

# Institutional Transformation and the Origins of World Income Distribution

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## Abstract

This paper presents an attempt to quantify institutional changes and examine the respective effects of institutions on the path of long-run economic growth and development for a large panel of countries in the period 1810-2000. Using principal component analysis, latent indices of *de jure* and *de facto* political institutions are constructed by exploiting several existing institutional datasets. The empirical evidence consistently suggests that societies with more extractive political institutions in Latin America, South Asia, Middle East and Eastern Europe have achieved systematically slower long-run economic growth and failed to catch-up with the West. The evidence confirms the primacy of *de facto* institutional differences over *de jure* institutions in causing differential growth and development outcomes over time. It also explains why highly concentrated political power and extractive political regimes inhibited the path of economic growth by setting persistent barriers to the engagement in collective action. In the long run, institutional differences account for up to 90 percent of within-country development path and up to 70 percent of cross-country income differences.

**JEL:** N10, N20, N90, O43, P16, C55

**Keywords:** institutions, economic growth, global income inequality, economic development, human capital

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## 1. Introduction

*“Santo Domingo became an economy of the West, not of the most developed models of Europe, but of the Spanish model. Spain transmitted to us everything it had: its language, its architecture, its religion, its dress and its food, its military tradition and its judicial and civil institutions; wheat, livestock, sugar cane, even our dogs and chickens. But we could not receive from Spain Western methods of production and distribution, technique, capital, and the ideas of European society, because Spain did not have them. We knew the evangel but not the works of Erasmus.”*

Juan Bosch, *Composicion Social Dominicana*

The question on what lies behind the inability of societies to embark on the long-term growth process is one of the most widely debated issues in the political economy of growth and development. Persistent differences in economic growth over the past two centuries have led to substantially changing shapes of world income distribution. The number of countries that experienced the failure to embark on growth-enhancing structural transformation kept rising throughout late 19th and early 20th century with the gravity of world poverty moving from East and South Asia to Sub-Saharan Africa (Bourguignon and Morrison, 2002; Van Zanden et al. 2013). Until early 1950s, both absolute and relative number of people living below poverty increased substantially. The onset of early 1950s earmarks the turning point in the landscape of global inequality with the steady decline in both absolute and relative poverty rates. In early 1950s, the majority of the world's poor lived in Asia whereas by early 1980s, the gravity of world poverty shifted to Africa (Pritchett, 1997; Sala-i-Martin, 2006). Starting with mid-1950s, the decline in global income inequality precipitated rapid growth and convergence in East Asia triggered by the set of policies emphasizing large-scale government-led investments in physical infrastructure and human capital investments (Stiglitz, 1996; Charles et. al., 2011).

By early 2000s, East Asian tigers converged steadily to OECD per capita income levels. By 1950, South Korea's per capita income was about a fifth of that in Western Europe whereas Latin America's average per capita income was about one half of Western European level. By 2010, South Korea, Taiwan and Singapore enjoyed the same per capita income as OECD nations whereas Latin America's per capita income relative to Western Europe fell further behind compared to early 1950s. In a similar vein, comparative per capita income level of Africa and Eastern Europe compared to the OECD failed to catch-up by 2010 compared to early 1950s.<sup>2</sup>

The central question behind the fundamental change of world income distribution to uncover the growth mystery behind the paths of development observed from early 19<sup>th</sup> century onwards is what accounts for large and persistent income differences over time. The literature on the fundamental causes and determinants of long-run economic growth emphasizes the continuous battle between the advocates of different fundamental sources of growth.<sup>3</sup> Geography-based view underwent bold theoretical and empirical criticism. Acemoglu et. al. (2001b) exploited differences in European settler mortality rates as an exogenous instrument

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<sup>2</sup> For an excellent discussion of on-going convergence in the past century, see Barro (1991, 2000), Mankiw (1995), Mankiw et. al. (1992), Baumol (1986), Quah (1996) and De Long (1988).

<sup>3</sup> The advocates of geography-based view content that the most underlying facet behind the inability of less developed countries to embark on growth-enhancing structural transformation is the adverse physical geography which presumably leads to a myriad of tropical diseases, low agricultural productivity, high transportation costs and the self-perpetuating vicious cycle of poverty trap (Bloom and Sachs, 1998; Bloom et. al., 2004, Sachs and Warner, 1997; Gallup et. al., 1999; Bloom and Canning, 2003). Nunn and Puga (2012) show that Africa's adverse physical geography helped prevent further raids during simultaneous slave trade between 1400 and 1900 since the areas with more adverse physical terrain experienced significantly lower absolute and relative number of exported slaves. Given earlier evidence on the negative effect of slave on historical development of Africa (Nunn, 2008), the evidence highlights possible positive link between adverse geographic terrain and development outcomes.

for the quality of contemporary institutions in the sample of former European colonies across Africa, Latin America and Asia and demonstrated persistent effect of colonial institutions on economic performance to the present. Once the effect of institutions on per capita income is controlled for, the effect of adverse physical geography on income disappears. In addition, further attempt by [Acemoglu et. al. \(2002\)](#) to uncover the origins of modern world income distribution shows the reversal in the economic prosperity of former colonies from 1500 to the present since European colonizers set extractive political and economic institutions in relatively affluent and densely populated regions whereas the adverse physical geography forced settlers in sparsely populated regions to establish inclusive institutions with secure property rights which spurred trade, investment and the long-run economic growth.<sup>4</sup>

In addition, [Grier \(1999\)](#) found out that former British and Africa colonies with longer period of stable institutional history tend to experience lower development gap compared to high-income nations in the postwar period. Formerly colonized societies where the early inhabitants of the country originated from places with longer histories of stable organized states are also more likely to end in the upper end of cross-country income distribution ([Putterman and Weil, 2010](#)) and experience more political stability, better quality of institutions and social infrastructure ([Bockstette et. al., 2002](#)). The setup of political institutions and the consequences for the onset of economic growth extends beyond the simple political economy framework since recent evidence also highlights (i) artificial colonial borders as a source of ethnic fragmentation and sequential conflicts as the possible major constraint on income growth ([Alesina et. al. 2011](#)), (ii) early genetic diversity at the dawn of civilization ([Ashraf and Galor, 2013](#)) and (iii) a series of domestic violence and civil wars ([Collier and Rohner, 2010](#)). The evidence on whether institutions cause growth from [Glaeser et. al. \(2004\)](#) highlights a critical discussion of the relationship between institutions and growth. Accordingly, most institutional indicators to establish the proposition that institutions cause growth are conceptually unsuitable for this purpose. A closer inspection of selected growth episodes demonstrates that formerly poor countries enhanced structural growth transformation primarily through human capital investment under authoritarian political regimes. In addition, [Djankov et. al. \(2003\)](#) developed a theoretical framework where each society faces a set of institutional opportunities determined primarily by human and social capital of its population, history and culture.<sup>5</sup>

The income gap between the prosperous North and underdeveloped South persisted to the present. The evidence on Mexico's postwar growth experience from [Hanson \(2010\)](#) and [Kehoe and Ruhl \(2010\)](#) points out that despite the aggressive privatization of state-owned enterprises, liberalization and fiscal discipline, Mexico experienced a shortfall of productivity growth which is possibly accounted for by poorly functioning credit markets, widespread informality, adverse trade specialization and distortions in the supply of non-traded inputs.<sup>6</sup> The

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<sup>4</sup> Cf. [Acemoglu \(2001a\)](#) for further discussion of the early origins of Botswana's postwar economic miracle and exceptional economic performance compared to the rest of Africa ([Acemoglu & Robinson, 2010](#)).

<sup>5</sup> A large strand of literature emphasizes the non-trivial role of human capital in long-run development starting with [Becker et. al. \(1990, 1999\)](#), and [Galor and Weil \(1999\)](#). The relevance of human capital for long-run growth has been confirmed empirically by [Barro, 2001](#); [Kimko and Hanushek, 2000](#); [Van Leeuwen et. al., 2012](#), and [Spruk \(2012\)](#). This paper focuses on the fundamental causes of long-run economic performance rather than proximates ones such as human capital. [Acemoglu et. al. \(2005b\)](#) further examined the relationship between human capital and political regimes and found that the relationship between education and democracy is not robust to including unobserved effects and exploiting within-country variation. The evidence rejected the proposition by [Glaeser et. al. \(2007\)](#) and showed that the cross-sectional relationship between education and democracy is driven by omitted variable bias, influencing both education and democracy such as the joint evolution of historical political and economic development whereas there is no evidence to support the direct effect of education on the likelihood of establishing democratic regimes. [Hausmann et. al. \(2005\)](#) examine 80 growth acceleration episodes in developing countries for the postwar period and confirm the increasing likelihood of sustained growth acceleration following the transition to a democratic regime whereas [Allen et. al. \(2012\)](#) and [Coatsworth \(2008\)](#) confirm the simultaneous relevance of human capital in institutions for the long-run development of Latin America.

<sup>6</sup> Cf. [Taylor \(1994\)](#) provides a nuanced discussion of the phases of Argentina's economic growth in the 20th century and possible causes for the failure to converge to the high-income frontier.

evidence on growth dynamics in Africa is even bleaker, suggesting that Africa's growth tragedy in the 20<sup>th</sup> century can be explained by high ethnic fragmentation, low schooling, political instability, underdeveloped financial systems, high government deficits, insufficient infrastructure and distorted market incentives (Easterly and Levine, 1997; Artadi and Sala-i-Martin, 2003). Moreover, the evidence on growth performance from the postwar period clearly suggests that Latin America, Africa and Eastern Europe failed to ignite the structural transformation. The failure to sustain structural transformation and attain the income and welfare frontier of Northwestern Europe and the United States naturally rises the questions on how the differential paths of institutional development largely account for the failure to develop.

Institutions can be viewed either as formally specified in the electoral rules, constitutions, and legislation or as factually enforced. The former distinction captures the *de jure* dimension whereas the latter resonates with the *de facto* dimension. Since the political institutions determine the choice of economic institutions that set incentives to engage in productive economic activity and hence determine the direction of economic change, it is nearly impossible to tackle the differences in the institutional development without a clear distinction between the *de jure* content of institutions and its *de facto* institutional outcomes that shape the economic outcomes in the long run.

In this paper, the role of institutions and human capital in the long-run growth process is reconsidered. New indices of *de jure* and *de facto* political institutions are proposed as measures of inclusive institutions (Acemoglu and Robinson 2012) for a large panel of countries, starting as early as 1810. The institutional indices are constructed on the basis of the underlying indicators from Vanhanen Polyarchy Dataset and Polity IV Index, using principal component analysis to construct latent variables of *de jure* and *de facto* political institutions. It is shown that the locus of *de jure* and *de facto* institutions remains robust to the alternative datasets and measurement techniques. The proposed indices allow the delineation between extractive and inclusive political regimes both in a cross-section of countries and over time. Using a new dataset on cross-country income differences (Bolt and Van Zanden, 2014), respective contributions of *de jure* and *de facto* institutions to long-run are estimated using both classical fixed-effects and instrumental variable estimator to address the potential sources of endogeneity. The results indicate that *de jure* and *de facto* institutions account for up to 90% of within-country income variance over time. In the long-term perspective, institutions and human capital explain up to 80% of cross-country income differences. Panel-data evidence largely suggests the primacy of *de facto* political institutions in determining cross-country income differences, namely the ability to engage in various forms of collective action whereas the role of *de jure* political institutions is more limited. Institutional transformation leads to higher income levels incrementally. But since institutions tend to persist and change only slowly over time, large seemingly small differences in growth rates in the long run compound into large income and welfare gaps as a result of the institutional persistence. The contribution of institutions is robust to time-invariant country-specific heterogeneity and common technology shocks over time.

The rest of the paper is organized as follows. In Section II, the importance of institutions and institutional change for long-run economic growth and development is discussed based on the review of the existing literature. In Section III, the underlying data and historical reconstruction of *de jure* and *de facto* institutional indices are described. Section IV discusses the identification strategy. Section V discusses the results whereas Section VI presents the baseline results, addresses the potential sources of endogeneity, and presents the robustness checks. Section VI concludes.

## 2. Institutions, Institutional Change and the Origins of Modern Economic Growth

Why has the United States and Northwestern Europe embarked on the path of rapid economic growth in the modern era and achieved impressive living standards while a vast majority of the nations in Latin America, South Asia, Eastern Europe and Sub-Saharan Africa failed to develop competitive markets, stable polities and cultures that promote human capital accumulation and inclusive institutional development, is perhaps one of the most fundamental questions of economic history. Seemingly small differences in the rates of economic growth over time can compound to large differences in income and welfare in the long run.<sup>7</sup>

Slow growth and the divergence from the U.S and Northwestern European frontier characterized much of the post-19<sup>th</sup> century economic performance in the non-West.<sup>8</sup> The scholarly literature on comparative and economic growth and development has emphasized several competing factors and explanations for the fundamental causes of the long-run growth and development. The importance of physical geography has been emphasized by [Diamond \(1997, 2005\)](#), [Sachs and Warner \(1997\)](#), [Gallup et. al. \(1999\)](#), [Pomeranz \(2000\)](#), [Bloom et. al. \(2004\)](#), [Olsson and Hibbs \(2005\)](#), and [Presbitero \(2005\)](#).<sup>9</sup> A large strand of literature emphasizes the fundamental importance of institutions in shaping economic outcomes. In the broadest forms, institutions can be defined as (i) humanly devised constraints that structure political, economic, and social interaction and consist of formal rules (laws, constitutions, property rights) and informal constraints on human behavior (customs, traditions, codes of conduct) ([North 1991](#)), (ii) prescriptions that humans use to organize all forms of repetitive and structured interactions ([Ostrom 2005](#)), (iii) systems of established and embedded social rules that structure social interactions ([Hodgson 2006](#)), or (iv) social devices to establish law and order, and reduce uncertainty in economic exchange ([Greif 1989](#)). Political institutions determine the distribution of *de jure* political power and the choice of economic institutions is usually determined in favor of those groups with greater *de facto* political power ([Acemoglu and Robinson 2006a](#)). Hence, institutions determine the set of economic choices, affect production and transaction costs, and indirectly shapes the incentives to engage in either productive or unproductive activities. Institutions can be either inclusive and thus expand the political and economic opportunities to the broad cross-section of society or extractive and thus designed by the elite to extract rents and resources from the rest of the society ([Acemoglu and Robinson 2012](#)). Institutions evolve gradually, consisting of both past and present and connect both to the future, establish incentive structure, and shape the direction of economic change. Institutions tend to persist and change slowly over time ([Roland 2004](#), [Acemoglu and Robinson 2006b](#), [Boettke et. al. 2008](#), [Guiso et. al. 2008](#)).<sup>10</sup>

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<sup>7</sup> By 1500, the per capita GDP of the Ottoman Empire was about 40 percent of the Holland's level ([Bolt and Van Zanden 2014](#)). If the Ottoman Empire managed to sustain 4 percent rate of economic in the long-run and if Holland's economic growth were at 3 percent, then the Ottoman Empire should have caught up the Dutch income and output level in less than 100 years. However, the path of economic growth in the Ottoman Empire failed to keep pace with the Northwestern Europe since early 1500s. In 1820, the economic gap between Holland and Ottoman Empire widened further whilst on the eve of World War I, Turkey's per capita GDP was less than one third of the Dutch level and failed to decrease in the postwar era echoed as the long divergence ([Kuran 2010](#)).

<sup>8</sup> Despite spectacular rates of economic growth during the Belle Époque, Argentina failed to sustained high rates of economic growth in the aftermath of World War I and Great Depression and fell into the middle-income country club by the late 20<sup>th</sup> century ([Taylor 1992, 1994](#), [Prados de la Escosura 2009b](#), [Prados de la Escosura and Sanz Villarroya 2009](#)). The collapse of socialist central planning in early 1990s in Central and Eastern Europe exacerbated a deep structural transformation ([Kornai 2006](#)) with a low ratio of per capita output relative to the United States and Northwestern Europe.

<sup>9</sup> In the general form, geography hypothesis suggests that the failure to achieve long-run development outcomes comparable to the United States and Northwestern Europe is an outcome of adverse tropical climate, prevalence of malaria and other diseases which hamper the efficient cultivation of soil and cause low agricultural productivity. High transportation costs in landlocked areas and poor infrastructure further exacerbate the vicious cycle of stationary economic growth and prevent the tropical regions from catching-up ([Sachs 2001](#)).

