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GLOBALIZATION, ECONOMIC GROWTH, AND SPILLOVERS: A SPATIAL ANALYSIS.

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Abstract:

This paper seeks to deepen our understanding of the globalization-growth nexus as it extends the investigation to using a spatial econometric approach, hitherto has been rarely used in the globalization literature. The objective of the paper is to uncover not only the significant growth-effects of globalization, but also the possible spillover effects of globalization onto neighbouring countries. Using a panel dataset of 83 countries and 30-year period and via a spatial autoregressive panel data method, this paper estimates a standard growth model augmented with a parameter to capture the countries' spatial dependence, whilst controlling for globalization indices. The findings indicate a positive effect of economic globalization and the effect is dependent upon the political settings in the countries under study. The spillover effects of globalization across neighbouring countries are shown, both in geographical and institutional spheres. The paper concludes with some policy recommendations.

Keywords: globalization, economic growth, institutional quality, spatial autoregressive model.

JEL code: F63, C31

1. Introduction and background

"It has been said that arguing against globalization is like arguing against the laws of gravity"
Kofi Annan, the former Secretary General of the United Nations, is once reported to have said this statement.² Globalization is apparently one of the many highly debated topics in the growth and development literature. Theoretically, globalization has many positive effects on growth via various mechanisms such as increased knowledge spillovers between countries, greater economies of scale, innovation potentials due to specialization, effective allocation of domestic resources, diffusion of technology, improvement in factors productivity and augmentation of capital.

Notwithstanding the theoretical arguments above, the empirical findings on the globalization-growth nexus are still far from conclusive, as have been discussed by Grossman & Helpman (2015), and Samimi & Jenatabadi (2014). Generally, empirical studies on the effects of globalization on growth can be divided into three general groups, firstly studies with findings that are supportive of the positive effects of globalization on growth, secondly studies that are postulating the adverse effects of globalization on growth, and finally studies that argue that the positive growth-effects of globalization are dependent upon complementary policies.

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² See here <https://www.theglobalist.com/kofi-annan-on-global-futures/>

Studies in this first group, for example that of Dollar (1992), Sachs, Warner, Aslund, & Fischer (1995) and Edwards (1998), are able to show the positive growth-effects of globalization using various de facto indices of globalization, namely trade openness and foreign capital inflows. On the contrary, studies arguing against the positive effects of globalization on growth reject the existing evidence which according to them are weak and non-robust. For example, Rodriguez & Rodrik (2000), who refute the findings of Dollar (1992), Sachs, et al. (1995) and Edwards (1998), argue their evidence are weak due to omission of some important growth indicators and the use of questionable trade openness index. Alesina & Perotti (1994), Rodrik (1998), and Stiglitz (2004) too have expressed their reservations on the potential growth improvement driven by mechanisms related to globalization. Finally, there are studies arguing that the positive growth-effects of globalization are dependent upon the presence of complementary policies in the globalizing countries. For example, sufficient stock of human capital could enhance the positive effect of FDI, as shown by Borensztein et al. (1998). In addition, structural policies relating to education, infrastructure, institutions, regulatory framework, among others, could be a determining factor to generate positive globalization effect (Calderón & Poggio, 2010).

With regard to indicators of globalization, arguably the most widely-used indicator is the KOF index of globalization first introduced by Dreher (2006) and continuously updated by Dreher, Gaston, & Martens (2008). KOF is a comprehensive index of globalization that comprises three dimensions namely economic, political and social globalization. As is stated by Dreher (2006), this index in general captures the major ideas in a globalization process such as creating new networks among economic actors worldwide, mediated by a variety of inflows like capital, culture, goods, people, information and ideas. It is a process that erodes national boundaries, integrates national economies, cultures, technologies and governance, and produce a complex relation of mutual interdependence.

In his panel study on 123 countries for year 1970-2000, Dreher finds that globalization has positive effects on growth, especially the economic and social dimensions. Political dimension however has no significant growth-effect. Using KOF index of globalization in 21 African countries for year 1970–2005, Rao & Vadlamannati (2011) find similar positive effects of globalization on growth. The positive finding is also supported by Gurgul & Lach (2014)'s study on ten CEE economies. Samimi & Jenatabadi (2014) too find positive significant effects of economic globalization in selected OIC countries, however they argue that the effect is dependent upon the level human capital and financial development.

