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# Institutional Hierarchies and Economic Growth
## A Bundled Approach

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**Abstract**
Theoretical and empirical evidence on the relationship between institutions and economic prosperity remains ambiguous, even though it has been part of scholarly discourse for decades. The present study adds to this discussion by introducing a bundled approach for measuring institutions. This approach takes into account interrelations in form of hierarchies between political, economic and the societal institutions and thereby adds to the literature that deals with the mechanisms of economic growth from an institutional perspective. Based on a panel of 153 countries from 1995 to 2016, we find that political institutions establish a deep-rooted framework in which societal institutions, such as education and health care, act as main drivers of growth processes.

**JEL-Codes:** H00, O11, O43, P51
**Keywords:** Institutional Hierarchy, Economic Growth, Bundled Measurement

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# 1. Introduction

The analysis of the theoretical and empirical analysis of the relationship between political system and economic performance greatly evolved over the past decades. The systematic study of this subject first picked up speed with Lipset's 1959 (Lipset, 1959) modernization theory, which revolves around the idea that democracy is the direct result of economic growth. A literature closely related to Lipset's ideas investigates how drops in GDP make the transition to democracy more likely. This perspective includes work by Rodrik and Wacziarg (2005), who distinguish between well-established and those that have been in existence for less than five years. They find that a change in regime type towards democracy is beneficial as countries categorized as a young democracy grew 0.87% faster than the established democracies. Rodrik and Wacziarg conclude that democratic structures emerge following periods of low economic growth and will not precede them (Rodrik/Wacziarg, 2005, p. 50). Brückner and Ciccone share this view in their 2011 paper (Brückner/Ciccone, 2011, p. 50), in which they use an instrumental variable strategy based on negative rainfall shocks. Papaioannou and Siourounis (2008) also add to this strand of literature. They develop a dichotomous index of democracy from Freedom House and Polity IV data and analyze a panel covering 166 countries from 1960 to 2003. They estimate an annual effect of a 1% increase in GDP per capita growth. While they find that growth rates decline substantially during the transition period, they find growth rates that are both stable and much higher after the transition period (Portes/Smith, 2008).

A vast literature developed around the opposing idea of the modernization theory, namely on the investigation of the effect of democracy on economic growth. Scholars like Hayek (1960) already put forward this view back in Lipset's time: Hayek was convinced of the existence of economic benefits of democracy and theorized that they would appear in the long run. But for a long time, the study of this nexus yielded ambiguous results. In his seminal 1996 study, Barro finds that free markets, the rule of law, human capital and low government consumption have a positive influence on GDP per capita growth in a panel comprising 100 countries from 1960-1990. Barro finds a negative influence of overall democracy as approximated with Freedom House data, as soon as the aforementioned variables are kept constant. His results also indicate that countries with few democratic institutions grow especially well economically (Barro, 1996, p. 14). Other scholars like Giavazzi and Tabellini (2005) or Murtin and Wacziarg (2014) cannot establish a statistically significant effect of democracy on growth.

Only more recently, it became widely accepted among researchers that there is a positive effect of democratic structures on economic growth, at least in the long-term. To name a few examples, researchers like Acemoglu et al. (2014) as well as Persson and Tabellini (2006) estimate positive long-run effects of democratization on the growth of GDP per capita. They show a growth in GDP per capita of 12.5% in a panel of 175 countries form 1960 to 2010 and 20% for a panel of 150 countries form 1960 to 2000 respectively (Acemoglu/Naidu, et al., 2014 and Persson/Tabellini, 2006). Gerring et al. also investigate the long-term influence of democracy. Since their initial estimation employing only Polity IV data does not yield conclusive results, they create a new democracy index using Polity II data and thereafter find a positive influence of democracy on the growth of the GDP per capita (Gerring et al., 2005, p. 350).

Madsen et al. (2015) conduct a study using long panel data on democracy and income for two periods, beginning in 1820 and in 1500 respectively. This approach allows them to analyze the three waves of democratization, as identified by Huntington (1991), as well as their long-term effects. They exploit the econometric fact that the consistency of the fixed effects estimator increases as the dataset grows. They further employ linguistic distance-weighted foreign democracy as an external instrument in their analysis, a novel approach. Depending on their respective sample and the respective model specification, their analysis yields increases in per capita income of 44-98% as a result of a one-standard deviation increase in democracy. Acemoglu et al. (2019) also confront methodological challenges and past measurement errors in a recent paper, and to that end combine various panel and instrumental variable estimations all while using a self-designed indicator of democracy. Across all their specifications, they find similar effects for countries that make the transition from nondemocracy to democracy, namely about 20 percent higher GDP per capita within 25 of the transition, as compared to the countries that remained nondemocratic (Acemoglu/Naidu, et al., 2019).

There is also a string of meta-analyses that summarize the empirical findings in this field of research. Among many others, the most cited meta-analyses include Przeworski and Limongi (1993), Doucouliagos and Ulubasoglu (2008) and most recently Colagrossi et al. (2020). Doucouliagos and Ulubasoglu (2008) find that while democracy does not exert a direct influence on economic growth, it has significant positive indirect effect through the stock of human capital, political stability, low inflation rates and economic freedom. Colagrossi et al. explicitly build on the 2008 Doucouliagos and Ulubasoglu analysis and conclude that democracy has a direct and positive effect on economic prosperity in terms

of growth, but acknowledge that the effect appears stronger in more recent papers that were not part of the Doucouliagos and Ulubasoglu analysis. They furthermore conclude that the relationship between democracy and growth is not homogeneous across different time periods and geographical regions.

Even before the Colagrossi et al. analysis, it was already established that the relationship between democracy and economic growth is not a simple, but that it is rather complex, and that factors beyond the direct relationship between political system and economic prosperity needed to be taken into account. Hence, the field of analysis was, among many other factors, extended to a comparative approach that took into account the length of the democratic experience and the general level of development. In this context, Gasiorowski (2000) shows that economic growth is slower in more-democratic societies compared to faster growth in less-democratic regimes (Gasiorowski, 2000, p. 341). Acemoglu et al. (2014) share this view and also find democracy to impair growth in developing countries. Evidence from a study by Tridico adds to the aforementioned evidence. He studies a panel of 48 fast-developing countries with an average growth rate of 4.9% from 1995 to 2006. His analysis yields a negative relationship between GDP per capita growth and the level of *Voice and Accountability* taken from the World Development Indicators, his proxy for democracy(Tridico, 2010). Also, the time-dimension itself has been a subject of research. An example for work in this area is Krieckhaus (2004), who also investigates evidence beyond the direct relationship between democracy and growth. He explains the ambiguous empirical results, that are found in the research community, with the different considered periods of time. He himself finds a negative relationship in the 1960's and a positive one beginning in the 1980's (Krieckhaus, 2004, p. 653).

Fueled by the emergence of new institutional economics, much of the debate has shifted towards the investigation of institutions as a possible channel of transmission between democracy and economic growth, ever enlarging the field of analysis in the nexus between political system and economic prosperity. Within democratic structures, researchers now increasingly focus on finding which institutions[1] instigate economic growth, and potentially give democracies the advantage over autocratic systems. Considering the abundant literature on the subject at large and on the growth-fostering effects of institutions in

[1] A consistent definition of institutions remains elusive in economics research as of yet, but many scholars rally behind North's definition of institutions as "the rules of the game in a society or, more formally, [as] humanly devised constraints that shape human interaction. In consequence they structure incentives in human exchange, whether political, social, or economic (North, 1990, p. 3)". The term *institutions* will be employed in this paper following North's comprehensive definition.

particular, it is striking that only few empirical studies analyze the simultaneous influence of multiple institutions at once with a focus on their interrelations.

Nevertheless, since institutions never exist outside of a whole system of rules that all might or might not have a respectively different impact on the economic performance, it is necessary to take these interdependencies into account in order to understand the mechanism behind their growth-fostering effects. In the relevant literature, this research agenda has been adopted under the keyword of hierarchies of institutions. Such a hierarchy, that is based on the interrelationship between economic and political institutions, was first theorized on by Acemoglu et al. (2005). Their conclusion is that political institutions are the deep cause of growth as they create the framework in which economic institutions take shape, which then in turn exert a more direct effect on economic growth.