<sup>10</sup> The persistence of institutions over time has been emphasized by [Grief \(1998\)](#) who notes that: »*Society's institutions are a complex in which informal, implicit institutional features inter-relate with formal, explicit features in creating a coherent*

The historical precedence of institutions has been recognized by North (1989), North and Weingast (1989), Mokyr (1990) and confirmed in the empirical analyses by Hall and Jones (1999), Acemoglu et. al. (2001b, 2002; 2005a; 2011), Easterly and Levine (2003) and Rodrik et. al. (2004).<sup>11</sup> The importance of European colonialism in shaping long-run growth and development outcomes has been stressed by Grier (1999), Engerman and Sokoloff (2000), Acemoglu et. al. (2001b, 2002, 2005a), Austin (2008), Putterman and Weil (2010) and Jones (2013). The contribution of social, cultural and religious factors to the long-run development has been highlighted theoretically by Weber (1930), Greif (1993) and Landes (1998), and has received empirical support from Barro and McCleary (2005), Tabellini (2008), Becker and Wössmann (2009), Guiso et. al. (2006), Gorodnichenko and Gerard (2010) and Aghion et. al. (2010). On the other hand, Easterly and Levine (1997), Alesina et. al. (2003) and Campos et. al. (2011), highlight the importance of ethnic and linguistic fractionalization and confirm its relevance for long-run economic outcomes empirically. De Pleijt and Van Zanden (2013) examined why Northwestern Europe evolved historically into the most prosperous part of the continent in the early 19<sup>th</sup> century by testing several competing hypotheses on the causes of the first little divergence between 1300 and 1800, and confirm the importance of institutional changes, proxied by the rise of active parliaments (Van Zanden et. al. 2012), for explaining long-run economic growth in pre-industrial Europe.<sup>12</sup>

The set of institutions that either supports or hinders economic exchange and growth reflects both written formal rules (*de jure*) and its factual (*de facto*) enforcement (Robinson 2013, Voigt 2013, Shirley 2013). De jure and de facto institutions evolve in a symbiotic relationship whilst participatory de jure institutions do not necessarily imply the factual enforcement thereof since the elites may block de facto institutional changes in spite of the provisionally pluralist and de jure political institutions. What pattern of *de jure* and *de facto* institutional development made the economic rise of Northwestern Europe possible? De Moor and Van Zanden (2009) emphasize the seeds of factually enforced inclusive and participatory institutions in the late medieval period in North Sea region wherein consensus-based marriage, the rise of participatory labor markets, and equality in property transfers between generations that postponed early marriage and thus encouraged the female labor market participation and resulted in a frequent interaction of households with labor, capital and commodity markets that made the institutional setting for growth and returns on factors of production and commodities.<sup>13</sup>

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*whole. These interrelations direct institutional change and cause this institutional complex to resist change more than its constituting parts would have done in isolation. Hence, this institutional complex is not a static optimal response to economic needs. Rather, it is a reflection of an historical process in which past economic, political, social, and cultural features interrelate and have a lasting impact on the nature and economic implications of society's institutions. «*

<sup>11</sup> Simultaneous effects of geographic conditions and institutions have been highlighted by Földvari and Van Zanden (2009) who examined the changing shapes of global income distribution and cross-country convergence dynamics from 1820 to the present. Accordingly, institutions strongly and independently affect the odds of entering convergence club whereas geographic conditions such as distance from England (as a center of industrialization and an economic leader), proximity to rapidly growing economies, and access to coast exert a strong effect on the likelihood of joining the convergence club.

<sup>12</sup> The empirical evidence by De Pleijt and Van Zanden (2013) confirms the importance of human capital formation, institutional changes and structural changes as the primary drivers of pre-industrial economic growth. Their evidence indicates the indirect effect of religion, proxied by the spread of Protestantism, on the economic growth through improved human capital formation, and an insignificant effect of land/labor ratio, highlighting substantial limitations of the Malthusian model for understanding Europe's first little divergence. Using the data on real wages in European cities, Allen (2001) and Allen et. al. (2011) suggest that the Great Divergence in real incomes taking place in mid-19<sup>th</sup> century was produced between 1500 and 1750 when income and welfare levels dropped in most European cities while remaining constant in North Sea region whereas China's welfare level stagnated uninterruptedly until the mid-20<sup>th</sup> century.

<sup>13</sup> North (2009, p. 130) emphasizes the uniqueness of early inclusive institutional transformation in the Low Countries in facilitating the path towards the Industrial Revolution, and highlights the fundamental importance of political competition and competitive capital markets before the onset of modern economic growth: "It was the Netherlands, and Amsterdam specifically, that these diverse innovations and institutions were put together to create the predecessor of efficient modern set of markets that make possible the growth of exchange and commerce. An open immigration policy attracted businessmen; efficient methods of financing long-distance trade were developed, as were capital markets and discounting methods in financial houses

The rise of the rule of law in Northwestern Europe as the underlying force behind the rise of participatory economic institutions depended not only on the initial *de jure* and *de facto* institutional equilibria which disfavored the persistence of extractive absolutist political institutions but also on the formulation and enforcement of legal rules. In Holland and England, the law rose as a methodical and scientific discipline, and had become a binding constraint on the choices of political rulers since it had been codified into a reasonable and methodical text that prevented the extraction of rents from economic exchange whilst its substantive content was judged by legal specialists trained at universities rather than unconstrained political rulers (Schäfer and Wulf 2014). The embeddedness of the rule of law was further echoed by 1688 Glorious Revolution which set the precedence by establishing Parliament as key executive constraint on the monarch and by separating the law from political hierarchy with its own sources of, governance and independent structure of appointment before the rise of democracy and accountable governments.<sup>14</sup>

Why the *de jure* and *de facto* political institutions outside the Northwestern Europe disfavored the rise of efficient economic institutions, rule of law and competitive polities? In China, dynastic political lineages based on the clan as a locus of cooperation (Greif and Tabellini 2012) never generated a comparable degree of the rule of law or political accountability. Non-existent civil society and the absence of independent aristocracy proliferated path-dependent persistent of extractive sets of institutions and perverse disincentives for the engagement in productive economic activity. Such institutional environment encouraged rent-seeking at the expense of dynamic technological change and innovation which impeded the development of efficient capital markets that would have made technological breakthrough possible, and laid the seeds of large-scale economic stagnation and the failure to embark on the path to Industrial Revolution on the scale comparable to England and Holland (Li and Van Zanden 2012, Brandt et. al. 2014).

Compared to Northwestern Europe, Eastern Europe followed a different path of institutional development. Low population density in Eastern European land and the decline of the serfdom manorial economy in Western Europe increased the demand for agricultural livestock and commodities where the lands east of Elbe River possessed the comparative advantage given its initial factor endowments and physical geography.<sup>15</sup> Such reversal of specialization led to the progressive enslavement of peasants at the same time as serfdom ceased to exist in Western Germanic states, Low Countries, France, England, Spain and Italy. The rise of serfdom in Eastern Europe changed the *de jure* and *de facto* status of peasants into various forms of social and economic incapacity such as the exclusion from contractual arrangements through rigid customary rules which prevented the rise of independent merchant groups as a constraint on the discretion of political rulers which constituted the backbone of institutional

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*that lowered the costs of underwriting this trade. The development of techniques for spreading risk and transforming uncertainty into actuarial, ascertainable risks, the creation of large-scale markets that allowed for lowering the costs of information, and the development of negotiable government indebtedness all were a part of this story."*

<sup>14</sup> The rule of law was institutionalized to a greater extent in Northwestern Europe compared to Southern and Eastern Europe, Middle East, and India chiefly because of the path-dependent historical circumstances arising from the extreme fragmentation of political power which prevented the centralization of political authority as a necessary condition for the consolidation of the rule of law (Fukuyama 2012).

<sup>15</sup> Drawing a border between Western and Eastern Europe is a subject of controversy. In the 16th and 17th century, the lands east of Elbe River (Bohemia, Silesia, Hungary, Prussia, Livonia, Poland, Lithuania, and Russia) comprised contemporary Eastern Europe. Successor states of the lands east of Elbe River (Czech Republic, Slovakia, Hungary, Poland, Lithuania, Latvia, Russia, Ukraine and Belarus) and South-Eastern European states (Serbia, Bulgaria, Romania, Bosnia and Herzegovina, Albania, Greece) thus belong to Eastern Europe. Following the historical evolution of Eastern Europe (Blum 1986), Austrian lands which comprise contemporary Austria and Slovenia (Oberösterreich, Niederösterreich, Salzburg, Kärnten, Steiermark, Krain, Tirol, and Vorarlberg) are excluded from Eastern European cultural and social space and considered either Central or Western European.

development West of Elbe.<sup>16</sup> In the West, higher population density advanced the establishment of large urban centers, independent cities and higher rates of urbanization which disadvantaged the political power of local lords and failed to impose critical constraints on the absolutist power of political rulers in coercing the non-elites into various forms of involuntary contractual arrangements<sup>17</sup> and stifled economic growth by channeling the surpluses to the political elites and thus preventing the rise of accountable governments.<sup>18</sup>

The Middle Eastern pattern of institutional development had been characterized with an equally divergent conjectures and internal contradictions. Compared to scattered, fragmented and politically weak polities in Arab Peninsula, Ottoman Empire moved swiftly from the tribal society to state-level political organization. The emphasis of Ottoman state organized laid on the establishment of centralized bureaucracy and meritocratic military recruitment based. Ottoman aristocracy never permitted the rise of blood nobility which could potentially fragment the political power. Compared to Western Europe, Ottoman Empire never underwent a transition to pluralist and participatory *de jure* and *de facto* economic and political institutions which had been hindered by the Islam. Islam's original tax system (*zakat*) systematic failed to encourage credible constraints on the political rulers since the wealthy interest groups decimated it through numerous loopholes to shelter wealth from taxation. Inflexible and stagnant Islamic institutions failed to produce corporations necessary to mobilize capital into productive investments and instead relied on generous inheritance laws and short-lived partnerships which pushed the Middle East into stagnant economic stagnation (Kuran 2010, 2012). The reliance on the doctrinal law-making inspired by the religion instead of the scientific and methodical treatment of law in Western Europe also known as *Verwissenschaftlichung* (Schäfer and Wulf 2014), failed to produce the economic and political institutions conducive to scientific progress and innovation and to provide a level-playing field supported by secure property rights which characterized the economic rise of Holland and England in the 16<sup>th</sup> century.

The route of institutional development taken by China, Ottoman Empire, and Eastern Europe differed substantially from Holland and England. The 1688 Glorious Revolution facilitated the endogenous institutional development which critically fostered strong civil society and fueled economic growth through expanding economic opportunities to the non-elites which undermined the political power of the aristocracy, and which critically fostered the economic growth. Endogenous rise of parliaments as a critical constraint on the absolutist rulers spurred the establishment of broader legal and economic institutions conducive to trade and investment such as: (i) secure property rights, (ii) efficient and low-cost enforcement of contracts, (iii) stable, honest and competent governance, and (iv) efficient and meritocratic civil

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<sup>16</sup> Beginning in 15th century, absolutist monarchs in sparsely populated Eastern European lands launched systematic limitation on the peasant mobility. Such limitations included the prohibition of leaving the land, heavy punishments for runaways and restrictions on cities to shelter peasants from manorial obligations (Blum 1957, 1960, Hellie 1971, Szücs 1988).

<sup>17</sup> In the lands east of Elbe River, cities were much smaller and had not served as urban centers for growing trade and economic opportunities but merely as administrative centers of political power and privilege of the landed elite. Such economic and political factors left cities in Eastern Europe politically weak and gave the upper nobility and aristocracy a complete freedom in dominating, coercing and suppressing the peasantry in serfdom and other comparative forms of economic incapacity. In essence, the rise of second serfdom in Eastern Europe prevented the emergence and consolidation of critical constraints on the coercive and extractive institutions through the complete absence of parliaments, and weak accountability groups which critically contributed to the Little Divergence starting in the 14th century (Allen et. al. 2011, De Pleijt and Van Zanden 2013).

<sup>18</sup> Persistent and remarkable differences in the pattern of institutional development between Western European states and Eastern Europe has been highlighted by Acemoglu and Robinson (2012, p. 107): »While the institutional differences between England and France were small in 1588, the differences between Eastern and Western Europe were much greater. In the West, strong centralized states such as England, France, and Spain had latent constitutional institutions. There were also underlying similarities in economic institutions such as the lack of serfdom. Eastern Europe was a different matter. The kingdom of Poland-Lithuania, for example, was ruled by an elite class called the Szlachta, who were so powerful they had even introduced elections for kings. The Szlachta ruled over a mostly rural society dominated by serfs, who had no freedom of movement or economic opportunities. Farther east, Russian emperor Peter the Great was also consolidating an absolutism far more intense and extractive than even Louis XIV could manage.«



administration. Such institutions necessary to expand economic opportunities to the non-elites failed outside in Habsburg lands, Iberia, Balkans, Russia and China. Compared to the regions outside the Northwestern European circle, Scandinavian countries, rich in intellectual capital, managed to attain the institutional breakthrough that facilitated the ultimate convergence to Western European frontier starting in early 19<sup>th</sup> century.<sup>19</sup>

Why the United States managed to establish the set of *de jure* and *de facto* political institutions that expanded the economic and political opportunities to the non-elites and why Latin America failed to do so? Compared to the United States, early post-independence Latin American republics periodically excluded a sizeable fraction of non-elites from access to economic opportunities and collective action and remained mired in uninterrupted political instability after the independence from Spain.<sup>20</sup> Such perverse political instability led to highly insecure and ill-defined property rights which stifled trade and investment. Unstable *de jure* and *de facto* political institutions created weak and inefficient states, unable to raise taxes and provide essential public services (Acemoglu et. al. 2011b). Despite the independence from Spain, Latin America inherited the set of inefficient political and economic institutions from Castilian legal and social norms such as systems of forced labor *mita* (Dell 2010) and *encomienda* (Acemoglu and Robinson 2012), designed to extract resources from the colonies. Liberal reforms imposed by the Bourbons in the 18<sup>th</sup> century provoked internal strife across Latin American colonial elites which perceived such reforms as the threat to the existing rents extracted from the indigenous population and non-elites. Whereas the colonial elites in the thirteen colonies of British America revolted to demand freedom of commerce, executive constraints on the political rulers, and rule of law, the struggle behind the independence movements in Latin America was primarily based on the preservation of rent extraction to prevent the spread of political and economic liberalization from Spain under the 1812 Cádiz Constitution (Lovett 1965, Payne 1973, Rodriguez 1998, Esdalié 2000).<sup>21</sup>

The failure to establish inclusive *de jure* and *de facto* political institutions to support freedom of enterprise and secure property rights was nowhere else more pronounced as in Mexico.<sup>22</sup> In the aftermath of the war of independence in 1821, Mexican society engaged in a political battle between the Conservatives, aiming to keep the Castilian colonial institutions in place, and Liberals, inspired by the economic and political liberalism espoused by the 1812 Cádiz Constitution.<sup>23</sup> The liberal triumph of 1855-1857 was ended by the French military

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<sup>19</sup> Based on the national per capita income estimates by Bairoch (1981), Landes (1998, p. 248) attributes the exceptional economic performance of Scandinavian countries during the late 19th century to cultural origins and institutions: »*Scandinavia, desperately poor in the eighteenth century yet intellectually and politically rich, was late in learning the ways of modern industry, but, once started, quick to pick them up. The impressive performance owes everything to cultural preparation. The Scandinavian countries, equal partners in Europe's intellectual and scientific community, enjoyed high levels of literacy and offered a first-class education at higher levels. They also operated in the atmosphere of political stability and public order. Once among the most warlike populations in Europe, now they were the most peaceable, even stolid by comparison with the peoples of the south. Property rights were secure; the peasantry was largely free... Scandinavia built on free enterprise and quick response, on the export of staples to more advanced industrial countries, on the investment of these gains in more diversified production.*«

<sup>20</sup> In the fifty years since the independence from Spain in 1810, Mexico had fifty-two presidents, many of whom came to power according to unconstitutional rules.

<sup>21</sup> The Spanish Constitution of 1812 was established in March 1812 by the Cádiz Cortes and Cortes Generales. It established universal male suffrage, constitutional constraints on the monarch, freedom of the press and supported land reform and freedom of the enterprise.

<sup>22</sup> Mexico inherited persistently high income and wealth inequality from the colonial period which further contributed to the resistance of colonial elites to critical institutional changes. Milanovic et. al. (2011) estimate the Gini coefficient for the territory of New Spain (*Nueva España*) in 1790 at 0.635, the highest extent of inequality among pre-industrial societies.

<sup>23</sup> Coatsworth (1999, p. 39) notes that Mexico been no exception to the liberalizing current sweeping across the rest of Latin America: »*In the second half of the nineteenth century, virtually every Latin American country carried out a series of similar reforms that eliminated or substantially reduced the most important of the institutional constraints inherited from the colonial era. In most cases, the process began with the elimination of state monopolies, Church and military fueros (exceptions from ordinary civil and criminal jurisdiction) and other privileges, a wide array of domestic taxes and fees, and archaic property*

intervention which installed the reign of Austrian-born King Maximilian which to the dismay of conservative elites upheld inclusive institutional changes such as land reforms, religious freedom and suffrage extension beyond the landholding class. Institutional changes that swept across Mexico abruptly ended by the defeat of the regime by revolutionary forces under Benito Juárez. In 1872, Porfirio Díaz launched a military coup, seized the presidency in 1876, and ruled almost without an interruption until 1910.<sup>24</sup> Although Díaz regime embarked on the de jure path of institutional change to overhaul the institutions inherited from the colonial era. Little had been achieved in terms of de facto institutional development apart from the expropriation of church wealth. Despite the changes in de jure constitutional provisions, colonial institutions such as internal customs, licenses, fees, and restrictions on economic activity still provided most of the revenues for municipal and state governments. Instead of implementing large-scale de jure and de facto institutional changes to allow for broad-based access to economic opportunities for the non-elites and for the gains from specialization, division of labor and international trade, Porfiriato regime rested on the expropriation of politically unmobilized groups and on the policy of divide-and-rule which bred short-term political gains at the cost of long-term economic disaster. By late 19<sup>th</sup> century, Mexico and the rest of Latin America fell further behind the U.S. per capita income and welfare frontier (Engerman and Sokoloff 1997, North et. al. 2000, Coatsworth 1999, Robinson 2003).