Arguably, the mixed findings could be the result of different sample of countries and period specifications used in the studies, various econometric techniques, as well as the presence of unobserved country-specific effects biasing the final results. As pointed by Samimi and Jenatabadi (2014), majority of the literature in the field of globalization used trade or foreign capital volume as the de facto indices of globalization to investigate its impact on economic growth. The issue with these de facto indices is that they do not proportionally capture trade and financial globalization policies. Apart from trade and

volume of capital inflows, the rate of protections and tariff also need to be accounted since they are policy-based variables capable to reflect the degree of trade restrictions in a country.

This paper revisits the globalization-growth nexus by extending the analysis into the spatial effect of globalization using spatial econometric estimation method. The spatial weight matrices used in this study comprise of both geographical and institutional matrices. The use of geographical matrices is pretty unambiguous since globalization processes are frequently shown to occur across countries located within the same clusters of area, region, or economic club. Additionally, the geographical distance is widely used as a natural proxy for transportation costs and technological transfers, a common feature in the globalization process. On the other hand, the use of institutional matrix is somewhat of a recent vintage in the spatial studies, and apparently rarely investigated in the globalization-growth nexus. The use of institutional matrices is derived from the concept of institutional proximity, discussed in Ahmad & Hall (2017), to distinguish a group of countries sharing similar institutional qualities.³

Against these backdrops, the research questions this study seeks to answer are: “Does globalization significantly determine growth? Is globalization capable of generating a spillover effect onto the neighbors’ economic performance? What is the role of institutional quality in the globalization-growth relationship? Does globalization propagate its spillover effect to countries sharing similar institutional qualities? Whilst the first question is rather straightforward, the latter three dig deeper into the possible globalization spillover effects across neighbouring countries, notwithstanding the definitions of “neighbor” either by geographical distance or via an institutional proximity of the countries under study.

Ultimately, this study seeks to contribute to our understanding on the globalization process via a spatial econometric analysis with the aim of uncovering the effects of globalization on growth and spillovers. This constitutes a major contribution of this study to the existing globalization-growth literature. The other contributions are, apart from relying on the geographical distance in capturing the spillover effects of globalization, this study also utilizes the concept of institutional proximity in investigating the possible globalization spillover effects across a group of countries with similar institutional characteristics. Finally, the panel dataset of 83 countries for year 1985-2014 used in this study is arguably extensively large and sufficiently able to yield robust answers to the above questions.

In general, the findings of this study indicate that economic globalization has positive significant effect on growth, whereas political and social institutions do not. This result is consistent even when institutional quality is controlled for. Furthermore, economic globalization is shown to be dependent on the complementary political settings in the countries under study. Economic globalization is also shown to have indirect spillover effects supporting the growth performance of geographically closer countries or countries sharing similar institutional characteristics.

³ Apparently, there is an increasing number of studies seeking to capture non-geographical interdependence based on institutional qualities, network of interactions, shared characteristics or historical ties. See for example Ahmad & Hall (2012a, 2012b, 2017), Arbia, Battisti, & Di Vaio (2010); and Beck, Gleditsch, & Beardsley (2006).

The study proceeds as follows: Section 2 discusses the globalization-growth spatial model, followed by Section 3 discussing the data sources and estimation strategy. Section 4 interprets the results and Section 5 concludes.

2. Globalization-growth spatial model

Consider a simple growth model based on Barro, (1991) as follows:

$$g_{it} = \alpha_i + X_{it}\beta + \gamma_t + \varepsilon_{it} \quad (1)$$

where g_{it} is the average growth rate of GDP per capita in country i measured over five-year interval, X is a vector of explanatory variables that includes three globalization indices, two institutional quality variables to reflect economic and political institutions respectively, and some commonly used variables controlling for other growth determinants. Meanwhile α_i captures the unobserved country specific effect, γ_t the time effects and ε_{it} represents the corresponding disturbance term where $\varepsilon \sim N(0, \sigma^2 I)$. The control variables included in the vector X are commonly used determinants of growth, namely initial level of real GDP per capita (in natural logarithmic form) proxied by the first period real GDP per capita for each of the five-year intervals of our dataset. This inclusion is meant to capture the convergence process and the coefficient for initial GDP per capita is expected to be negative to show the catching-up by the countries to their steady state growth level. Investment level, population growth rate, education (to reflect the level human capital) and inflation rate (as a proxy of macroeconomic policy) are among the control variables included in the growth model.

