thus fulfills the two necessary conditions of exogeneity and relevance. A potential concern is that geography may affect income levels directly (c.f. Gallup et al. 1999). There is evidence that the direct effect of geography disappears once institutions are accounted for (Rodrik et al. 2004; Easterly and Levine 2003), but some studies find a direct effect of the disease environment of a country (Auer 2013; Rodrik et al. 2004) . Although diseases such as malaria are related to geography, they are not geography. Moreover, disease prevalence might be endogenous to either economic development or institutions, both of which could facilitate prevention. However, to disperse the concern that geography has an additional effect on income levels through the disease environment section 4.3 presents a robustness check which directly controls for malaria prevalence. This has no effect on my findings.

The first stages for institutions are given by

$$CI_i = \delta_1 L_i + \eta_1 M_i + \mu_1 G_i + X_i' \xi_1 + u_{1i} \ ,$$
$$EI_i = \delta_2 L_i + \eta_2 M_i + \mu_2 G_i + X_i' \xi_2 + u_{2i} \ ,$$
$$PI_i = \delta_3 L_i + \eta_3 M_i + \mu_3 G_i + X_i' \xi_3 + u_{3i} \ .$$

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[7]Using the sugar-wheat suitability as alternative instrument leads to very similar results to the ones presented in the present paper. While Easterly (2007) uses the sugar-wheat suitability as instrument for income inequality, his story is consistent with institutions being a channel that leads to development. Moreover, Acemoglu et al. (2008) provide evidence that economic inequality has no long lasting effects on development once institutions are accounted for (without distinguishing types of institutions). Controlling for the inequality channel directly, treating it as exogenous, remains an imperfect approach but does not alter my main findings.

For further use, denote the $(n \times 1)$ vectors of all observations of legal origin, log settler mortality, and tropical plus subtropical land area as L, M, and G. The three vectors of first stage coefficients on the excluded instruments are denoted by $\pi_1 = (\delta_1, \eta_1, \mu_1)'$, $\pi_2 = (\delta_2, \eta_2, \mu_2)'$, and $\pi_3 = (\delta_3, \eta_3, \mu_3)'$, and I assume that $\begin{pmatrix} u_{1i} \\ u_{2i} \\ u_{3i} \end{pmatrix} \sim \mathcal{N}\left(0, \begin{pmatrix} \sigma_1^2 & \sigma_{12} & \sigma_{13} \\ \sigma_{12} & \sigma_2^2 & \sigma_{23} \\ \sigma_{13} & \sigma_{23} & \sigma_3^2 \end{pmatrix} \right)$.

3.2 Testing for Separate Identification

Identifying multiple endogenous variables is complicated by the problem that the instruments have to separately identify their effect. Intuitively speaking, the instruments have to be correlated in different ways with each of the institutions. In the applied literature it is common practice to analyze the joint significance of first stage parameters using the respective F-statistics.[8] However, this is not enough because it fails to account for the fact that the same instruments are used for several endogenous variables. An important contribution of this paper is therefore the use of recent advances in testing for separate identification of multiple endogenous variables.

Sanderson and Windmeijer (2016) (henceforth SW) develop a test that allows to evaluate if the effects of multiple endogenous variables can be separately identified with a given set of instrumental variables. The test is designed for the limit where the instruments and the three institutional measures are correlated such that π_1 is close to a linear transformation of π_2 and π_3, in which case, institutions are not separately identified. Formally, SW express this as weak instrument asymptotic of the form $\pi_1 = \varphi_{\pi_2}\pi_2 + \varphi_{\pi_3}\pi_3 + s/\sqrt{n}$, for a $(k_z \times 1)$ fixed vector s, where k_z indicates the number of instruments. SW derive individual F-statistics for testing identification of each parameter in the second stage, α, β and γ.[9] The test statistics, labeled $F_{SW,\alpha}$, $F_{SW,\beta}$ and $F_{SW,\gamma}$ can be evaluated against the Stock and Yogo (2005) critical values for the 2SLS estimator with $(k_z - 2)$ instruments and one endogenous variable to test for weak identification of individual second stage parameters.[10]

Weak instruments are defined in terms of the size distortion of the Wald test of

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[8]A better approach is to argue that institutions are separately identified if δ_1, η_2 and μ_3 are significantly different from zero, while other first stage coefficients on excluded instruments are not.

[9]Note that the test statistics are based on the first stages, but are not the same as the F-statistics for joint significance of all coefficients of one particular first stage. The latter can be misleading as they may be strong in each of the first stages, but do not account for the fact that the same instruments have to identify additional endogenous variables separately.

[10]The notation in this paragraph ignores the additional control variables X_i. This does not effect generality of the exposition as control variables can simply be partialled out from the variables of interest.

hypotheses about individual second stage parameter estimates. The null hypothesis for this *size test* is that the actual size of the Wald test is larger than $b\%$, for a level of b that the researcher finds acceptable, i.e., H_0 : Size of the Wald test $> b$. Reasonable values for b may be 10, 15, 20, and 25 as suggested by Stock and Yogo (2005).

If the null hypothesis of the SW test is not rejected, instruments are considered weak in the sense that they do not *separately* identify the effect of the tested endogenous variable, and the actual size of the Wald test may be large. This means that hypotheses tests of the second stage parameters will reject a true null too often. For example, a researcher who tests if a coefficient is significantly different from zero will then be inclined to conclude that it is, even if the true effect is not significantly different from zero. Following Stock and Yogo (2005), I consider a level of at most $b = 25$ for the null hypothesis of the SW test. When the null hypothesis of the SW test can be rejected, instruments are not weak. The implication is that the parameter of the tested endogenous variable, i.e., the effect of the specific institution on the economic outcome variable, is separately well identified. If all three SW F-statistics allow rejection of weak instruments, then the effects of all three institutions are separately well identified.

3.3   Data Summary

The dependent variable is the log of GDP per capita in 1995 from the World Bank's World Development Indicators (WDI). The period for the GDP measure (and those for institutions and control variables) is chosen to facilitate comparability with the results in Acemoglu and Johnson (2005), and I use their data for all measures used in their paper.[11] However, results are very similar for GDP data from later periods. An example for the similarity is presented in section 5 Table 8 using averages of GDP per capita over the period 1995-2005 from the Penn World Tables (PWT). Additional outcome variables used in later sections are the log of the capital stock per worker, a human capital index and total factor productivity (TFP), averaged over the period 1995-2005 and from PWT.

The previous subsections introduced the data for institutions and instruments. Except for the autocracy variable, a higher value of a political institution index is indicative of more accountability, i.e., better political institutions. Similarly, better and more equal property rights protection is associated with higher values of the in-

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[11]Data for additional variables (EFW property rights index, political institutions except executive constraints, land area in tropics and subtropics, additional control variables) stems from various sources. See appendix A for details on the type and source of all measures.

dices of economic institutions. However, higher values of the indices for contracting institutions indicate more formal and thus less efficient, or worse contracting regulations. All institutional indices are normalized to the zero-one interval and I use averages over several years when possible following, Acemoglu and Johnson (2005) (see appendix A for details).

Table 2: Summary Statistics.

Variable	Observations	Mean	Std. Dev.	Min	Max
Outcome Variables:					
Log GDP per capita (World Bank WDI)	71	7.83	0.97	6.16	10.25
Log GDP per capita (PWT)	71	8.10	1.05	6.28	10.71
Log Capital Stock per worker	71	9.89	1.26	7.21	12.50
Human Capital index	66	1.98	0.62	1.08	3.58
Total Factor Productivity	49	0.52	0.24	0.12	1.13
Political Institutions:					
Constraints on the Executive	72	0.54	0.32	0	1
Democracy	72	0.41	0.36	0	1
Autocracy	72	0.26	0.26	0	1
Polity 2 (combined Democ. a. Autoc.)	72	0.58	0.29	0	1
Political Rights	74	0.49	0.31	0	1
Economic Institutions:					
EFW Property Rights Index	62	0.47	0.16	0.12	0.89
HF Property Rights Index	66	0.49	0.25	0	1
PRS Index (Expropriation of FDI)	64	0.64	0.14	0.35	1
Contracting Institutions:					
Legal Formalism	51	0.65	0.21	0.24	1
Procedural Complexity	60	0.66	0.17	0.32	1
Number of Procedures	61	0.49	0.21	0	1
Instrumental Variables:					
Log Settler Mortality	74	4.79	1.16	2.15	7.99
UK Legal Origin Dummy	74	0.32	0.47	0	1
Tropical + Subtropical Land Area	74	0.61	0.40	0	1
Control Variables:					
Malaria prevalence	74	0.78	0.34	0	1
Trade openness	69	0.20	0.26	0	1
Communist History	74	0.11	0.31	0	1
Catholic Population (share)	74	37.94	36.50	0	96.60
Protestant Population (share)	74	10.18	14.26	0	58.40
Muslim Population (share)	74	25.52	35.15	0	99.40
Other Religion (Population share)	74	26.37	25.67	0.30	98.00
Log Inflation	70	2.91	1.45	1.20	7.69
Government Consumption	67	0.18	0.07	0.07	0.34
Real Exchange Rate Overvaluation	44	115.93	35.08	60.58	188.23

Notes: The table presents summary statistics for the maximum sample of European colonies used in the present paper. See Appendix A for details on the data series and their sources.