The 2014 study by Flachaire et. al is perfectly representative of this strand of literature as they find exactly this relationship in their analysis of a panel of 79 countries from 1975 to 2005 (Flachaire et al., 2014). Earlier work, which also postulates a hierarchy of institutions of this sort, includes Williamson (2000). He draws an evolutionary hierarchy of political and economic institutions based on their pace of change. Roland (2004) also focuses on the pace of institutional change in his description of slow and fast-moving institutions. Other notable authors in this niche of institutional research include Persson (2004), who discusses the consequences of constitutional arrangements with regard to the choice of economic institutions and Eicher and Leukert (2009), who explicitly rely on the validity of the hierarchy of institutions hypothesis since it provides the basis for their instrument variable approach. They employ political and constitutional institutions as instruments for economic institutions for a sample of OECD countries, for which suitable instruments are rare.

Overall, the literature on hierarchies of institutions in the growth context is rather small and it is interesting to observe that it draws a distinct line between political and economic institutions, while leaving out societal institutions, which have been found to be most conducive to growth. Glaeser et al. (2004) for example find that the quality of institutions is no longer a significant determinant of economic growth as soon as human capital is controlled for, which leaves Madsen et al. (2015) to conclude that human capital has to be considered in all investigations into democracy and growth. Doucouliagos and Ulubasoglu (2008) mention a positive effect of human capital on economic growth in their meta-analysis. Acemoglu et al. (2019) isolate capital, schooling and health as

driving factors within democracies that further the economic performance.

To fill this gap in the empirical literature, we link the literature on institutional hierarchies with the literature on the growth enhancing properties of institutions at large and that of societal institutions in particular. This enables us to move beyond the pure identification of growth enhancing institutions and analyze the mechanism behind their growth enhancing quality in our empirical analysis. To that end, we first test whether political, economic or societal institutions are most conducive to growth and then second, we study their interrelations to extrapolate the exact hierarchical mechanism behind their growth-enhancing effect. We conduct this analysis for a panel of 153 countries from 1995 to 2016 using the Arellano-Bond estimator, which works well with small-T-large-N panels, such as ours, to alleviate concerns of endogeneity. We also include our explanatory variables in the different lags to explore the exact time structure of the growth effect.

Our main empirical findings are twofold. Firstly, we find that the societal institutions are most important for economic growth as measured by GDP per capita growth. This finding is in line with previous literature. As to the mechanism, we identify a complementarity of the societal institutions with the political institutional quality. In order for the societal institutions to exude their growth-enhancing effect, they need high political institutional quality in terms of political rights and liberties, and this in turn is commonly found only in democratic systems. The intuition behind this empirical finding is obvious - only democratic systems allow for a credible commitment of a governing regime to the continued existence of societal institutions such as access to health care or education. Secondly, we find empirically that the effect of the underlying political institutions is more pronounced than that of the societal institutions, although only by a small margin. In conclusion, we are able to establish a hierarchy of institutions that relates to the previous literature in terms of the political institutions setting up the overarching framework but adds the societal institutions that were previously overlooked.

Following the introduction, the remainder of the paper is structured as follows. The hierarchy of institutions is established in section 2. Section 3 outlines the data and the empirical strategy used in the analysis. Estimation results are described and interpreted in section 4. Section 5 concludes and provides an outlook on future research.

# 2. A hierarchy of political, economic and societal institutions

It is noteworthy that the bulk of the literature on institutions in the growth-context focuses either on the analysis of single institutions and economic growth or on the analysis of aggregates, such as democracy, and economic growth. The literature on the effect of multiple institutions on economic growth is quite small and mostly neglects their interrelationships. We therefore extend our reach to explicitly study the relationships between institutions, among which a small, yet diverse, strand of literature is concerned with institutional hierarchies, which is suitable for our purposes.

Early work in this niche can be attributed to Williamson (2000) and Roland (2004), who both focus on the pace of institutional change and thus on a different angle than we do. But nevertheless, their respective approaches feed into our own ideas in important ways. For example, Roland (2004) describes slow-moving and, by his definition, continuously changing institutions as compared to fast-moving and by his definition rapidly and irregularly changing institutions. He stops short of ranking them in a hierarchy. He acknowledges though that slow-moving institutions are the ones that influence fast-moving institutions, by changing slowly, but continuously, creating rifts with the fast-moving institutions that will lead to changes. He uses the fitting analogy of an earthquake, where pressure slowly mounts along the fault lines and is suddenly released thorough a seismographic event, at the end of which the topography of the (institutional) landscape will have changed (Roland, 2004, p. 117).

Acemoglu et al. (2005) coined the notion of the hierarchy of institutions and also make use of the idea of two kinds of institutions, those who set up a deeply rooted framework and those who take shape within this framework. In their analysis, they go on an interesting tangent exploring the nature of such political institutions as collective choices, which implies that the distribution of political power in society is the key determinant of their evolution. Acemoglu et al. (2005) explicitly use the term "hierarchy" when they theorize on political institutions being the deep cause of economic growth and on economic institutions evolving in the space set up by the political institutions, de facto assigning them an indirect role. While the work of Acemoglu et al.(2005) on the institutional hierarchy remains in the realm of theory, Flachaire et. al (2014) put the idea to an empirical test in the growth context. They categorize their sample of developed and developing countries into two distinct groups, one with stable growth rates and

one with fluctuating growth rates. In their analysis, they find that political institutions define the group membership, while economic institutions are decisive for the growth rate within a given group.

A short overview of the literature on institutional hierarchies that focuses explicitly on the realms of political and economic institutions can be found in Eicher and Leukert (2009). Their research focus is distinctly different from ours, as they are looking for a suitable instrument to control for endogeneity of economic institutions and thus turn to political institutions. In this context, they review the literature on the relationship of these two kinds of institutions. They conclude that economic institutions influence the economic performance and that the economic institutions are themselves influenced both directly and indirectly by political institutions. The authors provide examples for both channels of influences: the direct effect could for example be visible in the form of a concentration of de facto political power in the hands of a malevolent autocrat, who prevents guaranteed property rights and equal market access, while the indirect effect could be visible in the distribution of de jure political power, which entails the discretionary power to change economic institutions.

Upon consideration of this literature, it is notable that political and economic institutions are at the center of the research in current literature and that these two constitute a hierarchy, in which the political institutions appear to be ranked higher since they constitute the underlying institutional breeding ground in which the economic institutions develop. We want to add to this by introducing two new aspects into the analysis that have not played a role so far.

First, we add the so-far overlooked growth-enhancing properties of societal institutions to the analysis. We know from recent literature that the influence of societal institutions, notably the influence stemming from institutions in the realms of education and health, is stronger than the influence of economic institutions. In the more recent literature investigating specific institutions as the channels through which growth is fostered, a pattern emerges that finds human capital indicators and health care indicators to be most conducive to economic growth (Madsen et al., 2015 and Acemoglu/Naidu, et al., 2019). Earlier studies by Barro (1996 and 1999) and Doucouliagos and Ulubasoglu (2008) explicitly identify human capital as being GDP-incresasing. Throughout the literature, these factors take on different forms. Human capital, for example, is commonly measured through various education variables, such as expected or mean years of schooling or attainment of primary or secondary schooling or any form of education possibility

(Oliva/Rivera-Batiz, 2002 and Baum/Lake, 2003 and Acemoglu/Naidu, et al., 2014). Health care is commonly proxied with life expectancy at birth, investment in the health care system or other fitting variables. Health care is found to be especially influential in poor countries (Baum/Lake, 2003). Therefore, we include societal factors into our analytic framework.