To account for the spatial dependence in the growth process, Equation (1) is expanded with the error structure as the following:

$$\varepsilon_{it} = \lambda W\varepsilon_{it} + u_{it} \quad (2)$$

where W is the spatial weight matrix capturing the spatial connections between the countries, λ is a spatial autoregressive parameter, ε_{it} is the spatially correlated errors, and u_{it} is the spatial disturbance term with i.i.d. properties. Equation (1) with error process of Equation (2) is normally called as spatial error model (SEM) where the spatial dependence operates via the residuals, since the dependency is assumed to be present in the error terms due to the omission of some unobserved variables that can be spatially correlated. Nevertheless, by this definition, it also renders the spatial spillovers a “nuisance” factor which rather makes the spatial effect a relatively less important in the model (Arbia et al. 2010).

To model a more substantive spatial effect, spatial autoregressive model (SAR) is frequently used, as the following:

$$g_{it} = \alpha_i + X_{it}\beta + \rho Wg_{it} + \gamma_t + u_{it} \quad (3)$$

Equation (3) is an augmented model of Equation (1) with the presence of the term ρWg_{it} among the right hand side variables. This term, called spatially lagged dependent variable, captures the countries' spatial dependence in a more substantive manner, and shows that the growth rates of home country depend, in part, to weighted average of the “neighbours” growth rates.⁴ Apart from the variables capturing globalization and institutional quality in the model, this term will be another variable of interest in this study. Its coefficient, rho (ρ) shows the size of growth spillovers between neighbours and the sign of ρ if positive (negative) indicates countries with similar (dissimilar) levels of growth would cluster together. Although SAR model seems to be the preferred model over SEM, to decide which of the two models that best suited our data, we refer to Lagrange Multiplier (LM) statistics which will be explained further in the estimation strategy discussion.

W in the Equation (3) above is the weight matrix to conceptualise the spatial dependence between the countries and, as earlier discussed, matrices based on geographical and institutional proximities are used. For geographical matrices, three measures are used firstly a simple binary contiguity matrix where countries are defined as neighbours if they share common borders and this matrix is denoted w_contig (therefore its element, $w_{ij} = 1$ if the country i and j have common borders, $w_{ij} = 0$ otherwise).⁵ Secondly, k -nearest regions matrix and k is set to equal to five, beyond which the spatial dependence is considered negligible, and it is denoted as w_knn (its element, $w_{ij} = 1$ if the country j are located within 5 nearest regions to country i , $w_{ij} = 0$ otherwise). Finally, an inverse squared distance matrix based on the concept of exponential distance decay, and denoted as w_invsq . The distance calculation for both w_knn and w_invsq matrix is done via Great Circle distance computation using latitude and longitude coordinates of the countries' capitals (Le Gallo and Ertur, 2003).⁶ For matrix w_invsq , a cut-off distance is specified at a minimum threshold which will guarantee that each country in the sample will have at least one neighbour, therefore the element of w_invsq is given by $w_{ij} = d_{ij}^{-2} / \sum_j d_{ij}^{-2}$ if $d_{ij}^{-2} \leq \overline{d}^{-2}$ where d_{ij} is the Great Circle distance between the capitals of country i and j ,

⁴ SAR model normally assumes that all spatial dependence effects are captured by the spatially lagged dependent variable term, ρWg_{it} , and therefore u_{it} is assumed to be an i.i.d disturbance term as it is no longer an SEM model. Spatial autocorrelated error term may still exist in SAR model and this type of model is called Spatial auto-regressive with spatial auto-correlated errors or SARAR, however this model is beyond the scope of this paper.

⁵ Island countries such as New Zealand and Australia are considered neighbours to each other and to Indonesia (based on 2nd degree border). Sierra Leone is the only country in our sample without an immediate neighbour and we consider Cote d'Ivoire, Mali and Senegal as its neighbours (based on 2nd degree border too).

⁶ The Great Circle distance between countries' capitals reflects the shortest distance between any two points on the surface of a sphere measured along a path on the surface of the sphere (as opposed to going through the sphere's interior). See more on http://en.wikipedia.org/wiki/Great-circle_distance.