The instrument variables are log settler mortality, a dummy for UK legal origin (equal to one if the colonizing power was the UK), and the combined land area in tropical and subtropical climate zones expressed as a share of total land area.

Additional data include measures of malaria prevalence, trade-openness, religion, communist history, and macroeconomic policy. These data are used for robustness checks as additional control variables.

Given the IV strategy I constrain the sample to former European colonies (as defined by Acemoglu and Johnson 2005). Summary statistics for the maximum sample used in this paper are given in Table 2.

4 Results

4.1 First Stage Results

This section examining the relationship between the endogenous institutions and the instruments in the first stages, which are reported in Table 3. Throughout I use the maximum number of available observations.[12]

Column 1 of panel A displays the first stage for constraints on the executive. The coefficient of settler mortality is negative and highly significant. Other instruments have small and insignificant coefficients. Columns 2-5 of panel A show that this holds for a variety of measures of political institutions such as democracy, political rights, and autocracy (with a positive sign for the coefficient of settler mortality on autocracy). The findings are in line with the argument in Acemoglu et al. (2001), that more hostile environments resulting in higher settler mortality rates led colonial powers to establish extractive political institutions with low constraints on political leaders which persisted over time.

In panel B, columns 1-3 show first stages for the three measures of contracting institutions. British legal origin has a significant negative coefficient. That means that British legal origin is associates with more effective (less formal) contracting institutions. The other instruments have very small and insignificant coefficients.

Finally columns 4-6 of panel B show the first stages for the three measures of economic institutions. All three instruments are correlated with two of the measures, the EFW property rights index and the HF index. British legal origin has a positive coefficient, while settler mortality has a negative coefficient. In addition the coefficient of land area in tropical and subtropical climate zones, is significantly negative for these two measures of economic institutions. Thus the data are in line with the narrative that conditions which shaped early economic structure impacted economic institutions in the long run.

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[12]Using only observations for which all outcome variables, institutional measures, and instruments are available reduces the sample size to 43 but leads to very similar results. The same holds for the samples that correspond to the second stages in Table 4.

The PRS measure for protection against expropriation of FDI is not partially correlated with geographic endowments. The index is thus not only conceptually less adequate to assess the role of overall property rights (because of the focus on (i) government expropriation and (ii) foreign capital) as argued above, but it is also empirically infeasible to distinguish it from other types of institutions given the set of instruments in the present paper. The continued use of the PRS index here serves to demonstrate that point and to provide a link to the part of the literature that employs the index.

Table 3: First Stage Results

	PANEL A					
	(1)	(2)	(3)	(4)	(5)	
Dependent Variable	Executive Constr.	Democ.	Autoc.	Polity 2	Political Rights	
Legal Origin	0.046	0.035	-0.016	0.018	0.083	
	(0.071)	(0.077)	(0.060)	(0.064)	(0.071)	
Tropical +	0.082	0.089	-0.085	0.099	0.053	
Subtrop. area	(0.098)	(0.119)	(0.088)	(0.098)	(0.099)	
Settler	-0.137***	-0.151***	0.082***	-0.116***	-0.110***	
Mortality	(0.0344)	(0.0427)	(0.0297)	(0.0341)	(0.0342)	
R^2	0.25	0.23	0.13	0.20	0.20	
Observations	72	72	72	72	74	
	PANEL B					
	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable	Legal Formalism	Procedural complexity	No. of Procedures	EFW Property Rights	HF Property Rights	PRS Index
Legal Origin	-0.333***	-0.255***	-0.197***	0.109***	0.214***	0.0701*
	(0.042)	(0.037)	(0.048)	(0.035)	(0.059)	(0.037)
Tropical +	0.037	0.037	0.083	-0.143***	-0.200***	-0.048
Subtrop. area	(0.048)	(0.043)	(0.063)	(0.042)	(0.068)	(0.043)
Settler	0.010	-0.004	0.018	-0.038***	-0.038*	-0.041**
Mortality	(0.012)	(0.014)	(0.018)	(0.013)	(0.019)	(0.016)
R^2	0.63	0.46	0.25	0.43	0.36	0.25
Observations	51	60	61	62	66	64

Notes: The table presents estimates of the first stage relation between instruments and institutions. Robust standard errors in parentheses. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Overall, the first stages for economic institutions demonstrate the difficulty of distinguishing three types of institutions, since all three instruments are partially correlated with economic institutions in columns 4 and 5. This may reflect that "critical junctures" such as European colonization affected several types of institutions and that political and economic institutions are connected (c.f. Acemoglu and Robinson 2012). However, the correlation of settler mortality with economic institutions is weaker than that with political institutions. Most importantly, the

geographic endowment instrument identifies variation specifically in economic institutions, as it is only significant in the first stages for economic institutions. Thus separate identification may be possible if this variation is sufficiently large. Using the SW test introduced above, the next subsection shows that this is the case. When economic institutions are measured by the EFW or the HF index, their effect can be separated from those of political and contracting institutions.

4.2 Main Results

This section discusses the main empirical results that show which types of institutions have an effect on cross country differences in income levels (log GDP per capita). Table 4 reports the second stage results, i.e., 2SLS estimates, of equation (1). Overall, the results indicate that political institutions have a strong effect on cross country differences in income levels.

Panel A, column 1 tabulates results for constraints on the executive as measure for political institutions, with economic institutions measured by the EFW property rights index and contracting institutions measured by legal formalism. Columns 2-5 vary the measure for political institutions, but keep measures for the other institutional dimensions fixed. For (almost) all institutions, the SW F-tests reject that the maximum size of the Wald-test is larger than 20%. The only exception occurs when political institutions are measured by the Freedom House political rights index (column 5), where the test rejects a maximum size of 25%. In many cases the test rejects at even lower levels than 20% (associated with better identification). Thus, the tests indicate that the effects of economic, political and contracting institutions can be separately identified.

My major finding is that political institutions are an important factor in explaining cross-country differences in GDP per capita. The effect of political institutions is large, and statistically significant. For example, a one standard deviation tightening of constraints on the executive leads to a 124% increase in GDP per capita. The size of the effect varies slightly for institutional measures. Overall political institutions that increase accountability have a strong positive effect on the level of GDP per capita.[13]

The coefficient on economic institutions, measured by the EFW property rights index, is positive but statistically insignificant in several specifications. This is the case when political institutions are measured by constraints on the executive,

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[13]The negative coefficient on the autocracy index (column 3) implies that more autocratic countries have lower income levels, which is also interpreted as a positive effect of better (less autocratic = more checks and balances) political institutions.