In a similar vein, 19<sup>th</sup> century Habsburg Monarchy missed the opportunity to seize the advantages of early industrialization as its political rulers actively prevented multiple attempts to introduce new technologies and infrastructural improvements such as railway expansion. Inherited feudal order and the persistence of serfdom, which had been officially abolished in 1848, constituted the backbone of Habsburg absolutism after the dissolution with the Bourbon throne in 1700. Unlike the Stuart England, the Habsburg lands lacked a strong merchant class as a counteracting *de facto* constraint on the absolutist political rule of Francis I, Maria Theresa, and her son Joseph II. Even though the absolutist rule had established a more efficient central state and administrative reforms, no real constraints on the executive rule and no elements of political pluralism such as a powerful parliament were imposed from within. Fearing industrialization and railroad expansion would bring mobility and economic opportunities to the broad cross-section of society, Habsburg rulers further undermined the economic and political institutions to prevent industrialization and the subsequent institutional changes. State council, which the empress Maria Theresa used as a consultation body was dissolved and the necessary reforms to alleviate poverty, encourage economic modernization and social progress were reversed, especially in eastern parts of the empire. The reign of Francis I subdued the de jure and de facto political rule to block the emergence of modern labor market, preserve state monopolies and trade restrictions, limits on occupational choices and the opposition to the development of industry and construction of railways. The Habsburg absolutism continually preserved the set of extractive de jure political rules and its de facto enforcement aiming primarily at the agrarian society with locked economic opportunities to the non-elites which caused slow economic growth large economic disparities within the empire.<sup>25</sup>

Drawing on the Habsburg pattern of political and economic development, Acemoglu and Robinson (2006a) advocate the political elites may block technological and institutional

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*rights (entail, ecclesiastical and indigenous mortmain, and slavery), and continued with the privatization of public lands, the enactment of new civil and commercial codes.»*

<sup>24</sup> Porfirio Diaz reign had been briefly interrupted in 1880-1884 period when Manuel Gonzales acted as a president.

<sup>25</sup> Reconstruction of Austrian and Hungarian national accounts by Schulze (2000, 2007) suggests a persistent economic decline of Austrian lands from 1870 to 1880 with substantial income differences between advanced lands in the Western part of the empire and less developed and largely agrarian societies in the east. By 1870, the ratio between the wealthiest part of the empire, Lower Austria and the poorest part, Dalmatia, corresponded to the output per capita gap between Holland and Bulgaria at the time. Similarly large differences did not disappear after the dissolution of the Austro-Hungarian Empire into multiple independent states.

development due to political replacement effect. High political competition or elite entrenchment by accountability groups may prevent the elites from blocking the development. Development blockade is more likely when economic stakes such as land rents and redistribution are high whereas external threat may reduce the incentives to block institutional change. Contrasting experience of institutional development in Britain and Holland compared to Austria, Russia and Spain testifies to the persistence of political power of the elites under absolutist institutions as a key impediment to economic opportunities for the non-elites and as a precursor of the economic change.<sup>26</sup>

De jure structure of political power and its de facto enforcement critically facilitate the choices of economic institutions. Participatory de jure and de facto political power encourage the adoption of efficient technologies necessary for the convergence to the frontier. Economic institutions set the incentives and constrains on economic actors and thereby influence economic outcomes. But as different groups benefit differently from alternative economic institutions, the conflict over the sets of economic institutions is usually determined by the structure of political institutions that allocate de jure political power. Groups with greater economic representation tend to acquire greater de facto political power, and since political institutions are characterized as state variables that change over time, groups with greater de facto political power strive to preserve the future de jure political power.<sup>27</sup> The persistence of economic institutions invariably interacts with the distribution of political power. When de facto political institutions persists, elites with different identity can prolong the same kind of dysfunctional and inefficient economic institutions. The survival of adverse institutional choices is not the persistence of elites but the persistence of incentives of power-holders to distort the economic and political system for their own advantage, known as iron law of oligarchy (Michels 1911).<sup>28</sup>

Despite its profound and far-reaching effects on long-run development, de jure and de facto political institutions do not evolve in a vacuum. Societies with inclusive and participatory political institutions are often endowed with good human capital (Jones 2001, Boucekkin et al. 2007, Galor 2011). More densely populated societies enable lower costs of start-up cost of

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<sup>26</sup> The persistence and entrenchment of political power has been highlighted by Robinson and Verdier (2013) who construct a simple model of clientelism with political commitment problem as a key driver of inefficient forms of income distribution such as public sector employment which is prevalent and attractive in the equilibrium with high inequality and low productivity whereas high political and economic stakes mutually reinforce high inequality.

<sup>27</sup> Acemoglu et al. (2005a, p. 389) demonstrate the institutional root causes of long-run differences in economic performance by focusing on several quasi-experiments in history such as the division of Korea in the postwar period across the 38th North parallel, suggesting that: »*Economic institutions encouraging economic growth emerge when political institutions allocate power to groups with broad-based interests in property rights enforcement and when they create effective constraints on power-holders, and when there are few rents to be captured by power-holders.*«

<sup>28</sup> The iron law of oligarchy posits a strong theoretical explanation for the persistence of elites, maintaining the same type of distorting policies. Even through current political elites can be replaced by newcomers, the future elites have no incentive to change the oligarchic structure of monopolized political power, and may instead use the entrenchment by the established set of political institutions to their own benefit. The persistence of de jure and de facto political power questions the possibility of large-scale externally-imposed institutional changes. To this end, Acemoglu et al. (2011a) exploit the exogenous variation in institutional reform, created by the French Revolution within German politics at the end of 18<sup>th</sup> century. The French Revolution abolished the monarchy and brought radical social changes based on economic and political liberalism. It established a secular democratic republic that turned increasingly militaristic and authoritarian with rise of the Napoleon regime. In Germany, French Revolution imposed the set of reforms aiming for substantial social and economic change such as: (i) the introduction of civil legal code, (ii) abolition of guilds, (iii) equality before the law, (v) undermining aristocratic privileges, (vi) end of serfdom and Jewish ghettos, (vii) extension of economic freedom, and (viii) agrarian reform. The empirical evidence, using urbanization rates as proxies for economic growth, suggests more rapid economic growth taking place in areas that had undergone the radical reforms brought by the French revolution, especially after 1850. In essence, the evidence from Germany provides a strong empirical case for the detrimental effect of *Ancien Régime* institutions, such as feudal land and labor relations, oligarchies and guilds, lack of equality before the law, for the economic prosperity. Moreover, institutional reforms imposed by the French paved the way for industrialization and economic growth at the onset of 19<sup>th</sup> century.

additional schools and facilitate more rapid acquisition of basic and more advanced skills which can simultaneously affect both long-run growth and the path of institutional development.<sup>29</sup>

An alternative view might suggest that the effect of political institutions on long-run development is weak once the effects initial factor endowments are controlled for. Factor endowment hypothesis (Engerman and Sokoloff 2000, 2002) advocated the importance of initial as the underlying cause of diverging long-run economic performance between New World economies.<sup>30</sup> Differences in initial factor endowments could potentially preserve the economic institutions that either limit or provide access to economic opportunities for the non-elites and thus indirectly shape the de jure and de facto political development. Societies with extreme inequality such as colonial Mexico, Peru, and Brazil failed to establish pluralist and inclusive political institutions not because of the favorable structure of initial factor endowments but as an outcome of elites extracting surpluses from the indigenous and non-elite population. In this respect, extractive de jure and de facto political institutions that persisted across post-independence Latin America cannot be explained by initial factor endowments since economic outcomes associated with endowment structure such as land ownership and low human capital investment is the outcome of different political institutions (Weingast 1995, Roberts and Wibbels 1999) leading to alternative economic institutions that set the incentives to extract resources rather than invest into productive economic activity with a level-playing field.

If extractive de jure and de facto political institutions persist and change slowly over time, institutions conducive to growth could be established by transplanting the institutional framework from the countries with good institutions. The difficulty of transplanting efficient and inclusive institutions has often led to adverse political and economic development with far-reaching consequences. Nowhere has such pattern been more evident than in Spain. After the initial rise of democracy following the 1812 Constitution of Cádiz, Spain receded back into dictatorship or fragile democracy following the rise of First and Second Spanish Republic. Persistent political instability resulted in the Spanish Civil War after a series of internal strives. The reversal of political development envisaged by the Constitution of Cadiz included the rise of inefficient economic and social institutions which took decades of civil strife to achieve such as the right of abortion, freedom of expression and equality of civil marriage, and which had not emerged until the democratic transition in 1975. Under what conditions could such adverse institutional development evolve?<sup>31</sup>

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<sup>29</sup> Baten and Van Zanden (2008) construct indices of book production for eight Western European countries from 1450 to 1750 to proxy advanced literacy skills rather than basic skills. The evidence based upon fixed-effects panel regressions clearly suggests that countries with faster rate of book production experienced higher real wage growth.

<sup>30</sup> The central argument of Engerman-Sokoloff hypothesis advocates differences in the degree of inequality in wealth, land ownership, human capital and political power are rooted in initial factor endowments which persisted from the colonial to the post-colonial period (Hoff 2003).

<sup>31</sup> North (1989, p. 1328) emphasizes deep historical differences in institutional development and culture between Castile and Aragon and the dominance of Castilian social and economic institutions in the political development of Spain: »Prior to the union of Ferdinand and Isabella, the kingdom of Aragon (comprising approximately Valencia, Aragon and Catalonia) had a very different character than Castile. Aragon had been reconquered from the Arabs in the last half of the 13th century and had become a major commercial empire extending into Sardinia, Sicily, and part of Greece... In contrast, Castile was continually engaged in warfare, either against the Moors or in internal strife. In the 15 years after their union, Isabella succeeded in gaining control not only over the unruly warlike barons but over church policy in Castile as well. The result was a centralized monarchy in Castile; and it was Castile that defined the institutional evolution of both Spain and Latin America. A major source of fiscal revenues was the Mesta (the sheep-herders guild), which in return for the right to migrate with their sheep across Castile provided the Crown with a secure source of revenue, but also with consequences adverse to the development of arable agriculture and the security of property rights, as well as with soil erosion. But as the Spanish empire grew to become the greatest empire since Roman times, its major source of revenue were increasingly external... Control internally over the economy and externally over the far-flung empire entailed a large and elaborate hierarchy of bureaucrats armed with an immense out-pouring of of royal edicts. Over 400,000 decrees had been issued concerning the governance and economy of the Indies by 1635, an average of 2,500 a year since Columbus first sailed to the Indies. Guilds also provided a vehicle for internal economic regulation. Price ceilings were imposed on grain and state-owned trading companies, and monopolistic grants provided control of external trade. As the military costs of controlling the empire outstripped the revenues, the Crown raised

In a stark comparison with the United Kingdom (North and Thomas 1973, Hayes 1982, North and Weingast 1982, Lang 1999, Acemoglu et. al. 2005a), Spain failed to establish and sustain the *de jure* and *de facto* parliamentary democracy through a turbulent institutional development since the Cádiz Constitution. The suppression of liberal reforms either by the absolutist rule of Isabella II. or through a civil strife had been a peculiar force behind the institutional development of Spain. Political instability of the First Spanish Republic, the military coup in the aftermath of the reign by Alfonso XIII., and the failure to regain overseas territories all contributed to the adversity of Spain's 19<sup>th</sup> century institutional development. The nature and path-dependence of exploitative *de jure* and *de facto* political institutions that restrict access to economic opportunities to the non-elites that characterized Spain's long-run institutional development is reminiscent of the Southern Europe.<sup>32</sup> Repeated failure to establish and sustain the inclusive *de jure* and *de facto* parliamentary democracy in Southern Europe were far more pronounced when the institutional development that continually characterized Spain, Italy, and Portugal was transplanted into Latin America. Latin American political development establish dictatorships as an outcome of the uninterrupted struggle between labor and capital. Prior to the rise of South American and Southern European dictatorships, working classes had begun to frighten property owners, leading to the failure to consolidate liberal democracy after the loss of power, privilege, profits and legitimacy. The economic elites were rescued by the military which facilitated a rapid rise of right-wing dictatorships defending capitalism from widespread populism, socialism, and communism by suppressing the demands from the lower social classes, by favoring private over public ownership, the wealthy elite over poor workers, capital accumulation over income distribution, hierarchy over equity and inclusivity (Drake 1996). Such pattern of political development confined post-independence Latin American republics and societies living under extractive institutions in 19<sup>th</sup> century Greece, Italy, Portugal and Spain to decades of political struggle between entrenched economic

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*the internal tax and repeatedly went into bankruptcy, which is resolved through the seizure of properties and financial assets. The consequence was the decline to the Spanish economy and economic stagnation.*«

<sup>32</sup> Landes (1998) notes the extraordinary human capital origins of Southern European institutional development: ““Compare the late industrial development of Mediterranean Europe, in particular of Italy, Spain and Portugal. All of these were hurt by religious and intellectual intolerance, and all were plagued by political instability. All of these countries were poor, handicapped by meagre, highly variable rainfall that reduced agricultural yields far below those of well-watered northern Europe. Spain was the least favored. A notional line divides Portugal and Italy approximately in half; but 90 percent of Spain lies on the dry side, and much of the wetter land above the line is mountainous and not arable. Add in Spain's high average altitude and hence extremes of temperature, and we have a bad country for cereals. One might have thought such poor lands good candidates for cottage industry ... but Iberia particularly wanted for enterprise and skills, including the ability to read. These failings went back centuries - to religious zealotry and Counter-Reformation cultivation of ignorance - and ruled out the kind of diversification that would have compensated for agricultural infertility and poverty... The contrast between Mediterranean and northern Europe is undeniably large. Around 1900, when only 3 percent of the population in Great Britain was illiterate, the figure for Italy was 48 percent, for Spain 56 percent, for Portugal 78 percent. The religious persecution of old - the massacres, hunts, expulsions, forced conversions, and self-imposed intellectual closure - proved to be the kind of original sin. Their effects would not wear off until the twentieth century ... and not always even then. Needless to say, this indictment has not been to the taste of Spanish elites, political and intellectual. No one likes to be told that his failures are due to his failings; or that his sources of pride are vices rather than virtues. Hence, a protracted effort by Spanish and hispanophile scholars to dismiss the historical indictment as a 'black legend' - a slander by people of bad faith. Yet the fact of 'decadence' remains and calls for explanation: more than three centuries of backwardness exerted a high price in income and achievement.”

elites and the working classes, perpetuating the set of fragile and unstable political institutions susceptible to subsequent reversal.<sup>3334</sup>

Despite the similarities in colonial histories, Colombia managed to sustain the transition towards inclusive political institutions and consolidated democratic politics successfully compared to Guatemala, Nicaragua, Paraguay and El Salvador where attempts to consolidate inclusive political institutions were suppressed by coups which turned these societies into dictatorship which often ended in endemic violence and civil war. An important source of differences in the paths of political development between Colombia one hand and the rest of Latin America on the other hand, is the presence of large smallholder coffee producers which facilitated the emergence of relatively large middle class which triggered both the establishment and consolidation of inclusive political institutions (McFarlane, 1993; Paige, 1997; Earle, 2000; Nugent & Robinson, 2010).<sup>35</sup>

The institutional development of East Asia differed tremendously from Latin America, Middle East, and Eastern Europe. It embodied the consolidation of non-democratic regime in the postwar period. Whereas the political elites in late 19<sup>th</sup> century China after the demise of the Qing dynasty geared towards the creation of the republic under the leadership, the nature of political institutions exhibited little change since powerful centralized government consistently stifled political competition. In fact, by mid-19<sup>th</sup> century, Taiping Rebellion in southern China led to more than twenty million deaths as a result of violence by established political and military elites of Qing dynasty and mass starvation. Despite the decline of Qing dynasty which caused a deep suffocation from extractive political and economic institutions, China experienced little institutional change in early republican period faced with deep-seated and prolonged extractive political institutions. Non-democratic politics was further consolidated under Mao's great leap forward and after the Cultural Revolution since all institutional regimes were marred by the nearly complete absence of political competition which exacerbated the power and persistence of political elites.