Secondly, we add to the literature by not only studying the indirect effect of political institutions on growth, but we also consider the direct effect. Other authors have denied such an effect and even rely on this observation in their methodology. Examples for this include Persson (2004, 2005) and Eicher and Schreiber (2010), who provide empirical evidence for the hierarchy of institutions, by employing specific constitutional variables as instruments for economic institutions. The argument is that political institutions perform well as instruments because they are slow moving, according to the aforementioned authors, and because their direct impact on output is negligible. Eicher and Leukert (2009) use a similar argument for their own instrumentation. Glaeser et al. (2004) also reject a direct link between economic output and political institutions. We consciously deviate from this approach and do not consider political institutions to be entirely exogenous. Timing is important here. In our framework of analysis, we also accept the notion of political institutions being the deep cause of growth, to use Acemoglu et. al's words. The political institutions establish an institutional framework in period t-2, in which further developed and hence established political institutions along with economic and the aforementioned societal institutions take shape in period t-1. Those three influence the current economic growth in t, along with past economic growth that is, through the logic pf path dependency. Figure 1 presents a schematic representation of our hierarchy of institutions and thus of our framework of analysis.[2]

In the following, we link these theoretical considerations to our empirical investigation and find evidence that political institutions also have a direct effect and that it is also necessary to take societal institutions into account.

[2]The length of each period t is explicitly not defined here and is meant to vary with regard to the specific context.

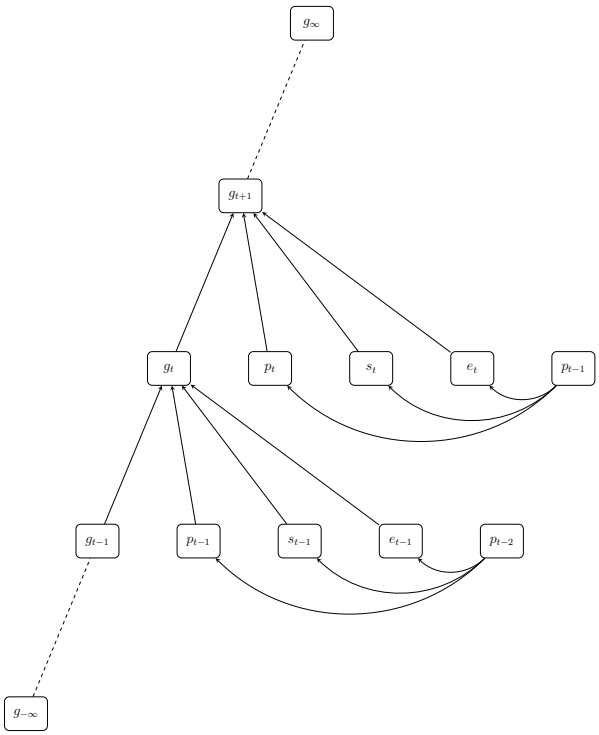


Figure 1: Analytical Framework

# 3. Data and Identification Strategy

## 3.1. Variables

The idea to dis-aggregate institutions beyond the level of the political system, and even to unbundle specific clusters of institutions in comparative analysis is well established. In their 2005 work, Acemoglu and Johnson study contracting rights and property rights in the growth context using an instrumental variable approach. While their instrument of settler mortality has sparked a considerable debate, for us it is noteworthy that their approach, in their own words, "unbundles" institutions (Acemoglu/Johnson, 2005). Guided by our framework, we go one step further and partly re-bundle the institutions to represent three aggregate dimensions, one measuring political institutions, one measuring economic institutions and one measuring societal institutions. This is necessary to determine the hierarchic structures of these institutional bundles. Our measure of institutions is taken from the SMEI database (Helfer, 2017), as it provides indices for all three dimensions needed: for political institutional quality (PIQ), for economic institutional quality (EIQ) and for societal institutional quality (SIQ). The indices run from 1 to 10, with 1 denoting the lowest level of the respective institutional quality and 10 the

highest. The three indices are available for a balanced panel for 153 countries between 1995 and 2016.[3]

Our main outcome variable of interest is economic prosperity. Generally, the literature dealing with economic prosperity relies on both GDP growth and GDP levels usually measured as the natural log of GDP per capita as proxies. If a panel, that is long in the time dimension, is available, the focus on levels of GDP as the dependent variable will provide a great resource as changes over time and thus development per se becomes easily apparent, if there is any. In our case, we are restricted by the availability of the data for the institutional dimensions and we will thus rely on GDP per capita growth data to proxy economic development. We obtain our GDP per capita growth data based on the GDP measured in 2010 US dollars from the World Bank Development Indicators. We exploit the fact that the data is given as per capita-data to control for population effects.

The three indices of PIQ, EIQ and SIQ that serve as our institutional dimensions are quite comprehensively built as aggregate indices and contain many variables that commonly serve as control variables in other empirical studies. In general, one should avoid a kitchen sink approach of including too many variables in a model. Therefore, this study contains a set of control variables that are standard in growth literature (Justesen/Kurrild-Klitgaard, 2013, p. 458), but are not part of the three indices. Our control variables include a measure for regime stability built from data obtained from the Database of Political Institutions (Beck et al., 2001) and the volume of exports and imports respectively to account for the trade volume. The trade data is again taken from the World Bank Development Indicators. To take convergence effects into account (Barro, 1996), the natural logarithm of the 1990 GDP per capita is included as initial value. Multiplicative interaction terms of the institutional dimensions and the initial

[3] We are aware of the prevalent use of dichotomous measures of institutional contexts in recent empirical literature, be it for singular institutions or larger institutional systems such as democracy, as done by Cheibub et al.(2012), by Acemoglu et al. (2014) or Boix et al. (2013). An interesting example for the use of a dichotomous measure of democracy can be found in Papaopannou and Sioutounis (2008) and Acemoglu et al. (2019). In this special case, the latter study builds on the former by essentially using the same data but by extending their coding to other data sources in case of missing values. While Papaiopannou and Sioutounis (2008) only code permanent transitions to democracy, Acemoglu et al. (2019) code all transition in terms of democratization and autocratic reversal. While there is a lot of merit to such approaches when dealing dealing with the realm of democratization as explanatory variable, such an approach falls short in case of our analysis as it would award the same score to a newly democratized country with institutional quality still in a state of flux and an established democracy with settled institutions, and we rely on changes in our institutions to explain economic development with the means of our institutional hierarchy. Therefore, we consciously opt for a multidimensional measure to accurately capture changes in the institutional development.

GDP value are used to control for nonlinearities. Since the effect of the institutional indices on GDP growth might for example be different in the US and Brazil, we create interaction terms between the three institutional dimensions and the country's level of development, proxied for by the initial GDP per capita value (Minier, 2007). The effect initial value itself is absorbed by the country fixed effects that will be used in the estimations.

Table 1 presents the descriptive statistics for our variables.

Table 1: Descriptive Statistics

| Variable | Obs | Mean | Std. Dev. | Min | Max |
|---|---|---|---|---|---|
| GDPpc growth | 3277 | 2.586 | 5.439 | -36.557 | 140.371 |
| PIQ | 3366 | 6.053 | 1.615 | 1.975 | 9.134 |
| EIQ | 3366 | 6.604 | 1.207 | 2.2 | 9.397 |
| SIQ | 3366 | 6.544 | .984 | 4.392 | 9.09 |
| Import | 2835 | 95302.55 | 235248.5 | 76.682 | 2930000 |
| Export | 2835 | 96971.32 | 204445.4 | 51.729 | 2218374 |
| Regime Stability | 3283 | 25.43 | 22.8 | 1 | 86 |
| ln GDPpc (1990) | 3036 | 8.136 | 1.523 | 5.267 | 11.139 |

Table A.1 in the appendix displays the pairwise correlation matrix of all explanatory variables. The correlation coefficients allow for assumptions regarding the separation precision of the variables. High correlations indicate low separation precision. According to Grogan and Moers (2001), coefficients with a value greater 0.7 are of concern in this regard. High correlations between the institutional bundles are not surprising. Generally, institutional factors related to economic prosperity are hard to separate and content-related overlaps exist. While most correlation coefficients in the table are not remarkable and indicate a good separation precision, the trade components of import and export are highly correlated. This is hardly surprising, since countries that are open to trade, usually trade in both directions.