Table 4: Main Results

	(1)	(2)	(3)	(4)	(5)
	Dependent variable is log GDP per capita				
PANEL A					
Contracting Institutions:					
Legal Formalism	1.604	1.689	2.000	1.832	2.068
	(1.488)	(1.518)	(1.576)	(1.476)	(1.608)
Economic Institutions:					
EFW Property Rights	3.888	4.545	6.353**	5.329*	4.321
	(3.075)	(3.198)	(3.020)	(2.988)	(3.840)
Political Institutions:					
Constraints on Executive	3.885**				
	(1.591)				
Democracy		3.241**			
		(1.443)			
Autocracy			-5.049*		
			(2.507)		
Polity 2 (joint Democ-Autoc. measure)				3.859**	
				(1.707)	
Political Rights					4.665*
					(2.451)
Observations	47	47	47	47	48
Tests for Weak Instruments					
$F_{SW,\alpha}$	17.41	19.78	23.42	21.85	21.86
$F_{SW,\beta}$	8.49	9.88	11.99	11.10	9.17
$F_{SW,\gamma}$	8.10	8.45	7.59	9.07	6.50
PANEL B					
Contracting Institutions:					
Legal Formalism			2.127*	1.585	
			(1.211)	(1.820)	
Procedural complexity	2.151				
	(1.563)				
No. of Procedures		3.653			
		(3.207)			
Economic Institutions:					
EFW Property Rights	3.275	4.098			
	(2.533)	(3.719)			
PRS Index			9.116**		
			(4.454)		
HF Property Rights				1.942	
				(2.092)	
Political Institutions:					
Constraints on Executive	3.410**	3.629**	0.210	4.392***	
	(1.393)	(1.355)	(2.140)	(1.479)	
Observations	54	54	49	48	
Tests for Weak Instruments					
$F_{SW,\alpha}$	17.35	3.87	2.53	13.43	
$F_{SW,\beta}$	10.06	4.52	1.15	11.60	
$F_{SW,\gamma}$	9.87	8.51	1.10	12.98	

Notes: The table shows second stage results for the IV estimation of effects of institutions on log GDP per capita. Robust standard errors in parentheses. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

democracy and political rights. When using the autocracy or the polity 2 index as measure for political institutions (columns 3 and 4), economic institutions also have a significant positive effect on the income level. A one standard deviation improvement in property rights protection leads to a 84% (polity 2) to 99% (autocracy) increase in GDP per capita. The size of the effect is large even if it is somewhat smaller than that of political institutions.

While the evidence for the positive effect of economic institutions remains mixed, the pattern in panel A is consistent with the hypothesis that reform of economic institutions can achieve some level of economic development independent of the political institutions. A prominent example is the recent history of China, which has achieved large growth rates after reforming economic institutions. However, my results suggest that this development is not likely to be sustained without reform of political institutions (see also Acemoglu and Robinson 2012).[14]

Finally, the effect of contracting institutions is never statistically significant. This confirms the finding of Acemoglu and Johnson (2005) that there is no evidence for a positive effect of contracting institutions.

Panel B of Table 4 shows results for political institutions measured by constraints on the executive and alternative indices of contracting and economic institutions. Most importantly, the results confirm the positive effect of political institutions.[15] In columns 1 and 2 contracting institutions are measured by the indices of complexity of procedures, and number of procedures (necessary to resolve a legal case concerning collection on a commercial debt) respectively. When I use the number of procedures to measure contracting institutions (column 2) the effects of contracting and economic institutions cannot be separately identified. However, the effect of political institutions is separately identified and very similar to that in panel A. Moreover, when using the complexity of procedures index (column 1) identification is even stronger than in panel A.

Turning to alternative measures for economic institutions, column 3 uses the HF property rights index. This leads to strong identification of effects and very similar results as in panel A. With the PRS index for economic institutions, effects of institutions cannot be separately identified (as indicated by the SW F-statistics). Therefore, the estimates in column 4 cannot be interpreted as partial effects of

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[14]Another interpretation of the results is that constraints on the executive is a more precise measure for relevant political constraints, as it can explain outcomes within the set of autocracies (c.f. Besley and Kudamatsu 2008). This interpretation emphasizes the role of constraints on the executive as best practice measure for political institutions. Constraints on the executive are a component of the democracy and autocracy index but can receive slightly higher weights in the democracy index.

[15]Results for alternative indices of political institutional are very similar.

separate institutions. This is the consequence of the geography instrument not being correlated with the PRS measure, as discussed above. The results are solely presented to link to the existing literature.

With regard to the different indices, the findings suggest that not all institutional measures are equally suited to be unbundled (for a given set of instruments). The commonly used PRS index focuses on FDI and expropriation through the government. This stands in contrast to other property rights indices, and I find that the PRS index cannot be unbundled from political and contracting institutions. However, for the majority of indices unbundling is possible.

Overall the results presented in this section provide strong evidence that political institutions are an important driver of cross country differences in income levels. This holds for many indices for political institutions and a variety of measures for economic and contracting institutions. The results do not allow to reject effects of economic and contracting institutions. Neither do the findings provide evidence for an effect of contracting institutions. There is some, but limited evidence for a positive effect of economic institutions. These findings are in line with the theoretical literature that suggests political institutions are important for sustained and long term development. (c.f. North et al. 2009; Acemoglu et al. 2005; Acemoglu and Robinson 2012). According to these theories economic and contracting institutions lead to economic development but depend themselves on political institutions. Thus, as my results suggest, economic institutions can have some limited effects irrespective of the political institutions, but political institutions are fundamental for long term development.

4.3   Robustness of Results

This section presents a series of robustness checks. Throughout this section I discuss results based on the specification in Table 4, panel A, column 1 using constraints on the executive, the EFW property rights index, and legal formalism as institutional measures (results for other institutional measures are very similar).

One possible concern is that factors related to geography affect income directly. To eliminate the concern I control for malaria prevalence in Table 5 column 1. Another theory suggests that large income differences are driven by openness to trade. Column 2 therefore controls for years with open trade policy. Third, countries which experienced a communist regime in the past may behave differently due to large changes in political and economic structure. In column 3 I control for communist history using a dummy variable that equals 1 if a country has had a communist regime at any time between 1960 and 2000. None of these control variables has a

significant effect on GDP per capita. More importantly, the main results are unchanged throughout: separate identification is achieved and political institutions have a significant, quantitatively large effect on income levels.

Table 5: Robustness 1 - Malaria, Trade, Communism and Macroeconomy

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Dependent variable is log GDP per capita						
Contracting Institutions:							
Legal Formalism	2.141	1.605	1.820	1.306	1.698	1.530	1.119
	(1.568)	(1.587)	(1.433)	(1.624)	(1.523)	(1.493)	(1.828)
Economic Institutions:							
EFW Property Rights	5.846	3.926	3.944	3.442	3.732	3.863	3.018
	(4.125)	(3.336)	(3.022)	(3.265)	(3.252)	(3.030)	(3.545)
Political Institutions:							
Exec. Constraints	3.550***	4.155**	3.736**	3.560	3.974**	3.738**	3.981
	(1.202)	(1.621)	(1.587)	(2.522)	(1.753)	(1.820)	(2.560)
Control Variables:							
Malaria	0.396						
	(0.912)						
Trade Openness		-0.325					
		(0.935)					
Communist History			-1.143***				
			(0.333)				
Log Inflation				-0.075	-0.060		
				(0.156)	(0.133)		
Government Cons.				-3.491		-1.118	
				(3.975)		(3.605)	
Real Exchange R. Overvaluation				0.008			0.006
				(0.010)			(0.012)
Observations	47	47	47	38	47	47	38
	Tests for Weak Instruments						
$F_{SW,\alpha}$	5.38	20.33	19.23	6.07	20.17	18.77	4.04
$F_{SW,\beta}$	3.71	10.38	8.89	3.61	7.62	8.42	2.92
$F_{SW,\gamma}$	7.35	8.91	8.74	3.17	7.21	6.89	2.63

Notes: The table presents robustness checks for the second stage estimates of effects of institutions on log GDP per capita. Each column adds one ore several control variables. Robust standard errors in parentheses. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Standard economic theory explains differences in income levels also through macroeconomic policy. Although controlling for policy variables in level equations is controversial (Rodrik et al. 2004), I follow Acemoglu and Johnson (2005) and control for the log of inflation, the government consumption share in GDP, and overvaluation of the real exchange rate in columns 4-7. In columns 4 I control for all three simultaneously. The estimated effect of political institutions is now statisti-

cally insignificant, although it does not change quantitatively. The same holds when I control only for exchange rate overvaluation in column 7. These results do not, however, challenge my main findings. First, the coefficient remains quantitatively similar. Second, the instruments are too weak to separately identify effects, which makes the interpretation of second stage results impossible. Third, the sample size is reduced by roughly one fifth so that we would expect less precision. In contrast, when controlling for inflation and government consumption the sample size is not reduced, the SW F-tests indicate separate identification and the estimated effects of political institutions are statistically significant and quantitatively similar to the baseline specification.