Despite the endurance and persistence of extractive political institutions, Singapore is known for rapid industrialization and economic liberalization in the postwar period which lifted the country from the economic and social backward to the highest levels of per capita income worldwide. Long-standing rule of People's Action Party (PAP) endured the harassment of political opponents, extension of control over the society and the media and a persistent suppression of political activism. However, compared to Latin America, extractive political institutions in Singapore endured without major threats of coups and revolutions mainly because the establishment of one-party state by PAP was exercised to combat corruption since Singapore is a rare example of one-party state where the ruling political party has had a long

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<sup>33</sup> An overview of Argentine institutional development by Acemoglu and Robinson (2006a) clearly supports the notional characteristics of political development blurred by political turmoil that confine de jure and de facto institutional equilibrium to permanent instability and mediocre performance: *»The political history of Argentina therefore reveals an extraordinary pattern where democracy was created in 1912, undermined in 1930, re-created in 1946, undermined in 1955, fully re-created in 1973, undermined in 1976, and finally re-established in 1983. In between were various shades of non-democratic governments ranging from restricted democracies to full military regimes. The political history of Argentina is one of incessant instability and conflict. Economic development, changes in the class structure, and rapidly widening inequality, which occurred as a result of the export boom from the 1880s, coincided with pressure on traditional political elite to open the system. But the nature of Argentine society meant that democracy was not stable.«*

<sup>34</sup> The fragility of Latin American political equilibrium is further emphasized by Bushnell (1993) discussing the introduction of universal male suffrage in 1936 by President Alfonso Lopez Pumarejo: *»Lopez... was well aware that Colombia could not go on indefinitely ignoring the needs and problems of what he once described as 'that miserable class that does not read, that does not write, that does not dress, that does not wear shoes, that barely eats and remains at the margin of national life. In his opinion such neglect was not only wrong but also dangerous, because the masses would sooner or later demand a larger share of amenities of life.«*

<sup>35</sup> Landes (1999, p.330) provides an eloquent account of the repeated failures to establish parliamentary democracy in Paraguay: *»Paraguay was the most exceptional country, more Indian (Guarani) than any other on the continent... After independence, like other debris states of the great Hispanic empire, Paraguay had fallen almost immediately under the control of dictators. The laws said republic, but the practice was one-man rule – a mix of benevolent despotism and populist tyranny.«*

tradition of recruiting politicians from the professions and civil service rather than party membership which prevented political rent-seeking. When Singapore gained independence from Britain and established one-party state, PAP maintained power by fostering popularity through generous social welfare and housing programs, achieving low income inequality, promoting macroeconomic stability which acted as a key driver of rapid postwar growth. In addition, because Singapore never endured large and persistent land inequality, it avoided Latin American-style populist political dictatorship to redistribute income and wealth from capital owners' minority to labor majority which prevented the adoption of social and economic policies disastrous to economic growth. The evolution of inclusive political and economic institutions in Northwestern Europe and the failure to embark on the inclusive institutional transformation across Latin America, Eastern Europe, South Asia and Sub-Saharan Africa poses a dilemma whether institutional changes are the main cause of the differences in economic development over long periods of time. The aim of this paper is to examine the effect of long-term institutional changes from early 19<sup>th</sup> century on economic performance in the long-run perspective. Our key research hypotheses are summarized as follows:

*H1: The rise of extractive de jure and de facto political institutions causes slow long-run economic growth and accounts for the large fraction of long-run developments paths across and within countries*

*H2: Societies outside the Northwestern Europe achieved slower comparative economic growth as a result of less inclusive de jure and de facto political institutions that denied access to economic and political opportunities to the non-elites and as a result failed to catch-up with the frontier.*

### 3. Data and Variables

#### 3.A GDP Per Capita

The data on per capita GDP is from the first update of the Maddison Dataset (Bolt & Van Zanden, 2014) whereas the original estimates are based on Maddison (2010). Real GDP per capita is expressed in international dollars using Geary-Khamis PPP converted and 1990 base year to provide inflation-adjusted real series. In addition, discontinuous benchmarks for particular years are decomposed into a continuous time-series using simple linear interpolation between adjacent benchmark years. The updated dataset expands both spatial and temporal coverage of GDP estimates. Since the goal of the paper is to test the hypothesis about the long-term effects of human capital and institutions on growth, the year 1820 is taken as starting year. Compared to the earlier dataset (Maddison 2010), historically reconstructed GDP per capita series are considered starting in 1820 for Spain (Alvarez-Nogal & Prados de la Escosura, 2013) and Portugal (Reis, 2011), Sweden (Schön & Krantz, 2012), Germany (Pfister, 2011; Burhop & Wolf, 2005) and Italy (Malanima, 2011; Bafiggi, 2011). Starting in 1850, the revised real GDP per capita estimates are considered for Switzerland (David et. al. 2011) and Greece (Kostelenos et. al. 2013). Reconstructed historical per capita GDP estimates from Milanovic (2011) for the territories of former Yugoslavia are added to the aggregate sample for post-WW2 period as well as recent estimates for Bulgaria (Ivanov, 2006).

Updated estimates for the United States (Sutch, 2006) are considered for the period 1820-1870 whereas the post-1870 series on real per capita GDP is based on existing series from Maddison (2010). For Latin America, income estimates based on Prados de la Escosura (2009a) are included in the sample. Reconstructed income per capita series for Latin American countries is mostly based on either direct proxies for historical GDP per capita trajectory considering

recently updated estimates for Argentina (Newland & Poulson, 1998; Della Paolera et. al., 2003; Newland & Ortiz, 2001), Brazil (Leff, 1982; Goldsmith, 1986), Chile (Diaz et. al., 2007), Colombia (Kalmanovitz Krauter & Lopez Rivera, 2009), Cuba (Santamaria 2005; Ward & Deveraux 2012), Mexico (Coatsworth 1989), Uruguay (Bertola et. al. 1998) and Venezuela (Baptista 1997).

From the year 1900 onwards, recently updated estimates for Central American countries (Nicaragua, El Salvador, Costa Rica, and Honduras) are considered based on the existing evidence from Thorp (1998). For Asia, recent GDP dataset on 20th century Indonesia (Van der Eng 2010) is considered. The work carried out by Fourie & Van Zanden (2013) on the level of per capita GDP for former Cape Colony is also considered. Reconstructed GDP series for Cape Colony is linked to the 20th century real GDP series for South Africa. Long-term time-series on Cape Colony and South Africa allows us to include the entity into the sample starting in 1850. To the best of our knowledge, this is the first systematic attempt to consider historically reconstructed time-series for Sub-Saharan African countries in long-run cross-country growth regressions.

Historically reconstructed real GDP per capita estimates are decomposed into seven intertemporal sub-samples: (i) 1820-2000, (ii) 1850-2000, (iii) 1870-2000, (iv) 1900-2000, (v) 1920-2000, (vi) 1950-2000, (vii) 1970-2000. Breaking down the aggregate sample into sub-samples allows us to facilitate the inclusion of recently estimates and updated per capita income levels in the cross-country growth regression framework. Six sub-samples allow for the stepwise inclusion of recently updated GDP estimates in the panel growth regression. Individual countries are grouped into regional blocks. In 1820, Western Europe consists of Austria, Belgium, Denmark, France, Germany, Netherlands, Norway, Sweden and UK. Starting in 1850, recent income estimates for Switzerland are added whereas by 1900, Ireland and Finland are included as well. Southern European sub-sample consists of Italy, Portugal, Spain and Greece. The latter enters the sub-sample in 1870. Two incremental changes were made by early 1950 where Croatia and Slovenia are included in the sub-sample. For Eastern Europe, the GDP series for Hungary and Romania is considered from 1870 onwards. By 1900, Albania, Bulgaria and Poland join the sub-sample whereas by 1950, income estimates for Serbia are added in the regional sub-sample.<sup>36</sup>

### 3.B Measuring Long-Term Political Institutions: Principal Component Analysis, 1810-2000

The data on the structure of long-term political institutions is used to explicitly consider the distinction between *de jure* and *de facto* aspect of political power. The former captures the structure of institutions and political power delegated by laws, electoral systems and constitutions whereas the latter captures the distribution of political power as the ability to engage in various forms of collective action (Acemoglu and Robinson 2006). The data on the

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<sup>36</sup> For Western Offshoots, similar to Maddison (2010), United States, Canada, New Zealand and Australia are considered although by 1820 only the United States is considered in the sub-sample. Latin American sub-sample consists of Argentina, Brazil, Chile, Colombia, Uruguay and Venezuela for which the continuous real per capita GDP series. In addition, Peru and Ecuador enter the sample in 1870 whereas income estimates for Central American countries are considered from 1900 onwards. In post-WW2 period, income estimates for Caribbean are considered as well. For East Asia, continuous income estimates for Japan, South Korea and North Korea are considered from 1820 onwards although North Korea is excluded from the sample for the period 1870-1950 given the lack of reliable GDP data. However, by 1870, China enters the sample whereas in 1900 income estimates for Philippines are added. For post-WW2 period, Malaysia, Mongolia, Philippines, Singapore and Taiwan are added in the East Asian sub-sample. For South Asia, annual income estimates for Nepal and Thailand start in 1820 whereas the sub-sample is expanded in post-WW2 period by adding income estimates for Bangladesh, Burma, Cambodia, India, Laos, Sri Lanka and Vietnam. For Middle East and North Africa, income estimates for Iran, Turkey and Morocco begin in 1820. This is followed by sub-sample expansion by Iraq (in 1900), North Africa and Gulf States (all in 1950). For Sub-Saharan Africa, income estimates for Cape Colony/South Africa are considered from 1820 onwards whereas the sub-sample remains intact until 1950 where the vast majority of Sub-Saharan African countries enter the sub-sample.



structure of political institutions from Polity IV is used for the period 1810-2000 (Marshall and Gurr 2010) to construct long-term cross-country indices of *de jure* political institutions

The Polity IV index is constructed from its underlying components. The aggregate polity index is constructed of six main indicators: (i) regulation of chief executive recruitment, (ii) competitiveness of executive recruitment, (iii) openness of executive recruitment, (iv) executive constraints on decision rules, (v) regulation of participation, and (vi) competitiveness of the participation. The first three underlying indicators capture the executive recruitment rules. The fourth indicator captures the constraints on the political rulers whereas the fifth and sixth indicator designate the degree of constitutionalized political competition. The aggregate index is scaled between -10 (full autocracy) and 10 (full democracy).

The data on political competition and electoral participation is used from Vanhanen’s index of democracy in *Polyarchy Dataset 1.2* based on Vanhanen (2000) for the period 1810-2000 to construct comparable long-term cross-country indices of *de facto* political institutions. The index of democracy comprises two underlying sub-indices. First, the index of political competition is constructed on the basis of percentage share of smaller political parties’ and independents’ of the votes cast in the parliamentary elections, or of the seats in the parliament. The index is constructed by subtracting the largest party’s vote share from 100 percent. Second, the index of political participation is composed of the percentage of the adult population that voted in the elections which captures the degree of political participation. The index is scaled between 0 and 100 where higher values indicate greater political participation. Combined, both indices capture the ability of the population to engage in various forms of collective action which embeds the *de facto* distribution of political power.

The main drawback of using a single index of institutions in the analysis of long-term economic growth concern two key issues, (i) the inter-correlation between the components comprising the index, and (ii) the extent of each component represented in the overall index. Since both Vanhanen and Polity IV indices are constructed on the basis of the underlying components, a single institutional may not capture distinctive dimensions of institutional change. The Vanhanen index of democracy is composed as a simple unweighted average of the competition and participation sub-indices whereas the Polity IV index is composed as a re-scaled unweighted average of underlying indices which denotes the extent of democratic institutions. It remains unclear from Vanhanen and Polity IV index construction to what extent the underlying components are correlated with each other.

Our goal is to construct consistent indices of *de iure* and *de facto* political institutions in which the maximum variance is extracted from each underlying component to construct feasible indices of institutional change. To this end, both indices are constructed on the basis of the underlying indicators of Vanhanen and Polity IV index by exploiting the principal component analysis (PCA).<sup>37</sup>

**Table 1:** The Correlation Between Original Variables and Latent *De Jure* and *De Facto* Institutional Indices

<i>Panel A: Polity 2 Composite Indicator of Political Institutions</i>								
Base Sample								
1810-2000	1820-2000	1850-2000	1870-2000	1900-2000	1920-2000	1950-2000	1970-2000	2000

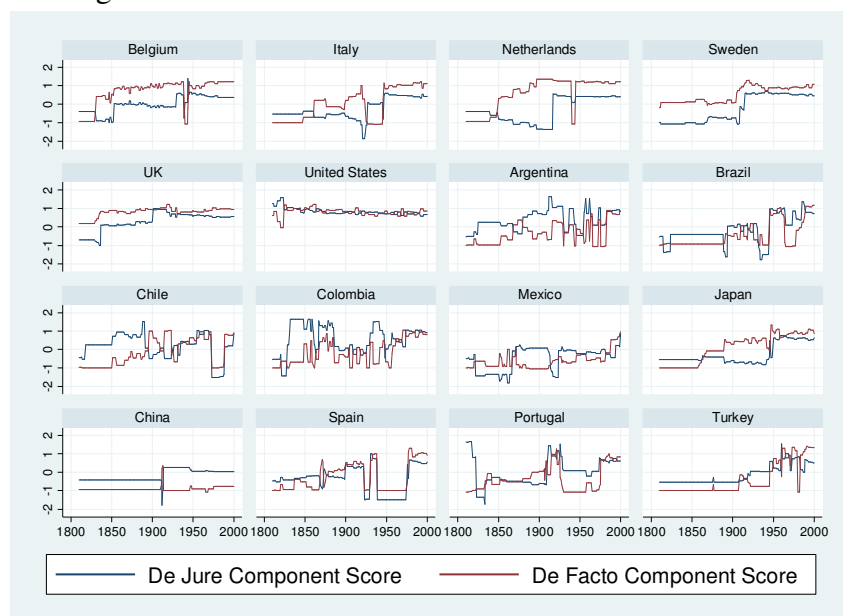
<sup>37</sup> PCA uses the orthogonal transformation to convert a set of correlated variables into a set of non-correlated variables known as principal components. In our setting, the sub-indices of political institutions from Vanhanen index of democracy and Polity IV index are nonetheless correlated whereas our goal is to construct measure of *de jure* and *de facto* political institutions by extracting the maximum possible variance into orthogonal uncorrelated latent indices.

De Iure Latent Component of Political Institutions	.752*** (0.000)	.764*** (0.000)	.944*** (0.000)	.947*** (0.000)	.889*** (0.000)	.908*** (0.000)	.843*** (0.000)	.189*** (0.000)
<i>Panel B: Vanhanen Index of Democracy</i>								
	1810-2000	1820-2000	1850-2000	1870-2000	1900-2000	1920-2000	1950-2000	1970-2000
De Facto Latent Component of Political Institutions	.842*** (0.000)	.928*** (0.000)	.929*** (0.000)	.921*** (0.000)	.918*** (0.000)	.913*** (0.000)	.892*** (0.000)	.885*** (0.000)

*Notes:* the table presents the aggregate correlation coefficient between the latent de iure and de facto measures of political institutions and their original variables, namely Vanhanen index of democracy and Polity IV composite measure in seven intertemporal subsamples. p-values for each correlation coefficient are denoted in the parentheses. Asterisks denote statistical significant correlation coefficient at 1% (\*\*\*), 5% (\*\*), and 10% (\*), respectively.

Based on principal component scores, *de jure* and *de facto* indices of political institutions are constructed. Both Vanhanen and Polity IV datasets are exploited repeatedly for the periods (i) 1810-2000, (ii) 1820-2000, (iii) 1850-2000, (iv) 1870-2000, (v) 1900-2000, (vi) 1920-2000 and (v) 1950-2000 to construct the indices for the maximum possible number of countries since the temporal availability of each indices varies from country to country. In Table 1, the aggregate correlation between Vanhanen index of democracy and Polity2 composite measure as original variables as latent de facto and *de jure* components of political institutions is presented. The correlation coefficient is displayed for seven intertemporal subsamples. Panel A exhibits the correlation between Polity2 and *de jure* latent component of political institutions whereas Panel B displays the intertemporal correlation between Vanhanen index of democracy and *de facto* latent component of political institutions. Both latent measures correlate strongly and significantly with the original variables Vanhanen and Polity2 indices. However, the latent variables are not perfectly correlated with the original counterparts which indicates additional variance exploited from the variation in the underlying sub-indicators of each original variable. In Figure 1, long-term institutional dynamics, captured by reconstructed latent de facto and de iure indices of political institutions, is presented for the 1810-2000 sub-sample which features the longest time-series on institutional changes for sixteen countries. In Table 2, descriptive statistics for the de jure and de facto institutional development indices and for the per capita GDP are presented and broken down across multiple years.

**Figure 1: Long-Run Patterns of De Jure and De Facto Institutional Development**



**Table 2: Descriptive Statistics**

	Obs	Mean	StD				Min	Max
			Overall	Between	Within			
Panel A1: Real GDP Per Capita								
By Year:								
1810-2000	3,056	3599.62	4306.05	1928.43	3880.01	448	28,702	
1820-2000	4,344	3598.87	4338.01	1975.78	3882.83	375	28,702	
1850-2000	4,228	4397.66	4765.99	2367.10	4160.56	397	28,702	
1870-2000	4,323	4641.83	4804.37	2634.01	4043.84	396	28,702	
1900-2000	3,737	5547.25	5069.28	3180.33	3981.68	448	28,702	
1920-2000	3,888	5609.22	5073.41	3595.69	3616.16	448	28,702	
1950-2000	5,814	4468.63	5046.36	4450.07	2415.16	214	33,199	
1970-2000	4,371	5421.37	5305.57	5044.31	1696.67	214	30,929	
Panel A2: De Jure Latent Institutional Component								
By Year:								
1810-2000	3,056	0.000	.699	.367	.602	-1.856	1.675	
1820-2000	4,343	0.000	.697	.266	.646	-1.680	1.921	
1850-2000	4,228	-0.000	.712	.320	.638	-2.457	2.196	
1870-2000	4,323	-0.000	.753	.393	.646	-2.245	1.459	
1900-2000	3,737	-0.000	.736	.339	.655	-2.548	1.608	
1920-2000	3,888	0.000	.749	.381	.646	-2.697	1.477	
1950-2000	5,814	0.000	.730	.490	.543	-3.293	2.019	
1970-2000	4,371	0.000	.818	.614	.542	-2.852	1.588	
Panel A3: De Facto Latent Institutional Component								
By Year:								
1810-2000	3,056	0.000	.828	.538	.644	-1.099	-1.409	
1820-2000	4,343	0.000	.860	.573	.652	-1.078	1.482	
1850-2000	4,228	0.000	.873	.611	.633	-1.323	1.390	
1870-2000	4,323	-0.000	.841	.631	.566	-1.533	1.181	
1900-2000	3,737	0.000	.888	.688	.573	-1.623	1.134	
1920-2000	3,888	0.000	.927	.729	.582	-1.682	1.145	
1950-2000	5,814	0.000	.973	.826	.519	-1.372	1.601	
1970-2000	4,371	0.000	.960	.798	.538	-1.183	1.650	

#### 4. Identification Strategy

The aim of the empirical model is to consistently estimate and identify the respective contribution of institutions and to long-run growth and development. The basic fixed-effects relationship that takes places is:

$$\ln y_{i,t \in \tau} = \hat{\alpha}_0 + \hat{\lambda}_1 \cdot I_{i,t \in \tau}^{\text{De Jure}} + \hat{\lambda}_2 \cdot I_{i,t \in \tau}^{\text{De Facto}} + \eta_i + \Gamma_{t \in \tau} + \varepsilon_{i,t \in \tau} \quad (4.1)$$

where  $y$  represents real income per capita for country  $i$  across time-varying estimation horizon  $t = 1, 2, \dots, \tau$ ,  $I^{\text{De Jure}}$  and  $I^{\text{De Facto}}$  represent the reconstructed latent indices of *de jure* and *de facto* political institutions,  $\eta_i$  denotes the set of unobserved country-fixed effects,  $\Gamma$  represents the unobserved technology shocks common to all countries over time, and  $\varepsilon$  is the error term clustered across countries to allow for arbitrary heteroskedasticity and serially correlated stochastic disturbances using the covariance matrix estimator from [Huber \(1967\)](#), [Eickner \(1967\)](#), and [White \(1980\)](#). The key coefficients of interest are  $\hat{\lambda}_1$  and  $\hat{\lambda}_2$  which denote the respective contribution of *de jure* and *de facto* political institutions to long-run economic

growth. When unobserved heterogeneity persists across countries and over time, this implies  $E(\eta) \neq 0$  and  $E(\Gamma) \neq 0$  and violates the exogeneity assumption when the fixed-effects estimator should yield consistent estimates of the long-term effects of institutions on the path of economic development.