\bar{d} is the critical distance cut-off after which spatial effect is considered to be negligible, i.e. $w_{ij} = 0$ if $d_{ij}^2 > \bar{d}^2$.⁷

Although weight matrices based on geography have exogeneity advantage and able to avoid identification problem, they may not be able to capture the true interdependence between the countries under study that may be shaped by non-geographical factors. To this end, this study posits that institutionally similar countries are expected to have a level of globalization of similar degree which would be consequently supporting growth and spillovers between these group of countries. The institutional distance matrix is thus expected to uncover the impact of this institutional proximity on the globalization-growth relationship. Nevertheless, the endogeneity of institutional matrix would possibly bias the spatial estimators if the matrix is constructed from time-varying institutional indicators scores, as Ahmad & Hall (2012b and 2017) have discovered. To avoid identification problem due to this endogeneity issue, the historical determinants of institutions, such as legal origins, colonial origins and language characteristics are used to construct institutional matrix. These historical determinants of institutions are undoubtedly time-invariant therefore exogenous to the model.

The use of these historical determinants of institutions are based on the arguments of the following important studies: Acemoglu et al. (2001, 2002) on the impact of colonial origins; La Porta, Lopez-de-Silanes, Shleifer, and Vishny (1998), La Porta, Lopez-de-Silanes, and Shleifer (2008) and Glaeser and Shleifer (2002) on the impact of legal origins to the current institutions; Alesina, Devleeschauwer, Easterly, Kurlat, and Wacziarg (2003) on linguistic fractionalisation roles in explaining the institutions, and Easterly, Ritzen, and Woolcock, (2006)'s proposition that social cohesion (instrumented with linguistic homogeneity) leads to better institutions (see Appendix A4 for a summary of the above studies' theoretical propositions).

In brief, legal origins, colonial origins and language are perceived as the deep-determinants of the current level of institutions and constitute to the underlying framework of the institutional proximity concept. Institutional proximity thus can be defined as a situation when two or more countries in the sample sharing similar legal origins, colonial origins, and language, and these historical factors are expected to shape the countries' present-day institutions in a perceived similar process over the long term. This natural process is assumed to eventually lead to creation of a conducive economic environment supporting greater economic activities, increased bilateral trades, spillovers of growth-promoting factors between the countries such as technology, human capital, information etc. and all of these are common features in the globalization process.

Returning to the weight matrix W specification using institutional distance, the three institutional matrices are of a binary matrix whose element $w_{ij} = 1$ if countries i and j share identical

⁷ We set a generous distance of 4500km as the cut-off distance to ensure all countries in our large sample to have at least one neighbour. Distance shorter than 4500km causes at least New Zealand, Australia, and Canada to have no neighbours.

legal origins, colonial origins and spoken language between each other, and $w_{ij} = 0$ otherwise. Matrix based on legal origins are denoted as w_{legor} , colonial origins w_{color} and language w_{lang} . Finally, the elements of the main diagonal of all geographical and institutional matrices are set equal to zero by convention since a country cannot be a neighbour to itself and all matrices are row standardized.

3. Data sources and estimation strategy

A panel dataset in consisting observations for 83 countries for a period of 30 years beginning from 1985 to 2014 are used in this study.⁸ All variables, with the exception of globalization and institutional variables which are taken at initial period value, are taken as average over a five-year interval, therefore there are six five-year intervals in this study with total observations of 498. Data on real GDP per capita growth, real GDP per capita (in natural logarithmic form), gross fixed capital formation as a share of GDP (as a proxy for investment), population growth rates, inflation (measured by GDP deflator) are obtained from World Development Indicators (WDI) dataset from the World Bank, (2014). Finally, education variable measured by average years of total schooling for population age 15 and above obtained from Barro & Lee (2013).

The variable of interests are indices of globalization namely economic globalization, political globalization and social globalization obtained from KOF index (Dreher, 2006; Dreher et al., 2008). To capture the institutional quality in the countries under study, two institutional variables widely used in the growth literature are included firstly Law and Order obtained from International Country Risk Guide dataset (PRS Group, 2014) to represent the level of economic institutions, and secondly Polity 2 variable from Polity IV dataset (Marshall and Jaggers, 2014) to capture the level of political institutions. Summary statistics and variable definitions are in the Appendix, in Table A1 and A2 respectively.

For the institutional distance matrices, data for Legal Origins are obtained from La Porta et al (1998) which identifies the legal origin of the Company Law or Commercial code for each country from five possible origins i.e. English Common Law, French Commercial Code, Socialist/Communist Laws, German Commercial Code or Scandinavian Commercial Code. For Colonial Origins, data are obtained from (Central Intelligence Agency, 2013) that classify the former colonial rulers of the country into Dutch, Spanish, Italian, United States, British, French, or Portuguese. There are also countries in our sample which had never been colonized. Meanwhile, for language similarity matrix, the language of the country is determined based on its official and second languages, and when the official and second languages have no neighbour (no other countries speaking the languages), the next largest spoken language by the immigrants is used, to meet the matrix requirement that there must be at least one neighbour for each individual country. Language data are obtained from the CIA World Factbook

⁸ Number of countries under study is determined by the availability of data for the globalization and institutional quality variables used in spatial econometrics analysis since it requires no missing observations.