Table 6: Robustness 2 - Subsamples and Religion

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Dependent variable is log GDP per capita
Contracting Institutions:							
Legal Formalism	1.420	2.358***	0.738	3.246	0.791	0.227	0.717
	(1.564)	(0.840)	(4.914)	(3.618)	(1.662)	(2.429)	(1.851)
Economic Institutions:							
EFW Property Rights	6.906	5.465***	-2.352	-0.216	3.900	-1.434	3.191
	(8.826)	(1.843)	(9.613)	(7.508)	(3.016)	(6.512)	(2.933)
Political Institutions:							
Exec. Constraints	4.087**	2.176**	7.579	7.307	3.921**	6.997	3.869**
	(1.672)	(0.870)	(6.868)	(6.434)	(1.619)	(4.567)	(1.530)
Control Variables:							
Protestant			0.013		-0.018		
			(0.064)		(0.019)		
Muslim			0.022			0.019	
			(0.031)			(0.017)	
Other Rel.			0.002				-0.008
			(0.029)				(0.011)
Catholic				-0.021			
				(0.028)			
Observations	43	39	47	47	47	47	47
	Tests for Weak Instruments
$F_{SW,\alpha}$	13.40	17.34	10.08	5.34	20.74	5.80	15.02
$F_{SW,\beta}$	2.41	12.28	1.49	1.91	8.58	2.79	8.05
$F_{SW,\gamma}$	7.80	10.87	1.37	1.62	8.21	2.60	8.04

Notes: The table presents robustness checks for the second stage estimates of effects of institutions on log GDP per capita. Columns 1 and 2 respectively exclude the four "Neo-Europes" and the poorest countries in the world from the sample. Columns 3-7 control for the prevalence of different religions. Robust standard errors in parentheses. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 6 displays further robustness checks. Column 1 excludes the four Neo-

Europes (Australia, Canada, New Zealand, USA) from the sample. The estimates indicate that results are robust and that the concern these countries may be driving the finding is unfounded. In column 2 I exclude the poorest countries (below the world median of GDP per capita) from the sample. There is now an effect of property rights and contracting institutions. While the effect of political institutions is somewhat smaller, it remains significant and is thus not entirely driven by the poorest countries. I discuss this pattern further in section 5.2.

Finally columns 3-7 of Table 6 control for the share of population within various religions. When I control for Protestant, Muslim or other religions jointly, or for the Catholic or Muslim share individually, effects of institutions are not separately identified. At the same time coefficient estimates are large and positive but insignificant as standard errors become equally large. While this does not lend further support to my main findings it also does not allow to reject the results. In contrast the effect of political institutions is robust to controlling for the Protestant share, and the share of other religions. Overall the evidence supports the finding that political institutions have an important effect on cross country differences in GDP per capita.

5   Channels: Reduced Forms and GDP Decomposition

This section is a first attempt to better understand the channels that drive the results presented above. In two steps, I further explore the relations between colonial history and geography, institutions, and GDP per capita. First, I analyze the reduced form relationships between colonial history/geography, and income. Second, I decompose GDP per capita into its capital, human capital, and total factor productivity (TFP) components, in order to understand through which of these channels specific institutions impact income levels.

5.1   Reduced Forms

Table 7 presents OLS estimates of reduced form regressions of GDP per capita on legal origin, tropical plus subtropical land area (geography), and settler mortality. The sample correspond to that of Table 4 panel A column 1, but results are again very similar for alternative samples used in the present paper. Columns 1-3 of Table 7 tabulate coefficients from univariate regressions. The coefficient for legal origin is not significant, and that of geography is significant at the 10% level. The coefficient of settler mortality is highly significant. In column 4 all three instruments enter in a

multivariate regression. Only the coefficient on settler mortality remains statistically significant and retains its size. This indicates that settler mortality is the main driver of the effects of institutions on GDP. The strong effect of political institutions results from the fact that political institutions project on settler mortality. Economic institutions only weakly project on settler mortality and hence the evidence for their effect on income remains limited.[16]

Table 7: Reduced Forms

	(1)	(2)	(3)	(4)
		Dependent variable is log GDP per capita		
Legal Origin	0.134			-0.298
	(0.345)			(0.221)
Tropical +		-0.717*		-0.058
Subtrop. area		(0.378)		(0.231)
Settler			-0.650***	-0.675***
Mortality			(0.071)	(0.088)
R^2	0.004	0.09	0.63	0.65
Observations	47	47	47	47

Notes: The table shows OLS estimates of the reduced form effects of legal origin, land area in tropical plus subtropical climate zones, and settler mortality on log GDP per capita. The sample corresponds to that of 4 panel A column 1. Estimates are very similar for alternative samples used in the present paper. Robust standard errors in parentheses. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

5.2 GDP Decomposition

The second part of this section analyzes the effects of institutions on the physical capital, human capital and TFP components of GDP. The decomposition follows the tradition of development accounting (c.f. Hall and Jones 1999). Data for GPD components stems from the Penn World Tables (PWT) version 9.0 (Feenstra et al. 2015), which provides the capital stock, a human capital index and TFP estimates.

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[16]The settler mortality data have triggered a recent debate in which Albouy (2012) questions their reliability. In a reply to this critique Acemoglu et al. (2012) present detailed arguments, historic sources, and additional evidence that supports the reliability of the data. The debate prompts Acemoglu et al. (2014a) to use a revised data series and cap mortality rates in order to further limit the influence of potential measurement error and very high mortality rates. The results in the present paper are robust to using this alternative series or addressing the main points raised by Albouy (2012) by (i) excluding contested observations in West Africa, (ii) controlling for the case when mortality rates are based on soldiers on campaign (vs. in barracks) or include mortality of displaced African laborers, (iii) using an alternative benchmark for matching bishop and soldier mortality in Latin America, and (iv) combining all of these steps.

Throughout I use averages for the years 1995 to 2005. I convert capital to per worker units, which is also the unit underlying the human capital index.

Table 8 presents the results for this exercise. Panel A displays second stage results, and panel B reduced forms (corresponding first stages are very similar to those reported in Table 3 and thus not repeated). For comparison with previous sections, I report results for GDP per capita in column 1 (results are similar using GDP per worker). The results are very close to those in Table 4 panel A column 1. This is reassuring as the only difference is the source of GDP data (PWT instead of World Bank) and the use of averages of GDP over several years.[17]

Columns 2-4 display estimates from the regression of GDP components on institutions. Column 2 uses capital per worker as outcome measure, and provides some evidence for a positive effect of economic institutions and of political institutions on capital per worker. The effects reflect the combination of a strong reduced form effect of settler mortality (panel B) and effects of settler mortality on political and economic institutions (see Table 3).[18]

Columns 3 and 4 present evidence that human capital is only affected by political institutions, and TFP only by economic institutions. Combining the inside from second stages, first stages (Table 3) and reduced forms, column 3 suggests a chain of effects from settler mortality through political institutions onto human capital and GDP.[19] In contrast column 4 shows that, even though the projection of economic institutions on settler mortality is somewhat weak in the first stages, the reduced form effect of settler mortality is strong enough to identify a long term relation of economic institutions and TFP.

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[17]SW F-statistics are trivially identical in columns 1-4 as they are based on first stages, which are independent of the second stage dependent variable, and thus do not change when keeping institutional measures, instruments and sample constant. In column 4 SW F-statistics differ slightly due to the changed (smaller) sample. The estimates in columns 1-4 remain similar when the sample is held constant at the 39 observations for which the TFP index is available.

[18]The reduced form specifications reveal a negative correlation of legal origin, a dummy variable for being colonized by the UK, and the capital stock. The negative correlation between UK legal origin and capital is in line with the observation that the UK colonized lands with worth conditions for economic prosperity and should not be interpreted as a negative causal effect of UK colonization (c.f. Auer 2013).