Using the Variance Inflation Factor (VIF) test, the explanatory variables were tested for multicollinearity. This is important to consider since an increase in the degree of multicollinearity potentially leads to instability in the estimates of the coefficients and to inflated standard errors. As a heuristic, a VIF value greater than 10 is considered worrisome and demands further investigation. Again, only our trade variables of imports and exports have such values and again it is feasible that these are highly correlated with more than one other variable due to comprehensive nature - all countries in our panel

of 153 participate at least in some trade activity. Table 2 presents the scores.

Table 2: Variance Inflation Factor Test

| Variable | VIF | 1/VIF |
|---|---|---|
| Export | 25.86 | 0.038675 |
| Import | 23.76 | 0.042096 |
| SIQ | 4.01 | 0.249615 |
| PIQ | 3.02 | 0.331546 |
| ln GDPpc (1990) | 2.93 | 0.341607 |
| Regime Stability | 2.85 | 0.351083 |
| EIQ | 2.40 | 0.416545 |
| Mean VIF | 9.26 | |

## 3.2. Identification Strategy

There is no perfect estimation technique to address all the challenges when it comes to estimating the effect of institutions on economic prosperity, much less if the estimation technique should include hierarchical relationships between the institutions to uncover the mechanism behind the economic development. After much investigation, we were not able to identify an estimation technique that is able to measure our hierarchical structure and the resulting influence of the bundles of institutions on economic development at the same time. Therefore, we choose a two step estimation procedure. We firstly measure the influence of the underlying political institutions on our institutional bundles in order to gather information on the hierarchical structure. This approach to identifying the hierarchies follows these linear panel models:

$$\begin{aligned} PIQ_{i,t} &= \beta_0 + \beta_1 PIQ_{i,t-lag} + C_{i,t-lag}\beta_2 \\ &\quad + \alpha_i + \delta_t + \epsilon_{i,t} \\ SIQ_{i,t} &= \beta_0 + \beta_1 PIQ_{i,t-lag} + C_{i,t-lag}\beta_2 \\ &\quad + \alpha_i + \delta_t + \epsilon_{i,t} \\ EIQ_{i,t} &= \beta_0 + \beta_1 PIQ_{i,t-lag} + C_{i,t-lag}\beta_2 \\ &\quad + \alpha_i + \delta_t + \epsilon_{i,t} \end{aligned}$$

Then secondly, we measure the influence of these bundles on economic development that we then can interpret based on the backdrop of our hierarchy. The baseline model for

estimation using GDP growth as dependent variable follows

$$gGDP_{i,t} = \beta_0 + \beta_1 lnGDPpc_{i,initial} + X_{i,t-lag}\beta_2 + C_{i,t-lag}\beta_3 \\ + X_{i,t-lag} \times lnGDPpc_{i,initial}\beta_4 + \alpha_i + \delta_t + \epsilon_{i,t}$$

where the vector $X_{i,t-lag}$ refers to PIQ, EIQ and SIQ consecutively, $C_{i,t-lag}$ is the vector of control variables, $\alpha_i$ and $\delta_t$ designate the country fixed effects, that absorb the influence of any time-invariant country-characteristics, and time fixed effects respectively, and $\epsilon_{i,t}$ represents the error term that includes all other possible time-varying unobservable shocks to our dependent variable. Note that the institutional bundles are included in lagged form. While this is intuitively based on our theoretical underpinnings, this is also helpful to alleviate two concerns, that of endogeneity and that of autocorrelation. Dealing with data on institutions and economic development, be it in the context of institutional hierarchies or not, automatically entails endogeneity concerns since causality may plausibly run in both directions, thus assuming correlation between the independent variables and the error term. Usually, this concern can be alleviated using fixed-effects instrumental variable regression, such as 2SLS, but this would require an adequate external instrument for our three institutional bundles, which is not available.[4]

Therefore, we resort to GMM regression, in which lagged levels of the endogenous regressors are used as internal instruments. This makes the endogenous variables predetermined and thus not correlated with the error term. Also the problem of potential autocorrelation is addressed by the GMM approach, which could potentially arise from the lagged dependent variable that is included through the initial GDP value. Using GMM, the lagged dependent variable is also instrumented with its past levels and thus alleviates such concerns. Regarding the composition of our panel data, we find a short time dimension of 22 years and a larger country dimension of 153 countries. This type of panel-data demands for the use of the Arellano-Bond GMM estimator, which was specifically designed for small-T-large-N panels. In general, we prefer to work with panel data

[4]The use of external instruments in institutional analysis is scarce. Table B.1 in the appendix presents an overview of notable instruments that exist, none of which are suitable to instrument our three institutional dimensions, as they mainly instrument institutions for a particular geographic region (former colonies, countries with mainly rainfall-irrigated agriculture, China) and are thus not suitable for a panel that covers countries beyond this specific region. The remaining instruments are also not better suited for our analysis, since they capture broad institutional orders of e.g. European-style institutions and not specific sets of institutions such as the aimed at political, economic and societal institutions.

over cross-section data in our analysis, since panel data can address the issue of unobserved heterogeneity and thus has an advantage over cross-section. A GMM estimation is also especially suitable for our particular panel data, since we use an almost completely balanced panel. All common GMM estimations disregard the observations with missing values, which is not a concern with our dataset. Furthermore, in the estimation, we opt to replace our GMM-style instruments with their principal components. This approach has the advantage of an overall reduced instrument count, which strengthens the explanatory power of our coefficients. We also use a two-step estimation technique so that the standard covariance matrix is robust to panel-specific autocorrelation and heteroskedasticity, which is common in panel data (Mileva, 2007, pp. 6–7).

In all empirical studies that deal with economic growth and its determinants, it is also of merit to address potential concerns of omitted variable bias, which would imply that both our institutional variables as well as our GDP growth-variable could potentially be affected by time-varying omitted variables. This is especially problematic if we have too little controls. Since our dimension indices are aggregate indices that contain many variables that are commonly used as controls and since we use additional controls for trade and regime stability, we are confident that we can disregard major concerns of omitted variable bias in the analysis at hand.

We present our results in the following order: we begin by presenting the results for our hierarchy estimations in order to understand the effect of established political institutions as a fundamental framework, in which current political, economic and societal institutions take shape. Then, we take these current political, economic and societal institutions and investigate their effect on economic development proxied by GDP growth in order to draw conclusions as the mechanisms behind economic development. In a subsequent sensitivity analysis, we will present the results from the OLS estimations. Due to endogeneity concerns, we will not interpret the coefficients too much. But the results from the fixed and random effects OLS models will provide us with a corridor, in which the estimators of our GMM estimation should lie, and hereby load additional explanatory power onto the GMM estimation. We will also present our GMM estimations with a different time structure and with a different clustering of the standard errors as well as present an estimation using GDP levels as dependent variable.

# 4. Results

Table 3 follows the structure of our hierarchy of institutions. Our three institutional bundles are the dependent variables that we seek to explain with the lagged political institutional quality. We see that the coefficients for all three institutional bundles are positive and in the same range, although only the coefficients in the estimations with the control variables are consistently significant at the 1% level. In the estimations without control variables, the coefficient for PIQ does not have explanatory power, while the coefficients for EIQ and SIQ are again significant at the 1% level. Compared to the size of the coefficients for our institutional bundles, the effects of the control variables are, albeit significant, small. This might be due to the scaling of the variables. If we take the three estimations with control variables as a basis for our theoretical analysis, we see that the effect of the lagged political institutions is most pronounced for the current economic institutions, which include institutional factors surrounding financial freedom, business freedom, monetary freedom and freedom from corruption. Political institutional factors include aspects such as political rights, civil liberties and government spending patterns and it is intuitive that such aspects would hugely influence the economic institutional landscape. It is surprising however, that the influence of the lagged political institutions is smallest, in comparison, on the societal institutions, which in our dataset are represented by measures for health care, education, freedom of the press, environmental sustainability and equal participation. This establishes the following hierarchy: the political institutional environment provides a framework, in which current institutions take shape. In this process, the biggest influence is exerted on the economic institutions, followed by current political institutions, and the influence on the current societal institutions is the smallest. Therefore, if the lagged political institutions would be the prime underlying influencing factor of GDP growth, we should observe a particularly large influence of the economic institutions on GDP growth.