(Wikipedia, 2016) cross-referenced against Wikipedia page: “List of official languages by country and territory” (Wikipedia, 2016).

Usage of spatial econometrics is widespread in the analysis of cross sectional models, however the application of spatial analysis to panel data is still quite restricted mainly due to two reasons: the theoretical models are very recent and the difficulty of computation implementation. A reference to Elhorst (2003, 2009, 2010) for the appropriate specifications of spatial panel models and Anselin, Bera, Florax, and Yoon, (1996) for the test statistics is made to help with the estimation and testing process. The presence of spatial autocorrelation in the residuals of the OLS estimation of Equation (1) is tested using Moran’s *I* test, and if it is present, OLS estimates are no longer appropriate.⁹ Moran scatterplot is also used to explore the spatial autocorrelation of the countries’ growth regardless of the measures the countries distance.

Having detected the presence of spatial effects, the appropriate form of spatial model, either spatial error or spatial lag model,¹⁰ is subsequently determined using Robust LM test. It is called robust because the existence of one more type of spatial dependence does not bias the test for the other type of spatial dependence. This characteristic is obviously important because the spatial model that fails this test in most cases when estimated with different weight matrices would omitted. Finally a spatial panel fixed effect estimation technique based on Elhorst (2003, 2009) via a STATA command “spregfext” prepared by Shehata and Mickaieel (2013) is employed. Spatial panel fixed effect, and not random effect, estimation is considered due to the nature of panel dataset that assumes the presence of unobserved heterogeneity in the growth estimations as a results of omitted variables that may influence the growth process.¹¹

4. Estimation results and discussion

The following results of OLS estimation fit the stylized facts about standard growth process while at the same time controlling for the effects of globalization. The presence of conditional convergence process in the countries’ growth, at the rate of 0.8%, is evidenced by the negative and statistically significant coefficient for initial GDP per capita. Similarly, the coefficients of the other

⁹ In the case of spatial autocorrelation in the error term, the OLS estimates of the response parameter remains unbiased, but it loses its efficiency property, and in the case of specification containing spatially lagged dependent variable, the estimates are not only biased, but also inconsistent.

¹⁰ To find the true data generating process, we follow the suggestion by Florax, Folmer, and Rey (2003) that using spatial lag model as the point to begin the analysis, conditional on the results of misspecification tests, will outperform the general-to-specific approach via Spatial Durbin model suggested by LeSage and Pace (2009). We limit our model to either spatial error or spatial lag model only and we do not consider spatial Durbin model since it contains not only spatially lagged dependent variable, but also spatially lagged explanatory variables and the latter would obscure a clearer explanation to the concept of institutional proximity in explaining growth spillover especially when spatially lagged explanatory variables are found to be significant in the estimation (which means direct spillover of growth determinants).

¹¹ Hausman tests for non-spatial estimation of fixed effects and random effects indicate that FE is the preferred model.

growth determinants too are also statistically significant with the expected signs. Meanwhile, among the globalization indices, only economic globalization is significant at 1% level.

$$\begin{aligned}
 \text{Real GDP per capita Growth} = & 2.991 - 0.792 \text{ Initial GDP per capita} + 0.174 \text{ Investment} - 0.567 \text{ Population growth} \\
 & (1.060)^{***} \quad (0.150)^{***} \quad (0.017)^{***} \quad (0.112)^{***} \\
 & + 0.104 \text{ Education} - 0.001 \text{ Inflation} \\
 & (0.306) \quad (0.001) \\
 & + 0.280 \text{ Econ globn} + 0.072 \text{ Political globn} + 0.055 \text{ Social globn} \\
 & (0.106)^{***} \quad (0.070) \quad (0.132)
 \end{aligned}$$

Note: Standard error in parentheses. Number of observations: 510, number of countries: 85, F-test p-value = 0.000, R-squared = 0.276, Adjusted R-squared = 0.250, ***, ** and * denote significance at 1%, 5% and 10% respectively.