[19]Glaeser et al. (2004) present arguments that human capital is a deeper determinant of institutions. Acemoglu et al. (2014a) investigate the issue further and show that it is important to address endogeneity issues of education. Their results suggest that this leads to estimates of the returns of schooling which are smaller and are in line with the micro evidence. At the same time, the effects of institutions on income remains robust. Overall the literature points to the importance of education and of institutions (c.f. Jones and Romer 2010). The evidence in Table 8 supports this view and suggests that political institutions affect GDP through human capital accumulation. Moreover, the effects of political institutions on GDP per capita found in the present paper are very robust and quantitatively large. Even if some part of the effects is due to initial education levels, this still leaves a large part that can be assigned to political institutions.

Table 8: Channels - Decomposing GDP into Capital, Human Capital, and TFP

Dependent Variable	(1) Log GDP per capita	(2) Log Capital per worker	(3) Human Capital index	(4) TFP
	PANEL A			
Contracting Institutions: Legal Formalism	1.595 (1.447)	2.886 (1.751)	-0.469 (0.763)	0.399 (0.375)
Economic Institutions: EFW Property Rights	4.626 (3.101)	6.996* (4.008)	0.627 (1.587)	1.393** (0.639)
Political Institutions: Constraints on Executive	3.545** (1.540)	3.499* (1.953)	2.335*** (1.958)	0.0740 (0.277)
Observations	47	47	47	39
	Tests for Weak Instruments			
$F_{SW,\alpha}$	17.41	17.41	17.41	14.29
$F_{SW,\beta}$	8.49	8.49	8.49	8.45
$F_{SW,\gamma}$	8.10	8.10	8.10	8.80
	PANEL B - reduced forms			
Results from univariate reduced forms:				
Legal Origin	0.199 (0.352)	0.0243 (0.394)	0.374* (0.201)	0.0706 (0.0785)
R^2	0.01	0.00	0.09	0.03
Tropical + Subtrop. area	-0.817** (0.392)	-1.123*** (0.415)	-0.233 (0.258)	-0.233*** (0.085)
R^2	0.11	0.16	0.02	0.20
Settler Mortality	-0.655*** (0.076)	-0.737*** (0.067)	-0.352*** (0.055)	-0.106*** (0.028)
R^2	0.61	0.60	0.49	0.31
Results from multivariate reduced forms:				
Legal Origin	-0.218 (0.215)	-0.435* (0.240)	0.148 (0.149)	0.005 (0.070)
Tropical + Subtrop. area	-0.177 (0.272)	-0.393 (0.273)	0.0863 (0.175)	-0.132 (0.090)
Settler Mortality	-0.659*** (0.084)	-0.740*** (0.073)	-0.346*** (0.049)	-0.085** (0.038)
R^2	0.63	0.65	0.51	0.36
Observations	47	47	47	39

Notes: Outcome variables in the table are log GDP per capita, capital, human capital, and TFP (averaged over the period 1995-2005). All data for outcome variables comes from the PWT 9.0. Panel A displays the IV estimates of effects of institutions on various outcomes, and the corresponding SW F-statistics. Panel B shows the reduced form OLS regressions of outcomes on instrumental variables. Robust standard errors in parentheses. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 9: Channels - Robustness

Robustness:	(1) Malaria	(2) Trade Openness	(3) Communist History	(4) Inflation	(5) Goverm. Expand.	(6) Real Exchr. Overval.	(7) No NEO-Europes	(8) No Poorest Countries	(9) Catholic	(10) Protest.	(11) Muslim	(12) Other Religion
				Panel A Dependent variable is log GDP per capita (PWT) 1995-2005								
Contracting Institutions:												
Legal Formalism	2.005	1.596	1.760	1.687	1.539	0.794	1.375	2.275**	3.200	0.694	0.222	0.721
	(1.414)	(1.537)	(1.405)	(1.464)	(1.453)	(1.848)	(1.566)	(0.908)	(3.402)	(1.639)	(2.407)	(1.695)
Economic Institutions:												
EFW Property Rights	6.118	4.661	4.668	4.474	4.607	3.163	8.251	6.193***	0.615	4.639	-0.684	3.938
	(4.004)	(3.342)	(3.072)	(3.276)	(3.077)	(3.722)	(9.104)	(1.919)	(7.186)	(3.041)	(6.463)	(2.938)
Political Institutions:												
Constraints on Executive	3.290***	3.794**	3.432**	3.632**	3.434*	3.772	3.783**	1.685*	6.890	3.585**	6.649	3.529**
	(1.179)	(1.509)	(1.541)	(1.694)	(1.755)	(2.686)	(1.608)	(0.888)	(6.035)	(1.568)	(4.414)	(1.499)
				Dependent variable is log of capital stock per worker (PWT) 1995-2005								
Contracting Institutions:												
Legal Formalism	3.642**	2.888	2.977*	2.961*	2.806	2.121	2.413	3.057**	5.292	1.548	0.867	1.733
	(1.588)	(1.965)	(1.727)	(1.738)	(1.696)	(1.518)	(2.260)	(1.192)	(4.254)	(1.856)	(2.946)	(1.807)
Economic Institutions:												
EFW Property Rights	9.751**	7.095	7.019*	6.871	6.969*	5.722*	14.82	8.091***	0.979	7.015*	-0.809	6.089
	(4.608)	(4.468)	(4.015)	(4.212)	(3.942)	(3.074)	(13.37)	(2.647)	(9.092)	(3.907)	(8.130)	(3.675)
Political Institutions:												
Constraints on Executive	3.027**	4.202**	3.436*	3.570*	3.340	2.741	3.979*	1.205	8.515	3.558*	8.061	3.477*
	(1.443)	(1.984)	(1.951)	(2.118)	(2.270)	(2.261)	(2.236)	(1.221)	(7.765)	(1.973)	(5.656)	(1.884)
				Dependent variable is human capital (index) (PWT) 1995-2005								
Contracting Institutions:												
Legal Formalism	-0.384	-0.471	-0.355	-0.495	-0.456	-0.816	-0.375	0.123	-0.305	-0.738	-0.714	-0.786
	(0.804)	(0.636)	(0.728)	(0.742)	(0.772)	(1.340)	(0.723)	(0.591)	(1.216)	(1.018)	(1.031)	(0.988)
Economic Institutions:												
EFW Property Rights	0.937	0.555	0.657	0.670	0.632	-0.242	-0.858	1.784*	0.218	0.631	-0.318	0.378
	(2.523)	(1.359)	(1.562)	(1.662)	(1.615)	(2.732)	(4.098)	(0.973)	(2.897)	(1.608)	(2.754)	(1.568)

Table 9 continued

Robustness:	(1) Malaria	(2) Trade Openness	(3) Communist History	(4) Inflation	(5) Goverm. Expand.	(6) Real Exchr. Overval.	(7) No NEO-Europes	(8) No Poorest Countries	(9) Catholic	(10) Protest.	(11) Muslim	(12) Other Religions
Political Institutions:												
Constraints on Executive	2.282***	1.820**	2.256**	2.311**	2.362**	2.996	2.254**	1.340***	2.676	2.347***	2.887	2.329***
	(0.706)	(0.753)	(0.843)	(0.868)	(0.995)	(1.836)	(0.835)	(0.428)	(2.329)	(0.869)	(1.864)	(0.849)
Observations	47	47	47	47	47	38	43	39	47	47	47	47
$F_{SW,\alpha}$	5.38	20.33	19.23	20.17	18.77	4.04	13.40	17.34	5.34	20.74	5.80	15.02
$F_{SW,\beta}$	3.71	10.38	8.89	7.62	8.42	2.92	2.41	12.28	1.91	8.58	2.79	8.05
$F_{SW,\gamma}$	7.35	8.91	8.74	7.21	6.89	2.63	7.81	10.87	1.62	8.21	2.60	8.04