Tables 4 and 5 present the results for the regressions, in which we estimate the determinants of GDP growth. Table 4 does not contain interaction terms, while table 5 does. Other than that, the regression schematics are the same. In table 4, we find that the coefficients for all three institutional bundles are positive and significant at the 1% level if we add control variables. We also find significance in our control variables, but again we see that the explanatory values of the trade variables is small. This might again be due to the scaling of the variables. The coefficients for regime stability are larger, but not as large as the coefficients for our institutional bundles. They are all significant at

Table 3: Hierarchy Estimation

| VARIABLES | (1) PIQ | (2) PIQ | (3) EIQ | (4) EIQ | (5) SIQ | (6) SIQ |
|---|---|---|---|---|---|---|
| L.PIQ | 0.143 | 1.003*** | 1.096*** | 1.333*** | 1.084*** | 0.857*** |
| | (0.174) | (0) | (0) | (0) | (0) | (0) |
| Import | | 0.00000121*** | | -0.000356*** | | 0.0000832*** |
| | | (0) | | (0) | | (0) |
| Export | | -0.00000137*** | | 0.000355*** | | -0.0000731*** |
| | | (0) | | (0) | | (0) |
| Regime Stability | | 0.000892*** | | -0.0738*** | | 0.0112*** |
| | | (0) | | (0) | | (0) |
| Constant | 5.535*** | 0 | 0 | 0 | 0 | 0 |
| | (0.764) | (0) | (0) | (0) | (0) | (0) |
| Observations | 3,213 | 2,669 | 3,213 | 2,669 | 3,213 | 2,669 |
| Number of CC | 153 | 142 | 153 | 142 | 153 | 142 |

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

the 1% level, but carry the negative sign, which implies that GDP growth and regime stability have a negative relationship. It is true that regime change often brings about patterns of catch-up growth, which subsides after a new regime is established. This frequently happens in transitions from autocracy to democracy, but might also be true for within-democracy transitions, if a new government, maybe formed from members of a former opposition party who enter their new roles with economic reforms, stimulates growth. It is therefore intuitive, that the sign is negative; and note that the effect is not too pronounced. As for the institutional bundles, we see that the effects are almost equal in size. The effect is largest for the societal institutions, followed by the effect of the economic institutions and the political institutions. Combined with our findings from our hierarchy estimations, this implies that the effect of the lagged political institutions as the deep cause of growth is undoubtedly present, but not as pronounced since the societal institutions appear to be most conducive to growth, which is a finding in line with the empirical literature, and not the economic institutions, on which the influence of the underlying political institutions is the largest. This is, of course, a very nuanced interpretation of our data.

Table 4: GDP Growth Estimations

| VARIABLES | (1) G GDPpc | (2) G GDPpc | (3) G GDPpc | (4) G GDPpc | (5) G GDPpc | (6) G GDPpc |
|---|---|---|---|---|---|---|
| L.PIQ | 0.427*** | 0.512*** | | | | |
| | (0) | (0) | | | | |
| L.EIQ | | | 0.392*** | 0.532*** | | |
| | | | (0) | (0) | | |
| L.SIQ | | | | | -0.356*** | 0.600*** |
| | | | | | (0) | (0) |
| Import | | 0.00000103*** | | -0.0000249*** | | -0.0000104*** |
| | | (0) | | (0) | | (0) |
| Export | | -0.00000188*** | | 0.0000214*** | | 0.0000132*** |
| | | (0) | | (0) | | (0) |
| Regime Stability | | -0.0276*** | | -0.0315*** | | -0.0689*** |
| | | (0) | | (0) | | (0) |
| Constant | 0 | 0 | 0 | 0 | 4.802*** | 0 |
| | (0) | (0) | (0) | (0) | (0.000000000161) | (0) |
| Observations | 3,135 | 2,469 | 3,135 | 2,469 | 3,135 | 2,469 |
| Number of CC | 151 | 131 | 151 | 131 | 151 | 131 |

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

We now consider table 5, which contains the multiplicative interaction terms of our institutional bundles and the initial value of the natural logarithm of the GDP per capita. Note that the coefficients for the initial value of the natural logarithm of the GDP per capita have been dropped from estimations 2 and 4 for collinearity reasons. We still see that the coefficients for our non-interacted bundles remain positive and significant at the 1% level. The coefficients of the trade variables are still small, while the regime stability coefficients are again larger in size than the trade variables. Looking at the coefficients of the interaction terms, we find that they are all significant at the 1% level, but that they all carry the negative sign. This implies that the higher the initial level of GDP, the smaller the influence of the institutional dimensions on current GDP growth. Intuitively, this makes sense, since countries, which are endowed with a high level of GDP to begin with, already have on average a set of good institutions, so that there is not much room for an increase in institutional quality. The coefficients for the interaction terms are again very similar in size; considering only the estimations with the controls, we find the interacted EIQ-coefficient to have the largest magnitude and the one for PIQ to have the smallest. Overall, the negative coefficients for the interacted variables hint at a necessary distinction with respect to the level of development of a country, illustrated with the example of societal institutions: The higher the initial level of GDP, the smaller is the influence of social institutional quality on GDP growth. This is intuitive, since high GDP per capita countries oftentimes display a high societal institutional quality, while poorer countries oftentimes lack a full set of societal institutions in terms of education, health

care, participation and environmental sustainability. Therefore, in future analyses, it is of merit to compare countries within their developmental peer group.

Table 5: GDP Growth Estimations with interaction terms

| VARIABLES | (1) G GDPpc | (2) G GDPpc | (3) G GDPpc | (4) G GDPpc | (5) G GDPpc | (6) G GDPpc |
|---|---|---|---|---|---|---|
| L.PIQ | 1.281*** | 0.565*** | | | | |
| | (0) | (0.000000000737) | | | | |
| L.PIQxln GDPpc (1990) | -0.103*** | -0.0732*** | | | | |
| | (0) | (0.0000000000927) | | | | |
| L.EIQ | | | 1.260*** | 1.604*** | | |
| | | | (0) | ( 0.000000000183) | | |
| L.EIQxln GDPpc (1990) | | | -0.102*** | -0.145*** | | |
| | | | (0) | (0) | | |
| L.SIQ | | | | | 2.056*** | 1.319*** |
| | | | | | (0.000000000244) | (0.000000000402) |
| L.SIQxln GDPpc (1990) | | | | | -0.108*** | -0.135*** |
| | | | | | (0) | (0.0000000000595) |
| ln GDPpc (1990) | | | | | -0.594*** | |
| | | | | | (0.000000000224) | |
| Import | | 0.00000796*** | | -0.0000209*** | | -0.0000184*** |
| | | (0) | | (0) | | (0) |
| Export | | -0.00000120*** | | 0.0000259*** | | 0.0000227*** |
| | | (0) | | (0) | | (0) |
| Regime Stability | | 0.0513*** | | -0.0244*** | | 0.0240*** |
| | | (0.0000000000561) | | (0) | | (0) |
| Constant | 0 | 0 | 0 | 0 | 0 | 0 |
| | (0) | (0) | (0) | (0) | (0) | (0) |
| Observations | 2,854 | 2,469 | 2,854 | 2,469 | 2,854 | 2,469 |
| Number of cc | 136 | 131 | 136 | 131 | 136 | 131 |

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

In that respect, the marginal effects are noteworthy. Inserting the estimated coefficients into the first derivative of the estimation equation gives the marginal effect of a rise, in this example case in the level of PIQ, for any given level of the natural logarithm of initial GDP per capita:

$$\frac{d(GGDPpc_{i,t})}{dPIQ_{i,t-1}} = 0.565 - 0.0732 * lnGDPpc(1990),$$

and this is positive for any $lnGDPpc(1990) < 7.7$. That is, for any country the initial natural log of the GDP per capita is lower than 7.7, a marginal increase in the level of political institutional quality raises the level of GDP per capita growth. If the initial natural logarithm of the GDP per capita is higher, we observe a decrease in GDP per capita growth. The marginal effect of a rise of SIQ is positive for any $lnGDPpc(1990) < 9.77$ and in case of the EIQ, it is true for any $lnGDPpc(1990) < 11.06$. In our dataset, the highest value of ln GDPpc (1990) can be found in the United Arab Emirates with

11.1, followed by Luxembourg and Switzerland, while Myanmar can be found at the bottom of the list with a value of 5.2, preceded by Ethiopia and Mozambique.