The major challenge to the fixed-effects estimator in Eq. (4.1) is the weakness of strict exogeneity assumption regarding long-term effects of institutions on income level. The evolution of political institutions is both: (i) the outcome of possible path-dependent change through critical junctures and turning points and (ii) shaped by the history of state formation and institutional establishment. When historical junctures in institutional development matter, fixed-effects estimator in Eq. (4.1) is likely to yield biased and inconsistent estimates. Since institutions are endogenous with respect to path-dependent change, history of state formation and critical junctures, the baseline fixed-effects model can suffer from omitted variable bias which influence both contemporary income levels and the quality of institutions which implies  $\text{cov}(\varepsilon_{i,t} | I_{i,t}^{\text{De Jure}}) \neq 0$   $E(\varepsilon_{i,t} | I_{i,t}^{\text{De Jure}}) \neq 0$ ,  $\text{cov}(\varepsilon_{i,t} | I_{i,t}^{\text{De Facto}}) \neq 0$   $E(\varepsilon_{i,t} | I_{i,t}^{\text{De Facto}}) \neq 0$ ,  $\text{cov}(\varepsilon_{i,t}, I_{i,t}^{\text{De Jure}}) = 0$   $E(\varepsilon_{i,t}, I_{i,t}^{\text{De Jure}}) = 0$ , and  $\text{cov}(\varepsilon_{i,t}, I_{i,t}^{\text{De Facto}}) = 0$   $E(\varepsilon_{i,t}, I_{i,t}^{\text{De Facto}}) = 0$ . Additional challenge can be posed by the reverse causality since higher income level could cause the improvement in political institutions.<sup>38</sup> The solution is to construct an observable instrument of the index of inclusive political institutions which satisfied the exogeneity and relevance assumption. In terms of exogeneity, the observable instrument should not be related to the structural error term and should influence only the quality of institutions.

Five-year lag and ten-year lags in reconstructed institutional indices are used as an instrument for the contemporary *de jure* and *de facto* institutions and as an exogenous source of variation to capture the possible channels through which (i) path-dependence, (ii) state formation and (iii) institutional history and (iv) critical junctures influence contemporary quality of institutions. The assumption underlying the exogeneity criterion lies on the proposition that 10-year changes in the composition of political institutions do not exert direct influence on contemporary income level whereas these changes influence contemporary quality of institutions directly through the four channels described above. Under the exogeneity assumption,  $\text{cov}(\varepsilon_{i,t}, I_{i,t}^{\text{De Jure}}) = 0$  or  $E(\varepsilon_{i,t}, I_{i,t}^{\text{De Jure}}) = 0$ , and  $\text{cov}(\varepsilon_{i,t}, I_{i,t}^{\text{De Facto}}) = 0$  or  $E(\varepsilon_{i,t}, I_{i,t}^{\text{De Facto}}) = 0$  ensures an exogenous and independent source of variation in contemporary income level unrelated to the composite stochastic term in structural relationship in Eq. (3.1). Since the exogeneity of the instrumental variables is the essential condition for identifying the possible causal effects of institutions on the path of economic growth and development, taking the levels of lagged endogenous *de jure* and *de facto* indices can lead to the failure of exclusion restrictions since the levels of indices are correlated within countries and over time. Instead, our identification assumption consists of using the lagged 5-year and 10-year differences in *de jure* and *de facto* indices of political institutions. This allows us to capture the effect of past institutional change on the formation of political institutions. The construction of observable

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<sup>38</sup> The literature on the modernization hypothesis initially emphasized by [Lipset \(1959\)](#) [Dahl \(1971\)](#), [Huntington \(1991\)](#), [Rusechmeyer et. al. \(1992\)](#) suggests economic development causes countries to be more democratic. Barro (1999) noted that rising standard of living predicts rising democracy whereas democracies without prior economic development do not to last. [Acemoglu et. al. \(2008\)](#) present evidence for a large panel of countries which suggests once country-fixed effects are controlled for, there is no evidence of causal effect of income on democracy.

instrument for the quality of contemporary institutions leads to the specification of first-stage relationship for the indices of *de jure* and *de facto* political institutions:

$$I_{i,t \in \tau}^{\text{De Jure}} = \hat{\gamma}_0 + \hat{\mu}_1 \Delta I_{i,t-5 \in \tau}^{\text{De Jure}} + \hat{\mu}_2 \Delta I_{i,t-10 \in \tau}^{\text{De Jure}} + \mathbf{X}'_{i,t \in \tau} \hat{\delta} + v_{i,t \in \tau} \quad (4.2)$$

$$I_{i,t \in \tau}^{\text{De Facto}} = \kappa_0 + \hat{\pi}_1 \Delta I_{i,t-5 \in \tau}^{\text{De Facto}} + \hat{\pi}_2 \Delta I_{i,t-10 \in \tau}^{\text{De Facto}} + \mathbf{X}'_{i,t \in \tau} \hat{\delta} + v_{i,t \in \tau} \quad (4.3)$$

where  $I_{i,t-5 \in \tau}^{\text{De Jure}}$ ,  $I_{i,t-10 \in \tau}^{\text{De Jure}}$ ,  $I_{i,t-5 \in \tau}^{\text{De Facto}}$ , and  $I_{i,t-10 \in \tau}^{\text{De Facto}}$  denote 5-year lag and 10-year lag of the *de jure* and *de facto* institutional indices, vector  $\mathbf{X}$  represents the exogenous variables from structural relationship in Eq. (4.1) and  $v$  is the reduced-form stochastic disturbance. The underlying coefficients of interest in first-stage relationships are:

$$\hat{\mu}_1 = \frac{\text{cov}(\Delta I_{i,t-5 \in \tau}^{\text{De Jure}}, I_{i,t \in \tau}^{\text{De Jure}})}{\text{var}(\Delta I_{i,t-5 \in \tau}^{\text{De Jure}})} \quad (4.4)$$

$$\hat{\mu}_2 = \frac{\text{cov}(\Delta I_{i,t-10 \in \tau}^{\text{De Jure}}, I_{i,t \in \tau}^{\text{De Jure}})}{\text{var}(\Delta I_{i,t-10 \in \tau}^{\text{De Jure}})} \quad (4.5)$$

$$\hat{\pi}_1 = \frac{\text{cov}(\Delta I_{i,t-5 \in \tau}^{\text{De Facto}}, I_{i,t \in \tau}^{\text{De Facto}})}{\text{var}(\Delta I_{i,t-5 \in \tau}^{\text{De Facto}})} \quad (4.6)$$

$$\hat{\pi}_2 = \frac{\text{cov}(\Delta I_{i,t-10 \in \tau}^{\text{De Facto}}, I_{i,t \in \tau}^{\text{De Facto}})}{\text{var}(\Delta I_{i,t-10 \in \tau}^{\text{De Facto}})} \quad (4.7)$$

where the relevance conditions for the lagged differences in *de jure* and *de facto* stock variables are met when  $\hat{\mu}_1 \neq 0$ ,  $\hat{\mu}_2 \neq 0$ ,  $\hat{\pi}_1 \neq 0$ , and  $\hat{\pi}_2 \neq 0$  and when  $\text{cov}(\Delta I_{i,t-5 \in \tau}^{\text{De Jure}}, I_{i,t \in \tau}^{\text{De Jure}})$ ,  $\text{cov}(\Delta I_{i,t-10 \in \tau}^{\text{De Jure}}, I_{i,t \in \tau}^{\text{De Jure}})$ ,  $\text{cov}(\Delta I_{i,t-5 \in \tau}^{\text{De Facto}}, I_{i,t \in \tau}^{\text{De Facto}})$ , and  $\text{cov}(\Delta I_{i,t-10 \in \tau}^{\text{De Facto}}, I_{i,t \in \tau}^{\text{De Facto}})$ . Instrumental variable (IV) estimator in Eq. (4.1) allows us to identify the contribution of institutions to long-run path of growth and development. IV estimator yields consistent and reasonably unbiased estimates when the sample IV panel estimator converges to its true magnitude. Denoting the probability limit of IV estimator:

$$\text{plim}_{NT \rightarrow \infty} \hat{\lambda}_1 = \hat{\lambda}_1 + \frac{\text{cov}(\varepsilon_{i,t} | \Delta I_{i,t-5 \in \tau}^{\text{De Jure}})}{\text{cov}(I_{i,t \in \tau}^{\text{De Jure}} | I_{i,t \in \tau}^{\text{De Jure}})} \frac{\sigma_\varepsilon}{\sigma_I} \quad (4.8)$$

$$\text{plim}_{NT \rightarrow \infty} \hat{\lambda}_1 = \hat{\lambda}_1 + \frac{\text{cov}(\varepsilon_{i,t} | \Delta I_{i,t-10 \in \tau}^{\text{De Jure}})}{\text{cov}(I_{i,t \in \tau}^{\text{De Jure}} | I_{i,t \in \tau}^{\text{De Jure}})} \frac{\sigma_\varepsilon}{\sigma_I} \quad (4.9)$$

$$\text{plim}_{NT \rightarrow \infty} \hat{\lambda}_2 = \hat{\lambda}_2 + \frac{\text{cov}(\varepsilon_{i,t} | \Delta I_{i,t-5 \in \tau}^{\text{De Facto}})}{\text{cov}(I_{i,t \in \tau}^{\text{De Facto}} | I_{i,t \in \tau}^{\text{De Facto}})} \frac{\sigma_\varepsilon}{\sigma_I} \quad (4.10)$$

$$\text{plim}_{NT \rightarrow \infty} \hat{\lambda}_2 = \hat{\lambda}_2 + \frac{\text{cov}(\varepsilon_{i,t} | \Delta I_{i,t-10 \in \tau}^{\text{De Facto}})}{\text{cov}(I_{i,t \in \tau}^{\text{De Facto}} | I_{i,t \in \tau}^{\text{De Facto}})} \frac{\sigma_\varepsilon}{\sigma_I} \quad (4.11)$$

when the set of exclusion restrictions implies zero covariance between the structural stochastic disturbances and the lagged differences of the de jure and de facto institutional stock variables,  $\text{cov}(\varepsilon_{i,t \in \tau}, \Delta I_{i,t-5 \in \tau}^{\text{De Jure}}) = 0$ ,  $\text{cov}(\varepsilon_{i,t \in \tau}, \Delta I_{i,t-10 \in \tau}^{\text{De Jure}}) = 0$ ,  $\text{cov}(\varepsilon_{i,t \in \tau}, \Delta I_{i,t-5 \in \tau}^{\text{De Facto}}) = 0$ , and  $\text{cov}(\varepsilon_{i,t \in \tau}, \Delta I_{i,t-10 \in \tau}^{\text{De Facto}}) = 0$ , the IV estimator should yield unbiased and consistent effects of de jure and de facto political institutions on long-run economic growth. Asymptotically, the IV estimator in structural model setup in (4.1) should reflect the true effect of de jure and de facto political institutions on the long-run paths of economic growth,  $\text{plim}_{NT \rightarrow \infty} \hat{\lambda}_1 = \lambda_1$  and  $\text{plim}_{NT \rightarrow \infty} \hat{\lambda}_2 = \lambda_2$ .

## 5. Results

In Table 3, baseline results are presented for the subsamples (i) 1810-2000, (ii) 1820-2000, and (iii) 1850-2000. The aggregate sample is broken down into eight intertemporal subsamples. Fixed-effects estimator with unobserved country-specific heterogeneity and intertemporal technology shocks is used to estimate the long-term model specification for the path of economic development with latent *de jure* and *de facto* indices of political institutions based on the structural model of economic growth in Eq. (4.1). In each specification per panel, the base sample is first used to estimate the model whereas in each subsequent specification regional groups are excluded from the base sample to examine the sensitivity and robustness of the underlying coefficients of interest. In Panel A, the long-run model of economic development is estimated for the period 1810-2000 across the columns (1)-(6) for 16 countries in the base sample. The estimated contributions of latent *de jure* and *de facto* political institutions is both reasonably large and statistically significant at 10% for de jure index and 5% for de facto index, respectively. In columns (2)-(5), each regional block is excluded from the base sample to examine the stability of the baseline coefficient. The same strategy is replicated in *Panel B* and *Panel C*. The results for the 1820-2000 subsample highlight the robust contribution of *de jure* political institutions to long-run economic development and marginally significant effect of *de facto* political institutions on the path of economic development over time.

Compared to the 1810-2000 sub-sample, the evidence from base sample specification suggests a systematic and significant effect of *de jure* political institutions on the path of economic development compared to the insignificant effect of *de facto* political institutions. Across columns (7)-(10), the significance of the *de jure* coefficient for this intertemporal subsample remains stable while the de facto coefficient is only marginally significant at 10% when Western European regional block is excluded from the base sample in column (7). In addition, the constant term, capturing the level of technology, remains significant across the entire set of estimated specifications even after the possible effects of unobserved country-level heterogeneity bias and intertemporal technology shocks are controlled for. In Panel C, the long-term growth and development model is estimated for the 1850-2000 subsample. In column (11) base sample estimates are displayed whereas across columns (12)-(16), the stability of the estimated coefficients is assessed against excluded regional subsets. Compared to Panel A and Panel B, the estimated respective contribution of *de facto* and *de jure* political institutions is significant and large. For instance, one point improvement in the latent index of *de jure* institutions is associated with 1.2 percent improvement in per capita income whereas a one point improvement in the latent de facto index of political institutions is associated with 4.6 percent permanent increase of per capita income in the long run. When regional subsets are excluded from the base sample, the respective contribution of de facto political index remains significant whereas an insignificant effect is found for *de jure* political index.

The estimated results confirm the importance of institutional change for the path of economic growth and development in the long term. A more detailed decomposition of the results suggests that de facto political institutions might be more central to facilitating the speed

of economic than de iure political institutions. In Table 4, baseline results are presented for the period 1870-2000 broken down into three intertemporal sub-samples. In *Panel A*, the results are presented for the 1870-2000 period comprising 33 countries. The evidence clearly suggests the reversal of the effects since the contribution of *de facto* political institutions to long-run growth is found to be large and significant whereas the effects of *de jure* institutions are not. In column (1), the results are presented on the base sample. The estimates suggest a strong and persistent effect of de facto political institutions, considerably higher than the estimated contribution of *de jure* political institutions. Across columns (2)-(5), regional blocks are excluded to check the stability and sensitivity of the underlying coefficients which confirm the dominance of *de facto* political institutions in shaping the path of long-run growth and development. The estimated coefficient on de facto political institutions ranges from .092-.112, suggesting a strong and persistent effect of the distribution of political power on the path of economic growth and development. In Panel B, the results are presented for the 1900-2000 subsample. In column (6) base sample estimates are displayed whereas columns (7)-(10) features the estimated model specification with regional excluded subsets. The constant term remains both robust and significant across the set of estimated model specifications. The evidence confirms the underlying large contribution of de facto political institutions to long-run growth. The estimated coefficient on *de facto* political institutions is both strong and significant whereas no such significance is found for the respective contribution of *de jure* political institutions. The results change substantially in Panel C where the results for 1920-2000 subsamples are exhibited for 47 countries. Whereas the estimated effect of *de facto* political institutions remains marginally significant, the contribution of *de jure* institutions to the path of economic growth is both strong and significant in comparison to earlier specifications. The estimated effect of *de jure* and *de facto* political institutions is not sensitive to different sample specification where regional blocks are excluded from the base group.