PANEL B
Dependent variable is TFP (PWT) 1995-2005

	(1) Malaria	(2) Trade Openness	(3) Communist History	(4) Inflation	(5) Goverm. Expand.	(6) Real Exchr. Overval.	(7) No NEO-Europes	(8) No Poorest Countries	(9) Catholic	(10) Protest.	(11) Muslim	(12) Other Religions
Contracting Institutions:												
Legal Formalism	0.228	0.405	0.425	0.440	0.391	0.354	0.357	0.383	0.508	0.452	0.253	0.151
	(0.385)	(0.391)	(0.375)	(0.399)	(0.376)	(0.400)	(0.387)	(0.314)	(0.838)	(0.453)	(0.387)	(0.610)
Economic Institutions:												
EFW Property Rights	0.765	1.430**	1.407**	1.392**	1.426**	1.411*	1.946	1.452***	1.308**	1.399**	0.955	1.204
	(0.856)	(0.687)	(0.644)	(0.652)	(0.623)	(0.792)	(1.443)	(0.484)	(0.635)	(0.660)	(1.014)	(0.786)
Political Institutions:												
Constraints on Executive	0.172	0.157	0.042	0.083	0.005	-0.069	0.109	-0.056	0.186	0.070	0.370	0.087
	(0.252)	(0.294)	(0.264)	(0.302)	(0.319)	(0.451)	(0.307)	(0.239)	(0.734)	(0.283)	(0.761)	(0.265)
Observations	39	39	39	39	39	34	35	34	39	39	39	39
$F_{SW,\alpha}$	7.36	15.18	15.57	18.65	13.57	4.02	11.09	11.13	3.51	12.53	2.17	7.62
$F_{SW,\beta}$	5.15	9.43	9.16	8.83	6.86	2.41	3.49	14.30	2.77	8.25	1.49	6.12
$F_{SW,\gamma}$	11.43	9.86	10.14	8.97	5.94	2.09	7.05	6.65	1.96	8.67	1.46	8.06

Notes: The table presents robustness checks for the IV estimates of effects of institutions on log GDP per capita, capital, human capital, and TFP. Panel A displays second stage estimates for GDP, capital, and human capital as outcome variable. Corresponding SW F-Statistics are the same for each outcome in Panel A and displayed ones. Panel B shows second stage estimates for TFP as outcome variable. Robust standard errors in parentheses. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 5.2 presents second stage estimates of the effects of institutions on GDP and its components for the same set of robustness checks used in section 4.3.[20] The header indicates the robustness check for each column. Columns 1-3 control for malaria prevalence, trade openness, and communist history respectively, and columns 4-6 for different indicators of the macroeconomy. Column 7 excludes the four "Neo-Europes", column 8 excludes the poorest countries, and columns 9-12 control for the prevalence of different religions as a share of the population. Panel A displays results for GDP, capital, and human capital as dependent variables. The SW F-statistics are identical for each outcome variable, because the sample is constant and the first stages are independent of the outcome variable, and are therefore only reported one time at the bottom of panel A. Panel B report results for TFP with separate SW F-statistics (changed because of the different sample). Overall the checks reveal the same pattern of robustness as above.

The effect of political institutions on GDP per capita and human capital is robust to controlling for malaria prevalence, trade openness, communist history, inflation, government expenditure, Protestant or other religion shares, and within the two subsamples. When controlling for the real exchange rate overvaluation and the Catholic or Muslim share in the population, the effects are not significant. As discussed above, in all cases identification is weak so this does not present evidence against an effect of political institutions.

The evidence for effects of political institution on capital per worker remains somewhat weaker. If coefficients are significant then on a lower level, and in two additional cases coefficients are not significant; namely when controlling for government expenditure (column 5) and when excluding the poorest countries (column 8). These two cases deserve further discussion. First, controlling for macroeconomic policy variables such as inflation, government expenditure or real exchange rate overvaluation is generally problematic in the regression of GDP (and its components) on institutions. Policies are potential outcomes of institutions themselves, and thus possible channels through which institutions can effect GDP and its components. This constitutes a problem of "bad controls" in which the policy measures may weaken and mask the underlying fundamental effect of institutions.

Second, an interesting result emerges when excluding the poorest countries from the sample. Doing so reduces the size of the estimated effect of political institutions on GDP per capita, capital, and human capital. At the same time standard errors do not increase (even decrease) compared to the baseline results in Table 8, even

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[20]I do not present the specifications entering several macroeconomic variables or several religion dummies at the same time. Doing so does not provide additional information compared to entering the variables individually (the pattern is the same as in Tables 4 and 6).

if the significance levels are reduced in the two former cases. The pattern suggests that the poorest countries partly drive the effects from settler mortality through executive constraints on GDP and its components. However, the poorest countries also have higher mortality rates and lower executive constraints. Excluding the poorest countries reveals this point and suggests that doing so is not necessarily a good idea if we want to learn about the effects of settler mortality on the quality of political institutions and economic development.

The evidence for effects of economic institutions on TFP and capital per worker remains somewhat limited. While there is no consistent evidence for robust effects of economic institutions on capital per worker, effects on TFP are statistically significant in all but one case (controlling for other religions in column 10) when the F-statistics indicate separate identification (column 2-5, and 8). This underlines that there is some but limited evidence for effects of economic institutions on economic development when controlling for political institutions.

Discussion of Results. The results in this section provide insides into how specific institutions are driving cross country differences in income levels. First, the reduced forms together with the first and second stages provide evidence for how colonial history affected GDP per capita levels, and suggest an important role for settler mortality. Second, while the evidence is somewhat mixed, it suggests that several institutions jointly determine the capital stock. This is in line with observations that under less constraint political leaders, some capital accumulation can be achieved by reform of economic institutions, as e.g., demonstrated by China and Singapore in recent decades. Third, while it is difficult to interpret TFP my findings indicate that good property rights impact factors such as adoption of more productive technologies or misallocation.

Finally, throughout the present paper, effects of political institutions on GDP per capita are supported by the strongest evidence. These effects derive from the projection of political institutions on settler mortality and work through human capital and physical capital accumulation. In sum, the evidence suggests an essential role for political institutions, first, and economic institutions, second, in creating incentives for the accumulation of production factors and innovation (c.f. Acemoglu and Robinson 2012) leading to high income levels.

6 Relation to Acemoglu and Johnson (2005)

The present paper delivers a thorough analysis of three major types of institutions and highlights the importance of political institutions for economic development.

This is a substantial contribution to a literature that has been pioneered by Acemoglu and Johnson (2005), who are the first to unbundle the relative effects of several types of institutions. The most important difference in the present paper is the distinction of political and economic institutions. This section highlights the consequences this has in relation to Acemoglu and Johnson (2005).

The distinction of political and economic institutions has a strong foundation in the recent theoretical literature. North et al. (2009) emphasize the importance of the organization of the state as defined by political institutions and the difference to economic institutions. Moreover, the separation of political and economic institutions is in line with theoretical contributions of Daron Acemoglu and his coauthors (especially Acemoglu et al. 2005; Acemoglu and Robinson 2012),[21] and influential theories of other authors.[22]

Acemoglu and Johnson (2005) also mention the difference between political and economic institutions ("our preferred measure [for property rights institutions] is constraint on the executive, [...], it highlights the close relationship between property rights and political institutions," p.951), and argue that both affect economic development ("places prospered when Europeans set up institutions that protected private property rights and placed effective constraints on politicians and powerful elites," p.960). However, in the empirical analysis they do not differentiate political and economic institutions. They consequently pool the two under the label "property rights institutions," treating "private property rights" and "constraints on politicians" as alternative proxies for the same type of institutions.[23] The present paper builds on their theoretical argument and empirically distinguishes political and economic (property rights) institutions.

An overview of the classification of institutions and measures is given in Table 10. The first column lists institutional indices used in the present paper, the second column, which is market "Further Unbundling," shows the classification in the present paper, and the third column, labeled "AJ", indicates the classification of measures in Acemoglu and Johnson (2005).

The difference in constraints on the executive (and political institutions in general) and economic institutions is reflected in the low correlations (below 0.35) be-

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[21]See also Acemoglu 2006; Acemoglu 2008; Acemoglu and Robinson 2008 for a non exhaustive list of references from the same author(s).

[22]In particular Besley and Persson 2011, who's classification is very close to that in the present paper as their prime example of political institutions is constraints on the executive and that of economic institutions is property rights.

[23]Acemoglu and Johnson (2005)'s preference for constraints on the executive is partly based on their reasoning that constraints are not measured as outcomes, while their alternative measures for property rights are. To my understanding this is not correct. Constraints on the executive also measures outcomes, as it captures observed, *de facto*, constraints (see Marshall et al. 2013).