We conduct various tests to control the validity of our results. The Arellano-Bond test for autocorrelation has a null hypothesis of no autocorrelation. The test for AR(1) processes rejects the null hypothesis across our specifications, which is desired as we need this kind of autocorrelation to establish a relationship in the first lag. The test for AR(2) processes still finds autocorrelation in some of our specifications, which is not ideal. As for the Sargan test for instrument validity in our GMM estimations, Roodman (2009) states that the p-values should be above 0.05, ideally greater than 0.1, less than 0.25. We find mixed results for this test across our estimations, and therefore must assume that some of our instruments are not completely exogenous. Therefore, we resort to a sensitivity analysis to corroborate our results.

# 5. Sensitivity Analysis

We start our sensitivity analysis by presenting results from simple OLS estimations with fixed effects and robust standard errors. Due to endogeneity concerns, we will not interpret the coefficients per se too much, but rather the pattern that we see to possibly load some more explanatory value to our GMM results. Table 6 presents the results from the OLS fixed effects model, table 7 presents the results from the OLS random effects model.

Table 6: OLS estimation with fixed effects

| VARIABLES | (1) G GDPpc | (2) G GDPpc | (3) G GDPpc | (4) G GDPpc | (5) G GDPpc | (6) G GDPpc |
|---|---|---|---|---|---|---|
| L.PIQ | -0.176 | 3.418*** | | | | |
| | (0.275) | (1.259) | | | | |
| L.PIQ x ln GDPpc (1990) | | -0.399*** | | | | |
| | | (0.148) | | | | |
| L.EIQ | | | -0.660** | 1.205 | | |
| | | | (0.286) | (1.333) | | |
| L.EIQ x ln GDPpc (1990) | | | | -0.192 | | |
| | | | | (0.167) | | |
| L.SIQ | | | | | 0.773 | 6.782*** |
| | | | | | (0.767) | (1.735) |
| L.SIQ x ln GDPpc (1990) | | | | | | -0.859*** |
| | | | | | | (0.217) |
| Controls | NO | YES | NO | YES | NO | YES |
| Constant | 2.512 | 1.383 | 5.888*** | 4.384** | -3.875 | 3.952 |
| | (1.737) | (2.007) | (1.801) | (1.892) | (5.416) | (3.803) |
| Observations | 3,135 | 2,469 | 3,135 | 2,469 | 3,135 | 2,469 |
| R-squared | 0.072 | 0.103 | 0.077 | 0.101 | 0.073 | 0.107 |
| Number of CC | 151 | 131 | 151 | 131 | 151 | 131 |

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

While the coefficients for the institutional bundles in the estimations without controls are not significant in case of the political and societal institutions, they are statistically significant at the 1% level in the estimations with controls and interaction terms. We observe the same pattern as in the GMM estimations: we see a coefficient for the singular institutional bundle carrying a positive sign and we see a coefficient for the interaction term carrying a negative sign. Only the dimension of economic institutions deviates from this pattern. In the estimation without controls, the singular coefficient is negative and significant at the 5% level. In the estimation with the interaction term, the signs match the pattern that we already observed in the GMM estimations and for PIQ and SIQ in the OLS estimations, but the coefficients are not significant. Note that the effect of the societal institutions on GDP per capita is larger than the effect of the political institutions, which is in line with our previous findings.

We further our sensitivity analysis by altering the time structure of our estimations, again with GMM estimations. Table 7 presents the estimation results of our baseline model with GDP growth as dependent variable and the institutional bundles as explanatory variables, where the explanatory variables are included in their fourth lag. The intuition

here is that the growth enhancing effect of the institutions takes time to manifest itself. The number of lags was chosen with respect to the stereotypical economic cycle, which lasts between three and five years as well as with respect to electoral cycles, which also last four or five years in many electoral systems around the world. As a side effect, this approach helps once more to alleviate concerns of endogeneity.

The number of observations drops when using the fourth lag, since we use less years in the analysis. Other than that, we again see that the pattern of significance and signs does not change compared to the estimations in the first lag. Even the coefficients are in the same size range, but they are not consistently smaller or larger than their first-lag counterparts. We still see the familiar pattern of positive coefficients for the singular dimensions, in estimations with and without controls, and we see the negative coefficients in the estimations with the interaction terms. This hints at robust results that are not too sensitive with regard to the time structure.

To address unobserved heterogeneity and possible autocorrelation in the residuals, we now cluster our standard errors on the country level. Table 8 presents the results from the respective GMM regressions. Overall, the pattern of positive and negative signs across the singular and interacted coefficients remains unchanged. What has changed however, is the statistical significance, which varies across the specifications, and the size range of the coefficients is larger than before. In the estimations that yield significant coefficients, we see again the familiar patterns that we have been able to observe throughout the analysis.

Table 7: GMM estimation with altered time structure

| VARIABLES | (1) G GDPpc | (2) G GDPpc | (3) G GDPpc | (4) G GDPpc | (5) G GDPpc | (6) G GDPpc |
|---|---|---|---|---|---|---|
| L4.PIQ | 1.156*** | 1.076*** | | | | |
| | (0.000000000871) | (0.000000000145) | | | | |
| L4.PIQ x ln GDPpc (1990) | -0.111*** | -0.126*** | | | | |
| | (0.0000000000637) | (0) | | | | |
| L4.EIQ | | | 0.646*** | 0.801*** | | |
| | | | (0.0000000000809) | (0.0000000000853) | | |
| L4.EIQ x ln GDPpc (1990) | | | -0.0842*** | -0.0744*** | | |
| | | | (0) | (0) | | |
| L4.SIQ | | | | | 1.062*** | 1.382*** |
| | | | | | (0.0000000000940) | (0.0000000000708) |
| L4.SIQ x ln GDPpc (1990) | | | | | -0.0850*** | -0.122*** |
| | | | | | (0) | (0) |
| Controls | | YES | | YES | | YES |
| Constant | 0 | 0 | 0 | 0 | 0 | 0 |
| | (0) | (0) | (0) | (0) | (0) | (0) |
| Observations | 2,446 | 2,152 | 2,446 | 2,152 | 2,446 | 2,152 |
| Number of CC | 136 | 131 | 136 | 131 | 136 | 131 |

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 8: GMM estimation with standard errors clustered at the country level

| VARIABLES | (1) G GDPpc | (2) G GDPpc | (3) G GDPpc | (4) G GDPpc | (5) G GDPpc | (6) G GDPpc |
|---|---|---|---|---|---|---|
| L.PIQ | 1.281*** | 0.565*** | | | | |
| | (0.0000256 | (0.000120) | | | | |
| L.PIQ x ln GDPpc (1990) | -0.103*** | -0.0732 | | | | |
| | (0.00000321) | | | | | |
| L.EIQ | | | 1.260 | 1.604*** | | |
| | | | | (0.000533) | | |
| L.EIQ x ln GDPpc (1990) | | | -0.102 | -0.145*** | | |
| | | | | (0.0000650) | | |
| L.SIQ | | | | | 2.056*** | 1.319 |
| | | | | | (0.0000109) | |
| L.SIQ x ln GDPpc (1990) | | | | | -0.108*** | -0.135 |
| | | | | | (0.000000539) | |
| Controls | NO | YES | NO | YES | NO | YES |
| Constant | 0 | 0 | 0 | 0 | 0 | 0 |
| | (0) | (0) | (0) | (0) | (0) | (0) |
| Observations | 2,854 | 2,469 | 2,854 | 2,469 | 2,854 | 2,469 |
| Number of CC | 136 | 131 | 136 | 131 | 136 | 131 |

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Finally, in our sensitivity analysis, we alter our dependent variable to the GDP level instead of growth and present the results from estimations with the natural logarithm of the GDP per capita as dependent variable in table 9.