In Table 5, the baseline results are presented for the 1950-2000 subsample which features the estimated model specification for 112 countries. In Panel D, the results are presented for 1950-2000 overall period. In column (1), base sample model estimates are displayed. Surprisingly, the results confirm the primacy of de facto political institutions in post-WW2 economic growth whereas the role of de jure political institutions is not discernable from zero. In Panel 3, the results are presented by restricting the sample to 1970-2000 which features a large number of entrants from Sub-Saharan Africa and Eastern Europe and thus allows us to re-assess the stability of the de jure and de facto political institutions to post-WW2 economic growth and development. Each model specification contains the unobserved country-specific and time-fixed effects to correct the contribution of *de jure* and *de facto* political institutions for the potential heterogeneity bias. The evidence surprisingly suggests the reversal of institutional effects on long-run paths of growth since the fundamental effects on long-run growth are dominated by the improvements in the de jure political institutions rather than *de facto* political institutions. The significance of *de jure* political institutions in accounting for differential development paths does not disappear once Western Europe, Latin America, and Sub-Saharan Africa are excluded from the base sample composition. Our evidence implies de facto and *de jure* political institutions contribute substantially to the cross-country differences in economic performance. In a long-term perspective, latent *de facto* and *de jure* political institutions jointly explain between 85% and 91% of within-country variance in per capita income over time, after common technology level, technological change and unobserved cross-country heterogeneity are appropriately controlled for. Moreover, both institutional indices account for 70% to 80% of cross-country variance in the path of economic development over time which demonstrates both the importance and relevance of institutions for explaining differential economic outcomes over time.

The share of growth and development variance, accounted for by de facto and de jure political institutions, drops substantially alongside shorter estimation horizon. This is potentially largely driven by omitted variable bias, the possible reverse causality and by the heterogeneity bias arising from large cross-country initial and contemporaneous differences in per capita income across space and time. This nevertheless provides the rationale to address the potential endogeneity of *de facto* and *de jure* political institutions to estimate and identify their respective contribution to the cross-country long-run economic development. Our baseline results support hypotheses H1 and H2. Do the long-run growth-enhancing effects of pluralist de jure and de facto political institutions remain intact once the endogeneity of institutions is addressed?



**Table 3: Fixed-Effects Estimated Long-Run Effects of De Jure and De Facto Political Institutions on Economic Growth, 1810-2000**

Excluded Subset	Panel A: 1810-2000 Period					Panel B: 1820-2000 Period					Panel C: 1850-2000 Period				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
	None	Western Europe	United States	Latin America	China	None	Western Europe	Latin America	Japan	South Asia	None	Western Europe	United States	Southern Europe	Latin America
De Jure Institutional Component	.017* (.009)	.014 (.010)	.021* (.009)	.016 (.015)	.011 (.007)	.021*** (.035)	.020** (.008)	.025** (.009)	.020*** (.006)	.020*** (.004)	.012** (.005)	.011 (.008)	.012** (.005)	.015** (.006)	.008 (.006)
De Facto Institutional Component	.061** (.030)	.089** (.030)	.049 (.030)	.088** (.038)	.052* (.028)	.039 (.023)	.050* (.027)	.062** (.030)	.035 (.023)	.019 (.024)	.046** (.019)	.040 (.032)	.050** (.022)	.042* (.022)	.078*** (.026)
Constant Term	9.170*** (.074)	8.996*** (.080)	9.116*** (.079)	9.045*** (.154)	9.289*** (.065)	6.898*** (.091)	6.734*** (.112)	7.048*** (.105)	6.902*** (.930)	6.913*** (.884)	7.118*** (.064)	9.040*** (.072)	7.105*** (.066)	7.109*** (.078)	9.191*** (0.993)
# Observations	3,056	2,292	2,865	2,101	2,865	4,343	3,076	3,077	4,162	3,981	4,228	1,963	4,077	3,624	3,171
# Clusters	16	12	15	11	15	24	17	17	12	22	28	13	27	24	21
Country-Fixed Effects (p-value)	YES (0.000)	YES (0.000)	YES (0.000)	YES (0.000)	YES (0.000)	YES (0.000)	YES (0.000)	YES (0.000)	YES (0.000)	YES (0.000)	YES (0.000)	YES (0.000)	YES (0.000)	YES (0.000)	YES (0.000)
Time-Fixed Effects (p-value)	YES (0.000)	YES (0.000)	YES (0.000)	YES (0.000)	YES (0.000)	YES (0.000)	YES (0.000)	YES (0.000)	YES (0.000)	YES (0.000)	YES (0.000)	YES (0.000)	YES (0.000)	YES (0.000)	YES (0.000)
Within R2	0.9152	0.9059	0.9129	0.9161	0.9370	0.8896	0.8591	0.9073	0.8895	0.9054	0.8925	0.9042	0.8906	0.8822	0.9141
Between R2	0.7336	0.5818	0.6978	0.8497	0.7065	0.7766	0.6845	0.8572	0.7821	0.7498	0.8214	0.6926	0.8109	0.8303	0.8874
Overall R2	0.6932	0.7147	0.6929	0.6934	0.7399	0.6529	0.6423	0.6720	0.6330	0.6978	0.6086	0.6587	0.6151	0.5852	0.6231

Notes: the table shows the contribution of institutions and human capital formation to long-run growth. Dependent variable is the natural log of GDP per capita (1990 Geary-Khamis International Dollar) from Bolt & Van Zanden (2014). Standard errors are adjusted into country-specific clusters, allowing for possible heteroskedastic distribution of error variance and serially correlated disturbances within countries over the estimation horizon. Sample coefficients are estimated using fixed-effects panel estimator to account for the persistence of unobserved heterogeneity bias and common technology shocks over time. Asterisks denote statistically significant coefficients at: 10% (\*), 5% (\*\*) and 1% (\*\*\*), respectively.

**Table 4: Fixed-Effects Estimated Long-Run Effects of De Jure and De Facto Political Institutions on Economic Growth, 1870-2000**

	Panel A: 1870-2000 Period					Panel B: 1900-2000 Period					Panel C: 1920-2000 Period				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
Excluded Subset	None	Western Europe	Western Offshoots	Latin America	China	None	Western Europe	Latin America	Japan	South Asia	None	Western Europe	Western Offshoots	Southern Europe	Latin America
De Jure Institutional Component	-.038 (.035)	-.048 (.042)	-.031 (.035)	-.045 (.051)	-.032 (.036)	.004 (.041)	.004 (.045)	-.037 (.050)	-.008 (.040)	.023 (.038)	.020 (.030)	.033 (.029)	.020 (.031)	.035 (.028)	-.043 (.049)
De Facto Institutional Component	.103*** (.029)	.112*** (.036)	.106*** (.030)	.100*** (.029)	.094*** (.028)	.092*** (.026)	.107*** (.033)	.060** (.023)	.095*** (.026)	.083*** (.024)	.049* (.027)	.056* (.030)	.051* (.027)	.041 (.027)	.059* (.030)
Constant Term	9.151*** (.058)	8.854*** (.077)	9.091*** (.062)	9.294*** (.065)	9.186*** (.061)	9.107*** (.061)	8.808*** (.078)	9.317*** (.055)	9.088*** (.060)	9.182*** (.061)	7.811*** (.022)	8.669*** (.063)	7.751*** (.026)	7.865*** (.023)	7.900*** (.023)
# Observations	4,323	3,013	4,061	3,144	4,192	3,737	2,626	2,727	3,636	3,535	3,888	2,835	3,483	3,726	2,673
# Clusters	33	23	31	24	32	37	26	27	36	35	47	34	43	44	32
Country-Fixed Effects (p-value)	YES (0.000)	YES (0.000)	YES (0.000)	YES (0.000)	YES (0.000)	YES (0.000)	YES (0.000)	YES (0.000)	YES (0.000)	YES (0.000)	YES (0.000)	YES (0.000)	YES (0.000)	YES (0.000)	YES (0.000)
Time-Fixed Effects (p-value)	YES (0.000)	YES (0.000)	YES (0.000)	YES (0.000)	YES (0.000)	YES (0.000)	YES (0.000)	YES (0.000)	YES (0.000)	YES (0.000)	YES (0.000)	YES (0.000)	YES (0.000)	YES (0.000)	YES (0.000)
Within R2	0.8824	0.8538	0.8778	0.9003	0.8888	0.8596	0.8256	0.8930	0.8639	0.8725	0.8340	0.7994	0.8264	0.8425	0.8890
Between R2	0.6338	0.3741	0.6378	0.7613	0.6007	0.7645	0.6593	0.7166	0.7572	0.7741	0.7017	0.5540	0.6498	0.6516	0.5995
Overall R2	0.5309	0.5337	0.5389	0.5132	0.5546	0.4687	0.4555	0.4251	0.4579	0.5231	0.3605	0.3576	0.3806	0.3864	0.3823

*Notes:* the table shows the contribution of institutions and human capital formation to long-run growth. Dependent variable is the natural log of GDP per capita (1990 Geary-Khamis International Dollar) from [Bolt & Van Zanden \(2014\)](#). Standard errors are adjusted into country-specific clusters, allowing for possible heteroskedastic distribution of error variance and serially correlated disturbances within countries over the estimation horizon. Sample coefficients are estimated using fixed-effects panel estimator to account for the persistence of unobserved heterogeneity bias and common technology shocks over time. Asterisks denote statistically significant coefficients at: 10% (\*), 5% (\*\*), and 1% (\*\*\*), respectively.

**Table 5:** Fixed-Effects Estimated Long-Run Effects of De Jure and De Facto Political Institutions on Economic Growth, 1950-2000

	Panel D: 1950-2000 Period					Panel E: 1970-2000 Period				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Excluded Subset	None	Western Europe	Eastern Europe	Latin America	India	None	Western Europe	Eastern Europe	Latin America	Sub-Saharan Africa
De Jure Institutional Component	-.032 (.032)	-.022 (.032)	-.028 (.032)	-.061 (.036)	-.032 (.032)	.061*** (.020)	.057*** (.020)	.025 (.020)	.083*** (.025)	.055* (.032)
De Facto Institutional Component	.056 (.034)	.070** (.035)	.064* (.035)	.085** (.042)	.057* (.034)	-.037 (.030)	-.017 (.031)	-.001 (.033)	-.042 (.035)	-.045 (.036)
Constant Term	8.150*** (.042)	7.164*** (.039)	7.290*** (.038)	7.213*** (.046)	8.155*** (.043)	7.964*** (.025)	7.839*** (.030)	8.130*** (.037)	8.170*** (.041)	8.632*** (.045)
# Observations	5,814	5,201	5,507	4,973	5,763	4,371	3,999	3,658	3,689	3,224
# Clusters	112	110	112	108	111	141	129	118	119	104
Country-Fixed Effects (p-value)	YES (0.000)	YES (0.000)	YES (0.000)	YES (0.000)	YES (0.000)	YES (0.000)	YES (0.000)	YES (0.000)	YES (0.000)	YES (0.000)
Time-Fixed Effects (p-value)	YES (0.000)	YES (0.000)	YES (0.000)	YES (0.000)	YES (0.000)	YES (0.000)	YES (0.000)	YES (0.000)	YES (0.000)	YES (0.000)
Within R2	0.4700	0.4261	0.4525	0.4754	0.4689	0.0765	0.0624	0.1119	0.0830	0.1195
Between R2	0.3463	0.0045	0.1027	0.0347	0.3887	0.0044	0.0752	0.0983	0.0000	0.1168
Overall R2	0.1137	0.1182	0.1228	0.1321	0.1175	0.0004	0.0348	0.0156	0.0027	0.0037

*Notes:* the table shows the contribution of institutions and human capital formation to long-run growth. Dependent variable is the natural log of GDP per capita (1990 Geary-Khamis International Dollar) from Bolt & Van Zanden (2014). Standard errors are adjusted into country-specific clusters, allowing for possible heteroskedastic distribution of error variance and serially correlated disturbances within countries over the estimation horizon. Sample coefficients are estimated using fixed-effects panel estimator to account for the persistence of unobserved heterogeneity bias and common technology shocks over time. Asterisks denote statistically significant coefficients at: 10% (\*), 5% (\*\*), and 1% (\*\*\*), respectively.

### 5.B. Instrumental Variable Estimates and Endogeneity

In Table 6, the main instrumental variable (IV) estimates of long-run cross-country growth and development model specification are displayed. *Panel G* exhibits second-stage endogenous model specification based on Eq. (3.1) whereas *Panel H* and *Panel I* present first-stage model specifications for *de jure* and *de facto* latent indices of political institutions using 5-year and 10-year lagged difference in the underlying index as instruments for each endogenous variable, based on first-stage relationships posited by Eq. (4.2) and (4.3). In column (1), the endogenous long-run growth model is estimated for the period 1810-2000. In the first stage, the effect of lagged institutional indices on the formation of contemporary institutions is both large and significant, pointing out the importance of using institutional changes rather than state variables to instrument the *de jure* and *de facto* political institutions. In the second stage, the evidence highlights the importance of *de facto* institutions rather than *de jure* institutions for long-term path of growth since the *de facto* coefficient is both large and significant at 1%. Compared to the fixed-effects estimated in Table 5, it follows that fixed-effects estimator yields downward bias in the estimated coefficients since the difference between the IV and fixed-effects estimated coefficient is large. Country-level fixed effects and time-fixed effects are added to base sample model specification to control for unobserved spatial and intertemporal shocks driven by unobservables as well as tested using a simple F-test on joint significance of fixed effects. In column (2), the long-run growth model is tested for the period 1820-2000. The evidence shows results similar to the established pattern in column (1). The *de facto* institutions exert a strong and persistent effect on the path of economic growth. This points out to the importance of institutional setting in which the citizens can engage in a collective action and a

more limited role of *de jure* political institutions. Once we address the institutional endogeneity, the *de jure* institutions do not seem to influence the conditioning trajectory of economic development significantly with the valid exclusion restrictions.<sup>39</sup> The established persistence and influence of *de facto* institutions and insignificant effect of *de jure* institutions on growth is evident across the set of estimated specifications in columns (3) and (4) where the sample size is augmented substantially. In column (5), the growth model specification is tested for the period 1900-2000. First-stage coefficients on lagged 5-year and 10-year differences in the underlying endogenous variables, capturing the emergence of contemporary institutions, are both large and significant which easily allows us to ascertain the relevance condition for the IVs as both lagged differenced instruments exhibit a systematic correlation with the endogenous institutional stock variables. In the second stage, the evidence reaffirms earlier finding on the persistent effect of *de facto* political institutions in facilitating the path of growth and development and either no effect of *de jure* political institutions or even a downward effect once the unobserved effects and technology level are controlled for. The importance of *de facto* political institutions for long-run economic outcomes is further amplified in column (6) where the model is estimated for 48 countries.

In column (7), the evidence from model estimation for 1950-2000 shows insignificant effect of *de jure* and a substantial and significant effect of *de facto* political institutions on long-run growth. Several caveats should be made before interpreting the results. First, the size of the sample is enlarged substantially as numerous independent states in Sub-Saharan Africa, South Asia and Eastern Europe enter the model which causes additional heterogeneity and increases the proportion of unobservables affecting the growth path. Second, the effect of institutional changes on economic performance can hardly be inferred from 50 years of institutional change since institutions tend to adapt slowly. And thirdly, in the postwar period, a significant fraction of the countries has already undergone major institutional changes towards a broader distribution of political power (captured by latent *de facto* component) and to the emergence of democratic institutions (captured by latent *de jure* institutional component) which leaves a substantial fraction of the sample with little long-term temporal variation in the underlying endogenous variables. The evidence from column (8) confirms such caveats and signals the reversals of institutional effects with the *de jure* political institutions dominating the long-run effects on economic growth.<sup>40</sup>

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<sup>39</sup> Since four instruments are deployed for two endogenous variables, it is a necessary condition to test for overidentifying restrictions to judge the validity of the model with instrumental variables. Using a test of overidentifying restrictions originally developed by Hansen (1982), the null hypothesis of no overidentifying restrictions is rejected across the entire set of estimated specifications which does not cast doubt on the validity of the underlying structural model. In each estimated long-run growth model in Table 6, we tested for weak identification of the reduced-form relationship for the current quality of institutions as endogenous regressor. The diagnostic F-test on excluded instruments, originally developed by Angrist and Pischke (2012), suggests that the null hypothesis of weak identification of the reduced-form (first-stage) relationship for the current quality of institutions is rejected at 5% significance level in seven out of eight specifications which implies that there is no evidence of weakly identified endogenous institutional structure instrumented by 5-year and 10-year lagged difference of the latent *de jure* and *de facto* institutional indices. Based on the seminal contribution of Wu (1973) and Hausman (1978), C-test of institutional endogeneity in the estimated long-run growth specification suggests the rejection of the null hypothesis at sufficiently low significance level which indicates that IV-2SLS estimator of yields consistent estimates since the sources of endogeneity among basic OLS regressions would have deleterious effects, leading to inconsistent and biased estimates of institutions on long-run growth.

<sup>40</sup> In addition, the significance of endogenous regressors is tested using Stock-Wright orthogonality test on weak instrument robust inference, originally developed by Anderson and Rubin (1949). The null hypothesis of weak inference on the effect of institutions on long-run growth is rejected in five specifications at 10% significance level. The rejection of weak identification hypothesis also confirms sufficient relevance of the lagged differenced institutional indices as the instruments for the latent *de jure* and *de facto* institutions. A possible drawback of the estimated model specification arises from the likelihood of underidentification of the endogenous regressor which is conceptually similar to the weak identification assumption. In this respect, we tested the underidentification assumption using Kleibergen & Paap (2006) robust Wald matrix-based rank test statistics. The rejection of the null hypothesis of underidentified endogenous regressor across the set of specifications indicates the validity of the constructed instrument with respect to the robust inference.