Table 10: Categorization of Institutions and Measures

Measures	Further Unbundling	AJ
- EFW Property Rights Index - PRS Index - HF Private Property Rights Index	Economic Institutions (EI)	-* Property Rights Institutions (I)
- Constraints on the Executive - Democracy - Autocracy - Polity 2 (Democracy-Autocracy combined) - Political Rights	Political Institutions (PI)	-* -* -* -*
- Legal Formalism - Procedural Complexity - Number of Procedures	Contracting Institutions (CI)	

* The EFW Property Rights Index, Democracy, Autocracy, Polity 2, and Political Rights are not used in Acemoglu and Johnson (2005).

tween the corresponding measures reported in Table 1. Moreover, the empirical analysis above shows that effects of political and economic institutions can be separately identified, and that the distinction has consequences for the results.

To demonstrate this point, I compare the results in Table 4 with three institutions to the results obtained when political and economic institutions are not differentiated. Results comparable to Acemoglu and Johnson (2005) with contracting institutions vs. either political *or* economic institutions (i.e., pooling political and economic institutions) are reported in Table 11. The table shows results for contracting institutions measured by legal formalism and a variety of measures for political and economic institutions. Columns 1-3 use the measures proposed by Acemoglu and Johnson (2005) and correspond to their Table 4 panel A columns 1, 5, and 6.[24] Columns 4-8 show results for the additional measures used in the present paper.[25]

The second stage estimates in panel A of Table 11 demonstrate that when political and economic institutions are not distinguished, both are found to have significant coefficients. In addition contracting institutions have a significant positive coefficient (indicating an apparent negative effect of better contracting institutions) whenever the second included institution is an index of economic institutions. In contrast, when controlling for political institutions the effect of contracting institu-

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[24]Apparent differences in the size of the coefficients result from normalization of indices in the present paper.

[25]Note that Table 11 does not report robust standard errors. While this stands in contrast to the practice in other parts of the present paper, I follow the approach of Acemoglu and Johnson (2005) in this instance to assure comparability. However, results are very similar with robust standard errors.

Table 11: Two Institutions Only - Contracting vs. Political *or* Economic

	AJ (2005)			Further Unbundling				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
				PANEL A				
Contracting Institutions:								
Legal Formalism	0.327	2.081**	5.117*	3.814**	0.224	0.0343	0.139	1.401
	(1.455)	(0.910)	(2.675)	(1.690)	(1.515)	(2.063)	(1.614)	(1.989)
Economic Institutions:								
PRS Index		9.848***						
		(1.550)						
Property Rights (HF)			9.796***					
			(3.227)					
Property Rights (EFW)				13.32***				
				(3.323)				
Political Institutions:								
Constraints on Exec.	5.952***							
	(1.754)							
Democracy					5.210***			
					(1.611)			
Autocracy						-10.14**		
						(4.332)		
Polity 2 (joint Democ-Autoc. measure)							6.761***	
							(2.243)	
Political Rights								7.733**
								(2.986)
Observations	51	51	52	51	51	51	51	53
				Tests for Weak Instruments				
$F_{SW,\alpha}$	29.08	33.76	8.12	19.74	27.78	20.47	26.16	11.88
$F_{SW,\beta}/F_{SW,\gamma}$	9.76	26.21	6.85	13.01	8.53	4.81	7.58	5.26
				PANEL B - first stages				
				Dependent variable is Legal Formalism				
Legal Origin	-0.313***	-0.326***	-0.335***	-0.355***	-0.313***	-0.313***	-0.313***	-0.330***
	(0.039)	(0.040)	(0.040)	(0.039)	(0.039)	(0.039)	(0.039)	(0.0375)
Settler	0.018	0.024	0.018	0.018	0.018	0.018	0.018	0.015
Mortality	(0.015)	(0.016)	(0.016)	(0.016)	(0.015)	(0.015)	(0.015)	(0.015)
R^2	0.62	0.63	0.63	0.68	0.62	0.62	0.62	0.64
Dependent variable	Executive contstr.	PRS index	HF index	EFW index	Democ.	Autoc	Polity 2	Pol. Rights
Legal Origin	-0.000	0.060*	0.179***	0.092**	-0.007	0.009	-0.009	0.062
	(0.081)	(0.031)	(0.056)	(0.037)	(0.099)	(0.068)	(0.081)	(0.081)
Settler	-0.109***	-0.071***	-0.076***	-0.057***	-0.124***	0.064**	-0.096***	-0.084**
Mortality	(0.032)	(0.012)	(0.023)	(0.015)	(0.039)	(0.027)	(0.032)	(0.033)
R^2	0.21	0.51	0.37	0.37	0.18	0.11	0.16	0.15
				PANEL C - reduced forms				
Legal Origin	-0.104	-0.089	0.042	-0.127	-0.104	-0.104	-0.104	0.015
	(0.218)	(0.217)	(0.220)	(0.187)	(0.218)	(0.218)	(0.218)	(0.215)
Settler	-0.643***	-0.651***	-0.648***	-0.693***	-0.643***	-0.643***	-0.643***	-0.627***
Mortality	(0.087)	(0.087)	(0.090)	(0.077)	(0.087)	(0.087)	(0.087)	(0.089)
R^2	0.54	0.56	0.54	0.64	0.54	0.54	0.54	0.52

Notes: The table reports results for regressions of GDP per capita on two types of institutions, following the approach of Acemoglu and Johnson (2005) who group political and economic institutions, in order to demonstrate the differences in results. Panel A displays second stage estimates, panel B first stage estimates, and panel C reduced form results. Columns 1-3 correspond directly to the main results of Acemoglu and Johnson (2005) presented in their Table 4 columns 1, 5, and 6. Apparent differences in the size of the coefficients result from normalization of indices in the present paper. Remaining columns use the additional institutional indices introduced in the present paper. Instruments are: log settler mortality, and legal origin. Standard errors in parentheses (the choice of non-robust standard errors assures comparability with Acemoglu and Johnson (2005) but results are very similar with robust standard errors). Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

tions is statistically not significant.[26] This suggests, that part of the adverse effect of contracting institutions is due to omitting political institutions. Moreover, when political and economic institutions are both included in the model (c.f. Table 4) the evidence for an effect of economic institutions is limited, while I find strong support for an effect of political institutions.

This pattern can be understood by analyzing the first stage and reduced form regression results reported in Table 11 panel B and C. In the first stages measures of economic institutions in columns 2 and 3 (corresponding to Acemoglu and Johnson 2005) project on settler mortality and on legal origin. The correlation of economic institutions and settler mortality is 40-50% larger than when conditioning on geography in Table 3. That is, not conditioning on the geography instrument strengthens this relation. The same is true for the EFW index in column 4. The corresponding reduced forms in columns 2-4 then suggest that this strengthened relation, and the omission of political institutions, partly drives the strong effects of economic institutions found in Acemoglu and Johnson (2005).[27]

Acemoglu and Johnson (2005) notice the conceptual difference of constraints on the executives and the empirical challenges associated with their alternative measure, the PRS index and the HF index, which are correlated with legal origin. In the present paper I build on their approach and present evidence that their "property rights category" can be disentangled into political and economic institutions. The empirical framework presented above allows to separately identify the effects. I show that the settler mortality instrument is linked particularly to political institutions and only weakly to economic institutions. The results in the present paper thus pinpoint a more precise mechanism and reinforce the evidence that settler mortality, specifically through the channel of political institutions, had a large impact on cross country differences in income.

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[26]These results are the same if contracting institutions are measured by procedural complexity. When using numbers of procedures the adverse effect of contracting institutions only appears in conjunction with the PRS measure for protection of FDI against expropriation from the government.

[27]Acemoglu and Johnson (2005) find a negative correlation between UK legal origin and GDP in the semi reduced forms with instrumented PRS and HF property rights index. This is in line with the fact that the UK colonized places with worth conditions for economic development (Auer 2013), as discusses above. Because the PRS and HF index also project on legal origin, they argue, the direct negative effect and the positive indirect effect of legal origin (through property rights measured by the PRS and the HF index) cancel each other out. For constraints on the executive, which only depends on settler mortality in the first stages, there is neither an indirect nor a direct effect. The present paper suggests this pattern occurs because constraints on the executive are political institutions, while the PRS and HF index measure economic institutions.