Using logs, or summarizing changes in terms of continuous compounding allows for a very straightforward interpretation of the results. Since our panel is rather short with only 22 years, the results from table 9 should be interpreted more in line with a cross-sectional analysis. Only longer panels would allow for meaningful interpretations regarding economic growth patterns. Since we have estimated a log linear model, we see for example in column two that the singular coefficient for PIQ is 0.287, that means that a one unit increase in PIQ one year ago leads to a 28.7 percent increase in the GDP level (not growth). This result is massive in size, but we need to keep in mind that the PIQ, and also the EIQ and SIQ, does not vary much, and that its scale runs from 1-10, so therefore a 1 unit increase is a lot more pronounced on a 1-10 scale than compared to a 1-100 scale. If we were to multiply our PIQ-values by 10, then we would see a coefficient of 0.0287 and thus a 2.87 percent increase. We see positive and significant coefficients for our singular dimensions in our estimations with controls, and we also see positive and significant coefficients for our interaction term, and thus quite a change compared to all previous results. Keeping in mind that we do not seek to explain GDP growth in this particular setting, but that the level of GDP is our dependent variable, the result is intuitive, especially in an almost cross-sectional environment, as an increase

in institutional quality will increase the level of GDP, especially over time.

Throughout our various sensitivity analyses, we saw a positive effect of our institutional bundles on GDP growth and on the GDP level. Also, the interpretation of our interaction terms was intuitive and matched the pattern that we saw in our main analysis. In our sensitivity analysis, while the coefficients were oftentimes similar in size, we never saw the EIQ dimensions to have the most pronounced influence on the economic development. If anything, the behavior of the EIQ coefficients was slightly erratic. This is noteworthy since the political institutions, as the fundamental cause of economic development, have the biggest impact on the economic institutions, which are apparently not most conducive to the economic development variables in our panel.

Table 9: GMM estimation with GDP levels as dependent variable

| VARIABLES | (1)<br>ln GDPpc | (2)<br>ln GDPpc | (3)<br>ln GDPpc | (4)<br>ln GDPpc | (5)<br>ln GDPpc | (6)<br>ln GDPpc |
|---|---|---|---|---|---|---|
| L.PIQ | -0.335*** | 0.287*** | | | | |
| | (0) | (0.0000000000517) | | | | |
| L.PIQ x ln GDPpc (1990) | 0.0813*** | 0.111*** | | | | |
| | (0) | (0) | | | | |
| L.EIQ | | | 0.926*** | 0.781*** | | |
| | | | (0) | (0.000000000373) | | |
| L.EIQ x ln GDPpc (1990) | | | 0.0423*** | 0.0351*** | | |
| | | | (0) | (0.0000000000515) | | |
| L.SIQ | | | | | 0.124*** | 0.504*** |
| | | | | | (0.000000000169) | (0.000000000351) |
| L.SIQ x ln GDPpc (1990) | | | | | -0.00257*** | 0.103*** |
| | | | | | (0) | (0.0000000000503) |
| Controls | NO | YES | NO | YES | NO | YES |
| Constant | 6.241*** | 0 | 0 | 0 | 0 | 0 |
| | (0.0000000000562) | (0) | (0) | (0) | (0) | (0) |
| Observations | 2,854 | 2,469 | 2,854 | 2,469 | 2,854 | 2,469 |
| Number of CC | 136 | 131 | 136 | 131 | 136 | 131 |

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

# 6. Further Research and Conclusion

In our analysis, we were able to shed light on hierarchies of institutions in the institutions and economic growth nexus. We found that while established political institutions exert most influence on present-day economic institutions, societal institutions are most conducive to economic growth. We were also able to establish a direct link of political institutions to economic growth, which is debated in the scientific discourse. Even though the societal institutions exert the largest influence on economic development in our panel, the influence of economic and political institutions is also positive and significant. If we therefore assume that all of these institutional dimensions are indeed growth-enhancing, one important question remains: What is the specific role of "democracy" in all of this, as non-democracies also can, and do, invest in public goods and implement economic and political reforms, ending up with institutional settings such as the ones that we analyzed. Acemoglu et al. conclude that non-democracies are simply "less likely to do so than democracies" (Kurzman et al., 2002, p. 51). The underlying issue here is the notion of credible commitment. While a democratic regime can credibly commit to uphold an institution such as for example access to health-care, an autocratic regime cannot. In our analysis, we took a step back from such considerations and focused on the status quo, but for a future analysis, it might be very interesting to include a measurement for trust in governmental structures in our estimations and to link this to the institutions-growth-nexus to determine if institutions have a more pronounced effect on growth in an environment in which the citizens trust the government or if the reverse is the case or if there is no connection at all, and the institutions are at work completely removed from the citizens of a country.

Our study yields promising results, not only with regard to the hierarchy of institutions in the growth context, but it also reveals that there is merit to a bundled approach since we can distinguish the effects of political, economic and societal institutions. Despite its promising results, the study does have inherent limitations. We are aware that when we study the effect of institutions on growth, we are assuming a specific direction of causality. Also, with our panel data estimation, we implicitly assume a parallel trend of our variables. Of course, we are aware that there is evidence that points to the contrary, which demands further investigation. Even though the concerns surrounding endogeneity have been addressed in the study at hand and some have been alleviated, omitted variable bias remains a possible source of endogeneity. Especially considering the heterogeneous set of 153 countries covered, possible omitted variable bias should

be addressed in future research in connection with our institutional bundles. Studying clusters of countries could help to alleviate the concern of omitted variable bias. Possible clusters of countries that could be worth analyzing in the institutional context include the the group of oil exporting countries in connection with the resource curse, or different groups of developing countries in different geographical regions, such as Sub-Saharan Africa or Latin America, in the growth context. In conclusion, while this study is able to account for interesting tendencies, it also provides a good template to study panels comprised of less heterogeneous countries.

# References


Acemoglu, D., & Johnson, S. (2005). Unbundling institutions. *Journal of Political Economy*, *113*(5), 949–995. https://doi.org/10.1086/432166

Acemoglu, D.,/Naidu, S.,/Restrepo, P., & Robinson, J. A. (2014). Democracy, technology, and growth. *National Bureau of Economic Research*. http://www.nber.org/papers/w13180

Acemoglu, D.,/Naidu, S.,/Restrepo, P., & Robinson, J. A. (2019). Democracy does cause growth. *Journal of Political Economy*, *127*(1), 47–100. https://doi.org/10.1086/700936

Barro, R. J. (1996). Democracy and growth. *Journal of Economic Growth*, *1*(1), 1–27. https://doi.org/10.1007/BF00163340

Barro, R. J. (1999). Human capital and growth in cross-country regressions. *Swedish Economic Policy Review*, *6*(2), 237–276. http://hassler-j.iies.su.se/conferences/papers/BARRO.PDF

Baum, M. A., & Lake, D. A. (2003). The political economy of growth: Democracy and human capital. *American Journal of Political Science*, *47*(2), 333–347. https://doi.org/10.1111/1540-5907.00023

Beck, T.,/Clarke, G.,/Alberto, G.,/Keefer, P., & Walsh, P. (2001). New tools in comparative political economy: The database of political institutions. *World Bank Economic Review.*, *15*(1), 165–176. https://doi.org/10.1093/wber/15.1.165

Brückner, M., & Ciccone, A. (2011). Rain and the democratic window of opportunity. *Econometrica*, *79*, 923–947. https://doi.org/https://doi.org/10.3982/ECTA8183

Colagrossi, M.,/Rossignoli, D., & Maggioni, M. A. (2020). Does democracy cause growth? a meta-analysis (of 2000 regressions). *European Journal of Political Economy*, *61*, 101824. https://doi.org/10.1016/j.ejpoleco.2019.101824

Doucouliagos, H., & Ulubasoglu, M. A. (2008). Democracy and economic growth: A meta-analysis. *American Journal of Political Science*, *52*(1), 61–83. https://doi.org/10.1111/j.1540-5907.2007.00299.x

Eicher, T., & Schreiber, T. (2010). Institutions and growth: Time series evidence from natural experiments. *Journal of Development Economics*, *91*, 169–179.