**Table 6:** Instrumental Variables Estimated Long-Run Growth and Development Model Specification, 1810-2000

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	1810- 2000	1820- 2000	1850- 2000	1870- 2000	1900- 2000	1920- 2000	1950- 2000	1970- 2000
<i>Panel G: Instrumental Variable Estimated Model Specification</i>								
De Jure Institutional Component	-.050 (.064)	.398*** (.081)	.213*** (.072)	-.148* (.080)	-.218** (.088)	-.196*** (.061)	.062 (.065)	.086** (.043)
De Facto Institutional Component	.242*** (.093)	.228*** (.098)	.198*** (.073)	.322*** (.067)	.322*** (.068)	.318*** (.065)	.093** (.042)	-.075** (.036)
<i>Panel H: First-Stage Estimated Model Specification for De Jure</i>								
5-Year Lagged Difference in De Jure Institutional Component	.414*** (.035)	.410*** (.065)	.458*** (.051)	.372*** (.049)	.340*** (.051)	.331*** (.067)	.291*** (.034)	.336*** (.058)
10-Year Lagged Difference in De Jure Institutional Component	.218*** (.062)	.395*** (.064)	.389*** (.045)	.177** (.068)	.125*** (.066)	.170** (.067)	.139*** (.043)	.105*** (.040)
<i>Panel I: First-Stage Estimated Model Specification for De Facto</i>								
5-Year Lagged Difference in De Facto Institutional Component	.282*** (.065)	.342*** (.059)	.409*** (.056)	.410*** (.064)	.471*** (.077)	.542*** (.094)	.407*** (.052)	.533*** (.061)
10-Year Lagged Difference in De Facto Institutional Component	.201*** (.065)	.265*** (.061)	.275*** (.061)	.300*** (.062)	.353*** (.074)	.397*** (.095)	.280*** (.053)	.420*** (.069)
Observations	2,880	4,079	3,920	3,960	3,330	3,360	4,475	2,820
Clusters	16	24	28	33	37	48	112	141
Country Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES
(p-value)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Time-Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES
(p-value)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Hansen J-Test of Overidentifying Restrictions (p-value)	0.46	0.13	0.06	0.59	0.59	0.19	0.76	0.27
C-Test for Endogeneity (p-value)	0.005	0.07	0.014	0.000	0.000	0.008	0.276	0.014
Angrist-Pischke F-Test on Excluded Instruments (p-value)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Kleibergen-Paap Underidentification Test (p-value)	0.039	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Anderson-Rubin Weak Instrument Test (p-value)	0.027	0.001	0.001	0.001	0.002	0.001	0.298	0.007

Notes: the table presents the estimated effects of *de facto* and *de jure* political institutions and human capital on the long-run economic growth and development. Dependent variable is the natural log of GDP per capita (1990 Geary-Khamis International Dollar) from Bolt & Van Zanden (2014). Standard errors are adjusted into country-specific clusters, allowing for possible heteroskedastic distribution of error variance and serially correlated disturbances within countries over the estimation horizon. Sample coefficients are estimated using fixed-effects panel estimator to account for the persistence of unobserved heterogeneity bias and common technology shocks over time. Asterisks denote statistically significant coefficients at: 10% (\*), 5% (\*\*), and 1% (\*\*\*), respectively.

### 5.C Robustness Checks

One of the key questions regarding the respective effects of *de jure* and *de facto* political institutions on long-run growth and developments concerns the similarity of *de jure* and *de facto* institutional components with respect to alternative datasets which potentially exploit similar dimensions of institutional change. To this end, I exploit the substantial variation in the structure of political institutions from a database by Beck et. al. (2001). The dataset contains 108 variables for 177 countries for the years 1975-2012. The variables provide detailed characteristics of electoral system, political competition, composition of government coalitions and opposition, measures of federalism, and political stability. The database is exploited in four key dimensions: (i) chief executive constraints, (ii) political competition, (iii) electoral rules, and (iv) federalism, based on 27 relevant characteristics of the political institutions. The details

of the dataset alongside with the descriptive statistics for the underlying covariates are presented in Appendix B. Since the composition of *de jure* and *de facto* political institutions might be confounded by unobserved political characteristics, Vanhanen indices of political competition and participation, six underlying components of Polity2 index, 27 underlying cross-country characteristics of political institutions from Beck et. al. (2001) and Freedom House indices of political rights and civil liberties are merged into a common dataset in the attempt to replicate similar *de jure* and *de facto* components of political institutions. The goal of the strategy is to examine whether the contribution of *de jure* and *de facto* political institutions to long-run economic growth remains robust across multiple datasets that measure different characteristics of similar political dimensions of institutions. In addition, principal component analysis used to extract maximum variance from the underlying Vanhanen and Polity2 indicators may be subject the weighing bias that might artificially inflate the loading factor and thus yield a pattern of *de jure* and *de facto* institutional development that might not be consistent with the stylized facts. Such inconsistencies can be overcome using the factor analysis to identifying the underlying structures behind the variation in multiple indicators.

Factor analysis is performed on 35 different covariates of the political institutions for 177 countries in the period 1975-2012 to identify the *de jure* and *de facto* structures of political institutions. The evidence based on the size of eigenvalues highlights two key factors dominate the structure of institutional development. The first factor comprises the executive constraints, political competition, share of opposition votes, political participation, political rights and civil liberties, which is clearly associated with the *de facto* institutional component. The second factor captures the formal characteristics of political regimes such the length of office term, openness of the executive recruitment, presidential system vs. parliamentary democracy, executive control of the upper house, fiscal federalism, and local autonomy, which arguably advocates the *de jure* institutional component. We restrict the factor loadings below 0.2 to eliminate the seemingly correlated components that add little consistency to the *de jure* and *de facto* factors of political institutions. *De jure* and *de facto* components from the merged dataset are replicated as follows:

$$\begin{aligned}
\text{De Jure}_t = & .860 \left( \begin{array}{c} \text{Competitiveness of} \\ \text{Executive Recruitment} \end{array} \right)_t + .491 \left( \begin{array}{c} \text{Openness of} \\ \text{Executive Recruitment} \end{array} \right)_t + .883 \left( \begin{array}{c} \text{Competition of} \\ \text{Participation} \end{array} \right)_t \\
& + .505 (\text{Finite Office Term})_t + .849 \left( \begin{array}{c} \text{Executive Electoral} \\ \text{Competition} \end{array} \right)_t + .803 \left( \begin{array}{c} \text{Legislative Electoral} \\ \text{Competition} \end{array} \right)_t \\
& + .589 \left( \begin{array}{c} \text{Proportional} \\ \text{Representation} \end{array} \right)_t + .290 \left( \begin{array}{c} \text{Vote Representation} \\ \text{Threshold} \end{array} \right)_t - .505 \left( \begin{array}{c} \text{Executive Control of} \\ \text{Legislature} \end{array} \right)_t
\end{aligned} \tag{5.1}$$

$$\begin{aligned}
\text{De Facto}_t = & .650 (\text{Parliamentary System})_t + .670 \left( \begin{array}{c} \text{Vote Share Largest} \\ \text{Opposition Party} \end{array} \right)_t + .604 \left( \begin{array}{c} \text{Total Vote Share} \\ \text{Opposition Parties} \end{array} \right)_t \\
& + .702 (\text{Party Fractionalization})_t - .910 \left( \begin{array}{c} \text{Freedom House} \\ \text{Political Rights} \end{array} \right)_t - .887 \left( \begin{array}{c} \text{Freedom House} \\ \text{Civil Liberties} \end{array} \right)_t \\
& + .901 \left( \begin{array}{c} \text{Vanhanen} \\ \text{Political Competition} \end{array} \right)_t + .536 \left( \begin{array}{c} \text{Vanhanen} \\ \text{Political Participation} \end{array} \right)_t
\end{aligned} \tag{5.2}$$

where the Cronbach's Alpha for the *de jure* replicated institutional component amounts to  $\alpha=.81$  and the Alpha for *de facto* replicated component equals  $\alpha=.72$  which advocates high internal consistency of the replicated components and which allows us to replicate the long-run cross-country growth regressions and test the institutional explanation of large differences in per capita output for the postwar period to observe whether the contribution of *de jure* and *de facto*

political institutions to the path of economic growth remains stable. In Table 7, the results for the merged institutional dataset are presented. *Panel A* features the set of regressions with fixed effects with and without excluded subsets that test for the stability of the underlying effects across multiple subsamples. The dependent variable is the first-difference of per capita GDP to control for potential non-stationarity. Standard errors are clustered across and within countries over time to allow for arbitrary heteroskedasticity and serially correlated disturbances that might over-reject the null hypothesis and render the parameter estimates inconsistent in spite of the control for unobserved effects, using [Cameron et. al. \(2006\)](#) multiway clustering scheme. The evidence confirms the primacy of de facto institutions over de jure institutions in shaping long-run path of economic growth. The evidence confirms the primacy of de facto institutions over de jure institutions in shaping long-run path of economic growth, and is consistent with the baseline long-run growth model estimates in Table 4 through 6. The coefficient on replicated de facto component is in the range between .011 and .022 and is statistically discernable from zero which does not depend on the specifically excluded subset of countries. The only exception to this pattern is indicated in column (7) where the exclusion of Middle East and North Africa from the base sample yields comparatively large effects of both de jure and de facto institutions on long-run growth at the same time whilst simultaneously positive effects of de jure and de facto institutions are not confirmed in the remaining specifications.

In Panel B of Table 7, structural model setup is estimated with endogenous *de jure* and *de facto* political institutions. Long-run growth model is re-specified using the endogenous replicated components from Eq. (5.1) and (5.2) to assess the robustness of the underlying endogenous effects of de jure and de facto institutions as postulated by (4.2) and (4.3). In Panel B, various dynamic panel data estimators are utilized to take into account the potential state dependence in the path of economic performance which might be hidden in the non-dynamic setup and which could potentially confound the established long-run effects of *de jure* and *de facto* political institutions on economic growth. The robustness check on the endogenous model setup clearly confirms the primacy of de facto political institutions over de jure institutions in shaping the path of long-run economic growth. The results in Panel B evidently indicate the underestimated effects of de facto political institutions using simple OLS estimates with fixed effects since the estimated contribution of de facto institutions to long-run growth is in the range between .021 and .126 and statistically significant at 5% in eight out of ten model estimates. In Panel C, first-stage results are displayed for the 5-year and 10-year lagged differences of the de jure and de facto institutional stock variables which entirely correspond to the persistent effects of institutional changes indicated by Table 6.

The robustness checks confirms the fundamental importance of de jure and de facto political institutions for the long-run economic growth. The persistent effects of institutions do not disappear once the potential non-stationarity in the path of economic growth, that might render the established effects spurious, is taken into account. The normative implications of the established effects consistently suggests that while pluralist, participatory and inclusive political institutions that facilitate the access to the institutions of collective action and parliamentary democracy may lie at the root of the economic breakthrough sustained by Northwestern Europe which failed outside the West for the most part of the 19<sup>th</sup> and early 20<sup>th</sup> century. Whilst institutions are necessarily central to the long-run economic performance of nations, de jure and de facto political institutions tend to persist and appear to change only slowly over time. If pluralist and inclusive political institutions persist in one society while extractive political institutions persist in a different society, a large gap is likely to appear between the two societies when seemingly small differences in growth rates compound in the long run, which might explain why the convergence high-income and welfare frontier might have taken a slow route despite the institutional changes towards greater inclusivity in the postwar period.

**Table 7: Post-1970 Institutional Development and Long-Run Economic Growth**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
<i>Panel A: Basic Fixed-Effects Model Estimates</i>										
De Jure Latent Institutional Component	.064 (.045)	.060 (.046)	.055 (.046)	.062 (.045)	.060 (.054)	.064 (.045)	.103*** (.041)	.033 (.060)	.053 (.048)	.069 (.047)
De Facto Latent Institutional Component	.017*** (.006)	.018*** (.007)	.019*** (.007)	.013** (.006)	.020** (.008)	.017*** (.007)	.011* (.006)	.019** (.008)	.022*** (.007)	.018** (.007)
Excluded Subset	None	Western Europe	Central Europe	Eastern Europe	Latin America	Western Offshoots	Middle East – North Africa	Sub-Saharan Africa	East Asia	South Asia
R2	0.015	0.015	0.015	0.014	0.015	0.015	0.012	0.011	0.018	0.018
# Observations	5,598	5,338	5,598	5,052	5,015	5,742	5,044	4,409	5,381	5,525
<i>Panel B: Structural Model Setup with Endogenous Institutions</i>										
	IV-2SLS Pooled OLS	IV-2SLS Fixed Effects	IV-2SLS Random Effects	Arellano- Bond GMM	Blundell- Bond	Arellano- Bover One-Step	Arellano-Bover Two-Step	Roodman Two- Step GMM	Anderson- Hsiao IV	Griliches- Hausman LD
De Jure Latent Institutional Component	-.267 (.229)	-.512 (.348)	-.357 (.366)	.063 (.082)	-.055 (.085)	.006 (.086)	.009 (.014)	-.066 (.079)	-.121 (.074)	-.780* (.404)
De Facto Latent Institutional Component	.081*** (.031)	.126*** (.048)	.100* (.057)	.030** (.013)	.026** (.011)	.021** (.011)	.020*** (.0009)	.033*** (.009)	.025*** (.008)	.119* (.072)
<i>Panel C: First-Stage OLS Estimates for De Jure and De Facto Latent Institutional Components</i>										
5-Year Lagged Difference De Jure	.332*** (.052)	.257*** (.052)	.293*** (.051)	.310*** (.050)	.310*** (.050)	.253*** (.036)	.253*** (.036)	.253*** (.036)	.259*** (.050)	.259*** (.050)
5-Year Lagged Difference De Facto	.220*** (.054)	.007** (.003)	.183*** (.049)	.247*** (.044)	.247*** (.044)	.150*** (.029)	.150*** (.029)	.150*** (.029)	.143*** (.037)	.143*** (.037)
10-Year Lagged Difference De Jure	.162*** (.057)	.139*** (.050)	.147*** (.049)	.233*** (.045)	.233*** (.045)	.133*** (.025)	.133*** (.025)	.133*** (.025)	.137*** (.049)	.137*** (.049)
10-Year Lagged Difference De Facto	.218*** (.053)	.010*** (.003)	.163*** (.050)	.225*** (.048)	.225*** (.048)	.130*** (.029)	.130*** (.029)	.130*** (.029)	.107*** (.024)	.107*** (.024)
Hansen J-Test (p-value)	0.94	0.71	0.96	0.70	0.99	0.99	0.99	0.77		0.73
Kleibergen-Paap Underidentification Test (p-value)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		0.004
Angrist-Pischke F-Test on Excluded Instruments (p-value)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		0.000
# Observations	3,862	3,862	3,862	3,760	5,726	5,888	5,888	3,862	5,300	3,862
# Countries	162	162	162	162	162	162	162	162	162	162

*Notes:* table presents the effects of post-1970 institutional development on the long-run economic growth. The dependent variable is the rate of economic growth obtained by taking the first differences on the natural log of real per capita GDP (SG-K 1990). Standard errors are adjusted for potential heteroskedasticity and serially correlated disturbances in unobservables, and denoted in the parentheses. Columns (1) and (2) use [Cameron et al. \(2006\)](#) non-nested multiway clustering variance matrix estimator to ensure cluster-robust inference on the underlying parameters and remove within-country serially correlated disturbances which do not disappear after controlling for unobserved effects and using finite-sample adjustment of the empirical distribution function. Column (4) uses [Arellano and Bond \(1991\)](#) dynamic panel data estimator with 1-year lagged dependent variable to correct for the inconsistency of standard errors as a result of the persistent correlation between unobserved effects and spatially distributed lag of the dependent variable. Column (5) uses [Blundell and Bond \(1998\)](#) by adding additional moment conditions to adjust the underlying empirical distribution function for large autoregressive errors and potentially high variance ratio of the panel-level effect to the idiosyncratic error. Columns (6) and (7) apply the [Arellano and Bover \(1995\)](#) linear dynamic panel estimator by using one-step and two-step estimator by estimating the moment conditions of the empirical distribution function through first-stage residuals. Column (8) uses [Roodman \(2009\)](#) system dynamic two-step panel estimator using the finite-sample correction of the covariance matrix estimator, and [Windmeijer \(2005\)](#) finite-sample adjustment of the covariance matrix estimator to adjust the standard errors for potential heteroskedasticity and within-country serially correlated stochastic disturbances. Column (9) uses [Anderson and Hsiao \(1981\)](#) dynamic panel data estimator with error components to correct for the potential correlation between the unobserved effects and the error term using the second lag of the dependent variable as an instrument for the lagged dependent variable. Column (10) uses [Griliches and Hausman \(1986\)](#) long-distance error-in-variables estimator using the second lag of the dependent variable as an instrument for the lagged dependent variable to tackle the spatial correlation between the error term and country-fixed effects with robust standard errors. Asterisks denote statistically significant regression coefficients at 10% (\*), 5% (\*\*), and 1% (\*\*\*), respectively.



## 6. Conclusion

The general consensus in the literature on the origins of long-run economic growth emphasizes the primacy of institutions over geography, trade and endowments in shaping the path of growth and development. However, what such institutions are, how to quantify them and examine their respective contribution to long-run growth and development still remains unclear. In this paper, the effect of institutions on long-run growth and development is examined for a large panel of countries based on *First Update of the Maddison GDP* database by Bolt and Van Zanden (2014). This paper presents an attempt to quantify long-term evolution of institutional change from 1810 to 2000. To this end, the variation of existing indicators of long-term institutional change in Vanhanen Polyarchy Dataset and Polity IV Dataset is exploited to construct the measures of *de jure* and *de facto* political institutions across countries over time. The former captures the formal institutional dimension whereas the latter captures the ability of the population to participate in the various forms of collective action and the extent of political competition. Principal component analysis is used to construct latent measures of *de jure* and *de facto* political institutions for a large number of countries in various subperiods. The indices provide a standardized measure of extractive political institutions, as motivated by Acemoglu & Robinson (2012), on the continuous annual basis and allow the investigation of the effects of institutional patterns on long-term economic performance of nations.