7 Conclusion

This paper unbundles three types of institutions - contracting, economic, and political - and separately identifies their effects on cross-country differences in GDP per capita. The major focus and contribution is the separation of political institutions and the identification of their fundamental role fore economic development. In addition I analyze the effect of institutions on the GDP components capital, human capital and TFP, in order to understand through which of these channels specific institutions affect income. To overcome endogeneity problems I use an instrumental variable strategy. For economic institutions I suggest an instrument based on geographic endowments, the land area in tropical and subtropical climate zones, that determined economic institutions during colonization. For political and contracting institutions I employ two well established instruments based on differences in colonial history: settler mortality and legal origin. The application of a recently developed test (Sanderson and Windmeijer 2016) shows that the instrumental variable strategy successfully identifies separate effects of the three types of institutions.

I find that political institutions have a significant and large, positive effect on cross-country differences in GDP per capita, even conditional on other types of institutions. There is some evidence for an additional positive effect of economic institutions, but no evidence for positive effects of contracting institutions. These finding are robust for a variety of measures of institutions and to controlling for other potential determinants of differences in income levels.

The results highlight that political institutions are a fundamental determinant of economic development, and thus provide empirical support for the theories of North et al. (2009), and Acemoglu and Robinson (2012). The absence of significant effects for contracting institutions, and limited evidence for effects of economic institutions and GDP per capita should be interpreted with caution. This does not mean that these institutions are never important for development. Instead there is much variation in the data once we control for political institutions, so that no clear conclusion can be drawn. There is, however, some support that good economic institutions can promote development. While it remains a task for future research to identify the specific mechanism in the second part of the statement, the results are in line with the hypothesis that political institutions are more fundamental for economic development and also (partly) determine economic and contracting institutions (Acemoglu and Robinson 2012).

Following the classical development accounting approach I separately consider the GDP components physical capital, human capital, and TFP, and analyze the effects of institutions on each of them. This provides important insides into the

channels through which institutions affect GDP per capita. Political institutions work primarily through physical and human capital. In contrast economic institutions are found to have an impact on TFP. Reduced form regressions reveal that the effects of institutions are largely driven by the settler mortality instrument. The additional evidence underlines the primary importance of political institutions for economic development and indicates a secondary role of economic institutions (primarily through TFP).

Overall the results demonstrate the importance of studying detailed and well-defined institutions with appropriate measures. Identification of effects and an understanding of which institutions drive economic development depends crucially on such a thorough unbundling. And, while the present study makes important progress, further analysis of detailed institutional concepts is needed.

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Appendices

A Data Description.

Table A1: Data Description and Sources

Variable	Description	Source
Constraints on the Executive	Index of the extent to which the executive branch of government is constrained in its decision-making by a separate elite within the state, referred to as accountability group. Range: 1 to 7, with 7 indicating strongest constraints; normalized to [0,1]. Averages over the years 1990-2000 are used throughout.	AJ. Original source: Marshall et al. (2013)
Democracy	Index for the degree of democracy. Range: 1 to 10, with 10 indicating the highest degree of democracy; normalized to [0,1]. Averages over the years 1990-2000 are used throughout.	Marshall et al. (2013)
Autocracy	Index for the degree of autocracy. Range: 1 to 10, with 10 indicating the highest degree of democracy; normalized to [0,1]. Averages over the years 1990-2000 are used throughout.	Marshall et al. (2013)
Polity 2	Combined democracy and autocracy index. Range: -10 to 10, with 10 indicating the highest degree of democracy, -10 the highest degree of autocracy; normalized to [0,1]. Averages over the years 1990-2000 are used throughout.	Marshall et al. (2013)

Table A1 continued

Variable	Description	Source
Political Rights	Index for general political rights. Range: 1 to 10, with 10 indicating the highest degree of political rights; normalized to [0,1]. Averages over the years 1990-2000 are used throughout.	Freedom-House (2007)
EFW Property Right	Index of overall protection of property rights. Range 0 to 10, with 10 indicating the best protection of property rights. Normalized to [0,1] and averaged over the years 1990-2000.	Gwartney et al. (2012)
PRS Index (Protection Against Expropriation)	Index of protection against risk of expropriation of private foreign direct investment by the government. Range: 1 to 10, 10 being the strongest protection; normalized to [0,1]. Averages over the years 1985-1995 are used throughout.	AJ. Original source: Political Risk Services
HF Private Property Rights	Index of protection of private property rights in 1997. Range: 1 to 5; 5 signifies the highest degree of property rights protection; normalized to [0,1].	AJ. Original source: Heritage Foundation
Legal Formalism	Index of legal formality involved with collecting on a bounced check over 5 percent of the annual per capita income for each country. Range: 1 to 7, 7 being the most formal and thus the least effective contracting institutions; normalized to [0,1].	AJ. Original source: Djankov et al. (2003)
Complexity of Procedures	Index of complexity of the legal procedure to collect a commercial debt worth 50 percent of the annual per capita income. Range: 0, the least complex, to 100, the most complex procedure; normalized to [0,1].	AJ. Original source: World Bank (2004)
Number of Procedures	Number of procedures necessary to collect a commercial debt worth 50 percent of the annual per capita income; normalized to [0,1].	AJ. Original source: World Bank (2004)

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Table A1 continued

Variable	Description	Source
GDP per Capita (World Bank)	Natural logarithm of PPP adjusted GDP per capita in the year 1995.	AJ Original source: World Bank (2003)
GDP per Capita (PWT)	Natural logarithm of output-side real GDP at current PPPs (PWT name: cgdpo) divided by the population size (PWT name: pop). Averaged over the years 1995-2005.	PWT 9.0
Capital Stock per Worker	Natural logarithm of the capital stock at current PPPs (PWT name: ck) divided by the number of employed (PWT name: emp). Averaged over the years 1995-2005.	PWT 9.0
Human Capital Index	Human capital index, based on years of schooling and returns to education, indicating average human capital per worker (PWT name: hc). Averaged over the years 1995-2005.	PWT 9.0
Total Factor Productivity (TFP)	Total factor productivity at current PPPs relative to USA (PWT name: ctfp). Averaged over the years 1995-2005.	PWT 9.0
Tropical + Subtropical Land Area	Land area in tropical and subtropical climate zones (Köppen-Geiger definition of climate zones) as share of total area.	Gallup et al. (1999) (http://www.cid.harvard.edu/cidglobal/economic.htm)
Settler Mortality	Natural logarithm of the estimated settler mortality of European settlers in their former colonies before 1850.	AJ. Original source: Acemoglu et al. (2001)
Legal Origin	Dummy indicating if the colonizing country was either: (i) Great Britain, indicating a Common Law tradition, (ii) Belgium, France, Germany, Netherlands, Portugal, or Spain, indicating a Civil Law (French) tradition.	AJ. Original source: La Porta et al. (1999) and Djankov et al. (2003).

Table A1 continued

Variable	Description	Source
Malaria Prevalence	Share of the land area affected by malaria in 1946.	Center for International Development (CID) at Harvard University
Trade Openness	Fraction of years with open trade policy in the period 1950-1994.	Hall and Jones (1999). Original source: Sachs and Warner (1995).
Communist History	Dummy variable for communist history. The dummy is set to one if a country has experienced a communist regime in any of the years 1960-2000.	Religion Adherence Data, 2003 (provided by Robert Barro at http://scholar.harvard.edu/barro/publications/religion-adherence-data)
Inflation	Log of inflation. Average annual inflation over the period 1970-98.	AJ. Original source: World Bank World Development Indicators 1999
Government Consumption	Real government consumption expenditure as share of GDP. Averaged over the period 1970-89.	AJ. Original source: Barro-Lee Data Set, 1994 (http://admin.nber.org/pub/barro.lee/)
Real Exchange Rate Overvaluation	Index of the overvaluation of the real exchange rate.	AJ . Original source: Acemoglu et al. (2003)
Religion	Share of the population that belonged to either of the following religions: Catholic, Protestant, Muslim, Other Religion. Measured in 1980; 1990-95 for countries that formed after 1980.	AJ . Original source: La Porta et al. (1999)

AJ stands for Acemoglu and Johnson (2005) and indicated that data are taken as provided by the authors at http://economics.mit.edu/faculty/acemoglu/data/aj2005. Original sources indicated in addition.

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