Eicher, T. S., & Leukert, A. (2009). Institutions and economic performance: Endogeneity and parameter heterogeneity. *Journal of Money, Credit and Banking*, *41*(1), 197–219. https://doi.org/10.1111/j.1538-4616.2008.00193.x

Flachaire, E.,/Garcia-Penalosa, C., & Konte, M. (2014). Political versus economic institutions in the growth process. *Journal of Comparative Economics*, *42*(1), 212–229. https://doi.org/10.1016/j.jce.2013.05.001

Gasiorowski, M. J. (2000). Democracy and macroeconomic performance in underdeveloped countries: An empirical analysis. *Comparative Political Studies*, *33*(3), 319–349. https://doi.org/10.1177/0010414000033003002

Gerring, J.,/Bond, P.,/Barndt, W. T., & Moreno, C. (2005). Democracy and economic growth: A historical perspective. *World Politics*, *57*(3), 323–364. https://doi.org/10.1353/wp.2006.0002

Giavazzi, F., & Tabellini, G. (2005). Economic and political liberalizations. *Journal of Monetary Economics*, *52*(7), 1297–1330. https://doi.org/10.1016/j.jmoneco.2005.05.002

Glaeser, E. L.,/La Porta, R.,/Lopez-de-Silanes, F., & Shleifer, A. (2004). Do institutions cause growth? *Journal of Economic Growth*, *9*(3), 271–303. https://doi.org/10.1023/b:joeg.0000038933.16398.ed

Helfer, H. (2017). Prosperity-enhancing institutions: Towards a comprehensive composite index. *Social Indicators Research*, *134*(3), 805–845. https://doi.org/10.1007/s11205-016-1466-3

Huntington, S. P. (1991). *The third wave: Democratization in the late twentieth century*. University of Oklahoma Press, Norman, OK.

Justesen, M. K., & Kurrild-Klitgaard, P. (2013). Institutional interactions and economic growth: The joint effect of property rights, veto players and democratic capital. *Public Choice*, *157*(3), 449–474. https://doi.org/10.1007/s11127-013-0143-1

Krieckhaus, J. (2004). The regime debate revisited: A sensitivity analysis of democracy's economic effect. *British Journal of Political Science*, *34*(4), 635–655. https://doi.org/10.1017/s0007123404000225

Kurzman, C.,/Werum, R., & Burkhart, R. E. (2002). Democracy's effect on economic growth: A pooled time-series analysis, 1951-1980. *Studies in Comparative International Development*, *37*(1), 3–33. https://doi.org/10.1007/bf02686336

Lipset, S. M. (1959). Some social requisites of democracy: Economic development and political legitimacy. *American Political Science Review*, *53*(1), 69–105. https://doi.org/10.2307/1951731

Madsen, J. B.,/Raschky, P. A., & Skali, A. (2015). Does democracy drive income in the world, 1500–2000? *European Economic Review*, *78*, 175–195. https://doi.org/10.1016/j.euroecorev.2015.05.005

Mileva, E. (2007). Using arellano-bond dynamic panel gmm estimators in stata. *Working Paper, Fordham Univeristy.*

Minier, J. A. (2007). Nonlinearities and robustness in growth regressions. *American Economic Review*, *97*(2), 388–392. https://doi.org/10.1257/aer.97.2.388

Murtin, F., & Wacziarg, R. (2014). The democratic transition. *Journal of Economic Growth*, *19*(2), 141–181. https://doi.org/10.1007/s10887-013-9100-6

North, D. C. (1990). *Institutions, institutional change and economic performance*. Cambridge University Press.

Oliva, M. A., & Rivera-Batiz, L. A. (2002). Political institutions, capital flows, and developing country growth: An empirical investigation. *Review of Development Economics*, *6*(2), 248–262. https://doi.org/10.1111/1467-9361.00152

Papaioannou, E., & Siourounis, G. (2008). Democratisation and growth. *The Economic Journal*, *118*(532), 1520–1551. https://doi.org/10.1111/j.1468-0297.2008.02189.x

Persson, T. (2004). Consequences of constitutions. *Journal of the European Economic Association*, *2*(2-3), 139–161. https://doi.org/10.1162/154247604323067907

Persson, T. (2005). *Forms of democracy, policy and economic development* (tech. rep.). National Bureau of Economic Research. https://doi.org/10.3386/w11171

Persson, T., & Tabellini, G. (2006). Democracy and development: The devil in the details. *American Economic Review*, *96*(2), 319–324. https://doi.org/10.1257/000282806777212396

Portes, A., & Smith, L. D. (2008). Institutions and development in latin america: A comparative analysis. *Studies in Comparative International Development*, *43*(2), 101–128. https://doi.org/10.1007/s12116-008-9019-7

Rodrik, D., & Wacziarg, R. (2005). Do democratic transitions produce bad economic outcomes? *AEA Papers and Proceedings*, *95*(2), 50–55. https://doi.org/10.1257/000282805774670059

Roland, G. (2004). Understanding institutional change: Fast-moving and slow-moving institutions. *Studies of Comparative International Development*, *38*(4), 109–132. https://doi.org/10.1007/bf02686330

Tridico, P. (2010). Growth, inequality and poverty in emerging and transition economies. *Transition Studies Review*, *16*(4), 979–1001. https://doi.org/10.1007/s11300-009-0116-8

Williamson, O. E. (2000). The new institutional economics: Taking stock, looking ahead. *Journal of Economic Literature*, *38*(3), 595–613. https://doi.org/10.1257/jel.38.3.595

# Appendices

## A. Pairwise Correlations

Table A.1: Pairwise Correlations

| Variables | PIQ | EIQ | SIQ | Import | Export | Regime Stability | ln GDPpc |
|---|---|---|---|---|---|---|---|
| PIQ | 1.000 | | | | | | |
| EIQ | 0.695 | 1.000 | | | | | |
| SIQ | 0.774 | 0.654 | 1.000 | | | | |
| Import | 0.305 | 0.322 | 0.331 | 1.000 | | | |
| Export | 0.317 | 0.347 | 0.367 | 0.976 | 1.000 | | |
| Regime Stability | 0.595 | 0.553 | 0.689 | 0.474 | 0.518 | 1.000 | |
| ln GDPpc | 0.581 | 0.626 | 0.737 | 0.421 | 0.490 | 0.678 | 1.000 |

## B. External Instruments in Institutional Analysis

Table B.1: Instruments in Institutional Analysis.

| **Authors** | **Instrument** | **Intuition** |
|---|---|---|
| Acemoglu et al. (2001) | Settler Mortality | Low mortality rates were an incentive for long-run settlements and therefore investments in good institutions |
| Fang & Zhao (2007) | Enrollment in Christian Missionary Schools | China's "modernization" was based on western ideas, enrollment reflects western influence in the early 20th century |
| Hall & Jones (1998) | Characteristics of Geography | Europeans were more likely to settle in areas with a similar climate |
| Hall & Jones (1998) | % of Western European Languages as a mother tongue | "correlation seems perfectly natural" |
| Mauro (1995) | Ethnolinguistic Fractionalization | Individualism vs collectivism |
| Miguel et al. (2004) | Rainfall Variation | In economies that agriculturally largely depend on rainfall, weather shocks influence GDP growth |

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