The results confirm the fundamental importance of institutional changes for the path of long-run growth and development. Societies with a better structure of *de jure* political institutions and a broader distribution of political power, captured by *de facto* institutions, achieved systematically higher and less volatile rates of economic growth. The contribution of *de facto* political institutions trumps the contribution of both *de jure* political institutions to the long-run growth and development. The estimated effects of institutions remain robust to common technology shocks, and heterogeneity bias. The results also demonstrate the invariance of *de jure* and *de facto* political institutions to alternative datasets as both components are replicated using additional dataset by Beck et. al. (2001) which confirms the interplay between *de jure* and *de facto* political institutions that characterizes much of the long-run differences in the institutional development. Highly concentrated distribution of political power tends to inhibit the path of economic growth and since institutions tend to persist, the persistence channel largely accounts for the large gaps in economic development across countries as seemingly small differences in growth rates compound in the long run as a result of institutional persistence. In the long run, *de jure* and *de facto* institutional differences account for up to 90 percent of within-country development path and up to 70 percent of cross-country development gaps.

The results suggest a strong and significant responses of long-run economic growth to the change in constructed *de jure* and *de facto* indices of political institutions. Since higher values of these latent indices imply greater inclusivity of political institutions, the results advocate a systematic link between the institutions, institutional change and long-run economic outcomes. The evidence conclusively suggests that extractive institutions emerge as an outcome of concentrated political power which prevents the political participation and causes the elites to use the institutions to their own advantage at the expense of non-elites fewer economic and political opportunities. The evidence presented in this papers suggests such adverse institutional pattern condemns societies to slow economic growth and low income levels which is consistent with the historical evolution of world income distribution where Western Europe and Western Offshoots achieved and sustained high economic growth whereas large parts of Latin America, South Asia, Eastern Europe and Sub-Saharan Africa persistently lagged behind, which arguably lies at the core of second Great Divergence in the 19<sup>th</sup> century.

This paper contributes to the growing literature on the long-term effects of institutions and economic growth by quantifying long-term institutional change and examining its effects on long-run economic outcomes. The findings also reveal that a significant share of unexplained between-country income variance for the postwar period when the aggregate sample is augmented by Sub-Saharan African, South Asian and Eastern Europe countries. Moreover, it still remains unclear why the inclusive *de jure* and *de facto* political institutions evolved initially in Northwestern Europe rather than in Eastern and Southern Europe, Latin America, and South Asia, which naturally leaves the explanation on how the initial conditions shaped the future of institutional change largely unanswered. The emphasis on the role of initial conditions in subsequent institutional development is a fruitful area for future research.

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## Appendix A: Principal Component Analysis of Long-Term Institutional Change (For ONLINE PUBLICATION)

Consider a matrix of data  $\mathbf{X}$  on the structure of political institutions with zero empirical mean with  $n$  rows and  $k$  columns. The goal is to construct a principal orthogonal eigenvector by transforming the set of  $p$ -dimensional vectors of loadings  $\mathbf{w}_k = (w_1, w_2, \dots, w_k)$  that map each vector  $\mathbf{x}_i$  into a new vector of principal component scores denoted by  $t_i = \{t_1, \dots, t_k\}$  where  $k$  denotes the number of principal components as  $k=2$  in our example. Each component score is given by  $t_{k(i)} = \mathbf{x}_i \cdot \mathbf{w}_k$ . The first component score satisfies:

$$\mathbf{w}_1 = \arg \max_{\|\mathbf{w}\|=1} \left\{ \sum_i (t_1)_i^2 \right\} = \arg \max_{\|\mathbf{w}\|=1} \sum_i (\mathbf{x}_{(i)} \cdot \mathbf{w})^2 = \arg \max \{ \|\mathbf{X} \mathbf{w}\|^2 \} = \arg \max \{ \mathbf{w}^T \mathbf{X}^T \mathbf{X} \mathbf{w} \} \quad (\text{A.1})$$

where  $\mathbf{x}_{(i)} = \{x_1, x_2, \dots, x_i\}$  denotes the data matrix and  $\mathbf{w}_k = (w_1, w_2, \dots, w_k)$  is the set of dimension vector loadings and which is known as the Rayleigh quotient. For a symmetric matrix  $\mathbf{X}^T \mathbf{X}$ , the quotient's maximum value is the largest eigenvalue of the matrix when  $\mathbf{w}$  is the main eigenvector. The eigenvalue  $\mathbf{w}_1$  the first component of a data vector  $\mathbf{x}_{(i)} = \{x_1, x_2, \dots, x_i\}$  is given a sample score  $t_{k(i)} = \mathbf{x}_i \cdot \mathbf{w}_k$  in the orthogonal coordinate system as the equivalent vector in the original variables. The second component ( $k=2$ ) is found by subtracting the first ( $k=1$ ) from the data matrix  $\mathbf{X}$ :

$$\hat{\mathbf{X}}_{k-1} = \mathbf{X} - \sum_{s=1}^{k-1} \mathbf{X} \mathbf{w}_s \mathbf{w}_s^T \quad (\text{A.2})$$

which allows us to find the loading vector which extracts the maximum possible variance from the new data matrix  $\hat{\mathbf{X}}_{k-1}$ :

$$\mathbf{w}_k = \arg \max \{ \|\mathbf{X}_{k-1} \mathbf{w}\|^2 \} = \arg \max \left\{ \frac{\mathbf{w}^T \hat{\mathbf{X}}_{k-1}^T \hat{\mathbf{X}}_{k-1} \mathbf{w}}{\mathbf{w}^T \mathbf{w}} \right\} \quad (\text{A.3})$$

which gives the remaining eigenvectors  $\mathbf{X}^T \mathbf{X}$  with the maximum values for the orthogonalized component denoted by  $\mathbf{w}^T \hat{\mathbf{X}}_{k-1}^T \hat{\mathbf{X}}_{k-1} \mathbf{w} / \mathbf{w}^T \mathbf{w}$ . The second principal component is given a score  $t_{k(i)} = \mathbf{x}_i \cdot \mathbf{w}_k$  in the new coordinate which corresponds directly to the space data matrix of the original variables. The second component is orthogonal to the first component which ensures that both constructed indices are uncorrelated. Using PCA, two principal components of political institutions, de jure and de facto component, are constructed in which the maximum variance in each underlying sub-indicator is extracted and where both principal components are orthogonal to each other. Both measures capture the latent dimension of de jure and de facto political institutions which allows us to examine the relationship between institutional change and economic growth.

## **Appendix B: Postwar Institutional Change Dataset, 1975-2012 (For ONLINE PUBLICATION)**

The dataset by [Beck et. al. \(2001\)](#) is exploited along 32 relevant characteristics of political institutions for 177 countries in the period 1975-2012 to reconstruct de jure and de facto components of political institutions. Factor analysis is used to construct latent de jure and de facto indices of political institutions from four underlying features of the political regimes. Chief executive constraints composed of six underlying variables. The first three underlying variables denote the type of political system in terms of electing chief executives. Three distinctive dummy variables are considered for (a) presidential system, (b) assembly-based presidential election, and (c) parliamentary system. The fourth underlying variable is a dummy variable for a finite office term and the fifth variable is a dummy variable for chief executive control of the legislature in the given year. The last underlying variable is the number of years of chief executive's political party in office which captures the persistence of political power.

The degree of political competition largely determines the possible persistence and consolidation of de facto political power. A fractionalized legislature can hardly achieve efficient political decisions. Political competition composed of ten variables measuring the extent of party competition. Uniform and cumulative vote shares of government and opposition parties in the general election capture the concentration of political power. Second, dummy variable for the absolute parliamentary majority is used to capture the degree of political fragmentation. In addition, Hirschman-Herfindahl indices of government and opposition party shares are used to further the comparable differences in the political fragmentation. In addition, fractionalization index for all party shares and separately for government and opposition party shares. The index denotes the degree fractionalization based on the probability that two randomly selected deputies will be from different parties.

The incentives of political decision-makers and the ability to act independently from the political pressure largely depends on the extent and substance of electoral rules. As such electoral rules denote whether the candidates are encouraged to pursue pure individual or party interests. Electoral rules component is composed of five underlying variables which denote the type and extent of rules and constraints in the electoral competition. First, the legislative index of electoral competition is based on ordinal scale with seven categories. These categories range from no legislature and unelected legislature at the bottom to systems with one elected candidate and one-party legislature in the middle to multiple parties in the high range. The highest score is achieved if the largest party won less than 75% of all votes in the general election. Second, the executive index of electoral competition is similarly based on the seven-category ordinal scale. Societies with rival chief executives in armed conflicts or with executives elected by military juntas comprise the bottom of the scale. Chief executives of communist nations and one-party systems with multiple candidates are ranked in the middle of the scale. Multiple parties with a single candidate and competitive elections where the winning candidate won more than 75% of the votes comprise the upper middle part of the scale. Societies with competitively elected prime ministers who won less than 75% of the votes achieve the highest score on the executive index of electoral competition. Three additional variables are considered in the electoral rules principal component: (i) dummy variable for proportional representation of political parties, (ii) vote representation threshold which denotes the minimum vote share the party must win to take more than one seat in proportional representation system, and (iii) a dummy variable if the country has adopted D'Hondt/Jefferson method of seat allocation in the legislature. The latter method is based on the highest vote averages in allocating seats and denote the degree of proportional representation in the legislature.

Subnational political structure can influence policymaking at the national level in many possible ways. Subnational units such as regions and provinces may have veto power of national policy decisions. They may exert additional pressure for particular policy preferences and they can also affect the composition of political parties in the struggle for subnational and national election. Federalism component is composed of five underlying variables: (i) dummy variable for regional political autonomy, (ii) ordinal scale of the municipal elections based on three distinctive levels, depending on whether executive and the legislature are elected locally, (iii) dummy variable if state/provincial governments are elected locally, (iv) dummy variable if states/provincial governments exert decisional autonomy over taxes, spending and regulatory policies, and (v) dummy variable if the states/provinces are the constituents of

the elected senators. The federalism principal component denotes the degree to which the political decentralization of decision-making is delegated from the central government to the subnational level. In addition, Freedom House indices of political rights and civil liberties are considered as the underlying characteristic of the political regimes that might reflect the *de jure* and *de facto* institutional characteristics of the regimes.

Table B1 summarizes the main variables used in the factor analysis whilst Table B2 displays the essential descriptive statistics for the postwar indices of institutional change and broken down across key benchmark years. While average levels of latent indices for political competition, electoral rules and federalism rose over time, indicating greater inclusivity of political institutions, political stability and chief executive constraint indices deteriorated which indicates a substantial heterogeneity in the structure of postwar political institutions.

**Table B1: Essential De Jure and De Facto Characteristics of Political Regimes, 1975-2012**

<b>Chief Executive Constraints</b>	
Presidential system	Dummy variable for presidential system of chief executive election (1 if yes, 0 otherwise)
Assembly-based presidential election	Dummy variable for assembly-based chief executive election (1 if yes, 0 otherwise)
Parliamentary system	Dummy variable for parliamentary system of chief executive election (1 if yes, 0 otherwise)
Finite office term	Dummy variable for a finite chief executive office term, (1 if yes, 0 otherwise)
Formal term restraints	Dummy variable for formal executive restraints on serving additional term (1 if yes, 0 otherwise)
Executive control of the legislature	Dummy variable for executive control of the legislature (1 if the chief executive controls all relevant houses, 0 otherwise)
Years in office	Years of chief executive's political party in office
<b>Political Competition</b>	
Government party index of political power	Vote share of largest government party
Opposition party index of political power	Vote share of largest opposition party
Cumulative index of government political power	Total vote share of government parties
Cumulative index of opposition political power	Total vote share of opposition parties
Absolute majority index and fragmentation	Dummy variable for an absolute majority (1 if the opposition party has an absolute majority in all Houses, 0 otherwise)
Concentration of government parties' political power	Hirschmann-Herfindahl index of government party shares (sum of squared seat shares of all parties in the government)
Concentration of opposition parties' political power	Hirschmann-Herfindahl index of opposition party shares (sum of squared seat shares of all parties in the opposition)
Party fractionalization index	The probability that two deputies picked at random from the legislature will be of different parties
Government fractionalization index	The probability that two deputies picked at random from among the opposition parties will be of different parties
Opposition fractionalization index	The probability that two deputies picked at random from among the government parties will be of different parties
<b>Electoral Rules</b>	
Legislative index of electoral competition	Ordinal scale of the legislative index of electoral competition (1 – no legislature, 2 – unelected legislature, 3 - one elected candidate, 4 – one-party legislature and multiple candidates, 5 – multiple parties are legal but only one party won the seats 6 – multiple parties won seats but the largest party won 75% of all seats, 7 – largest party got less than 75% of the seats)
Executive index of electoral competition	Ordinal scale of executive index of electoral competition (1 – rival chief executives in armed conflicts, 2 - executives elected by small appointed juntas or appointed electoral colleges, 3 - chief executives of communist nations, 4 – one-party system with multiple candidates, 5 – multiple parties with a single candidate, 6 – competitive elections where the winning candidate received more than 75% of the votes, 7 – competitively elected prime ministers with less than 75% of the votes)
Proportional representation	Dummy variable for proportional representation (1 if political parties in electoral system are represented proportionally, 0 otherwise)
Vote representation threshold	Minimum vote that the party must obtain to take more than one seat in proportional representation system

D'Hondt/Jefferson system	Dummy variable if the country has adopted D'Hondt/Jefferson highest averages method for allocating seats in the legislature. This indicator proxies the preference for large party coalitions. (1 if yes, 0 otherwise)
<b>Federalism</b>	
Regional autonomy	Dummy variable for regional political autonomy (1 if there are autonomous regions, 0 otherwise)
Municipal electoral system	Ordinal scale for the extent of municipal elections (0 – neither local executive nor local legislature are locally elected, 1 - the executive is appointed, but the legislature elected, 2 – the executive and the legislature are both locally elected)
State/Provincial electoral system	Dummy variable for the extent of state/provincial electoral system (1 if state/provincial governments are locally elected, 0 otherwise)
Fiscal federalism	Dummy variable for fiscal federalism (1 if states/provinces have the authority over taxes, spending and regulation)
State/Provincial Constituency	Dummy variable for the type of state/provincial constituency (1 if states/provinces are the constituents of elected senators, 0 otherwise)

**Table B2:** Descriptive Statistics for the De Jure and De Facto Covariates of the Political Regimes, 1975-2012

	Obs	Mean	Std				
			Overall	Between	Within	Min	Max
<b>Panel A4: Executive Constraints</b>							
Presidential System	6,232	.550	.497	.426	.257	0	1
Assembly-based System	6,232	.158	.365	.258	.258	0	1
Parliamentary System	6,232	.291	.454	.405	.206	0	1
Finite Office Term	6,232	.794	.403	.298	.272	0	1
Formal Term Restraints	6,232	.694	.126	.296	.125	0	1
Executive Control of the Legislature	6,232	.642	.479	.346	.332	0	1
Chief Executive Party's Years in Office	6,232	12.20	15.96	10.11	12.37	0	102
<b>Panel A5: Political Competition</b>							
Largest Government Party Vote Share	6,214	42.58	35.68	25.78	24.73	0	100
Largest Opposition Party Vote Share	6,232	12.99	15.56	11.85	10.11	0	57.1
Government Parties' Total Vote Share	6,230	39.85	37.11	23.54	28.74	0	100
Opposition Parties' Total Vote Share	6,230	17.21	21.96	16.16	14.91	0	93.83
Absolute Majority	6,232	.012	.110	.060	.092	0	1
Hirschmann-Herfindahl Index of Government Party Shares	6,139	.864	.646	.404	.503	0	1
Hirschmann-Herfindahl Index of Opposition Party Shares	6,227	.424	.317	.239	.209	0	1
Party Fractionalization Index	6,231	.417	.317	.219	.229	0	1
Government Fractionalization Index	6,229	.168	.257	.176	.187	0	1
Opposition Fractionalization Index	6,226	.352	.301	.212	.214	0	1
<b>Panel A6: Electoral Rules</b>							
Legislative Index of Electoral Competition	6,229	5.303	2.130	1.454	1.560	1	7
Executive Index of Electoral Competition	6,229	5.046	2.165	1.568	1.497	1	7
Proportional Representation	6,232	.438	.496	.418	.268	0	1
Vote Representation Threshold	6,232	.938	2.364	1.755	1.589	0	25
D'Hondt/Jefferson Legislative Seat Allocation System	6,232	.123	.329	.283	.168	0	1
<b>Panel A7: Federalism</b>							
Regional Autonomy	6,232	.173	.378	.331	.185	0	1
Municipal Electoral System	6,232	.477	.499	.386	.317	0	1
State/Provincial Electoral System	6,232	.441	.496	.424	.260	0	1
Fiscal Federalism	6,232	.167	.373	.338	.159	0	1
State/Provincial Constituency	6,232	.218	.413	.351	.219	0	1
<b>Panel A8: Political Rights and Civil Liberties</b>							
Freedom House Index of Political Rights	6,172	4.050	2.229	1.887	1.196	1	7
Freedom House Index of Civil Liberties	6,191	4.023	1.922	1.650	.993	1	7