Nevertheless, interpretation of the above results needs caution since there is a possibility of spatial autocorrelation in the error term leading to misspecification and bias. Moran's *I* test statistics in Table 1 is thus referred and the results indicate that the null hypothesis of no spatial autocorrelation in the residuals of the OLS regression is overwhelmingly rejected in all estimations regardless of types of matrix, with the exception of *w_legor*. Similarly, as is seen in Figure 1, Moran scatterplots of the home country's growth against the spatially lagged growth for the significant matrices also show a positive relationship between the growth in a home country and the growth levels in neighbouring countries. This is consistent regardless of distance measures. Thus, it can be perceived that not only the countries' growth levels tend to cluster in space (when distance is defined by geography), but they also do for institutionally similar countries (when distance is defined using institutional proximity).

Therefore, Equation (1) can be considered misspecified and it must be modified to include a spatial dependence term. Returning to Table 1, the robust LM test statistics indicates that the spatial error model is apparently inappropriate as it fails in all estimations across different matrix specifications. Therefore, spatial autoregressive (SAR) or spatial lag model is the preferred model to explain growth's spatial dependence for the countries under study.

Table 1: Moran's *I* test for spatial autocorrelation in OLS regression with different matrices and Robust LM test for spatial error vs. spatial lag model

	<i>w_contig</i>	<i>w_knn</i>	<i>w_invsq</i>	<i>w_legor</i>	<i>w_color</i>	<i>w_lang</i>
Moran's I	3.281***	4.689***	5.023***	1.023	4.600***	4.194***
Spatial error:						
LM test	9.679***	19.557***	22.679***	0.561	17.064***	15.599***
Robust LM test	0.043	0.533	0.125	0.375	1.011	1.683
Spatial lag:						
LM test	12.151***	28.753***	26.056***	1.965	17.467***	14.853***
Robust LM test	2.515	9.729***	3.502*	1.779	1.414	0.936

Note: ***, ** and * denote significance at 1%, 5% and 10% respectively. *w_contig* = contiguity matrix, *w_knn* = 5-nearest region matrix, *w_invsq* = inversed squared distance matrix, *w_legor* = legal origins matrix, *w_color* = colonial origins matrix and *w_lang* = language matrix.

Returning to this study research questions, how do globalization growth-effects fare in these two distinct spatial settings? Table 2 below shows the results of SAR model of Equation (3) via spatial fixed effects estimations with five weight matrices found significant in the earlier Moran's I tests. In Table 3, the similar estimations are repeated with the presence of institutional quality variables.

The variables of interest are the three indices of globalization. Apparently the results in Table 2 of the spatial fixed effect estimations mirror that of OLS estimation where the economic globalization is the only KOF index significant at 1% level. The level significance is consistent across geographical and institutional matrices. The latter is undoubtedly an important finding which is able to support our earlier proposition that countries sharing similar institutional characteristics (in this case similar colonial origins and language homogeneity) are expected to cluster along the similar level globalization and consequently to generate a spillover effect towards growth. Meanwhile, in Table 3, economic globalization index retains its significance in the presence of variables capturing institutional quality in the countries under study, although the level of significance is now slightly weaker at 5% as compared to 1% when it is estimated independently of institutional quality in Table 2. This is arguably an additional evidence for the studies finding the positive globalization effects dependent upon the complementary policies as earlier discussed.

This study finds that institutional quality is apparently an important factor supporting the positive growth effect of globalization, at least in the case political institutions. Specifically, Polity 2 is found to be significant at 5% level with the expected sign, but Rule of Law is not and has wrong sign. This is consistent across all estimations with different weight matrices. This finding also gives support the proposition of political prominence theory by Acemoglu, Johnson, & Robinson (2005) over the property rights institutions as proposed by North (1990) and many similar studies thereafter.

Another variable of interest is the spatially lagged growth; its coefficient ρ (rho) shows the size of growth spillovers from neighbours and the positive sign of ρ indicates countries with similar growth levels cluster together (country with high growth clusters together with high-growth neighbours, vice versa). As is seen in Table 2 and 3, ρ are positive and significant at 1% level across model specifications using all weight matrices. The Wald tests for the null hypothesis of $\rho = 0$ are overwhelmingly rejected and this finding gives convincing support to the proposition of positive growth spillovers across the countries under study. Significant economic globalization variable and spatially lagged growth variable therefore confirm the presence of indirect globalization spillover effect (via neighbours' growth).

Figure 1: Moran's I scatterplot of Real GDP per capita growth against the spatially lagged growth (using different weight matrices)

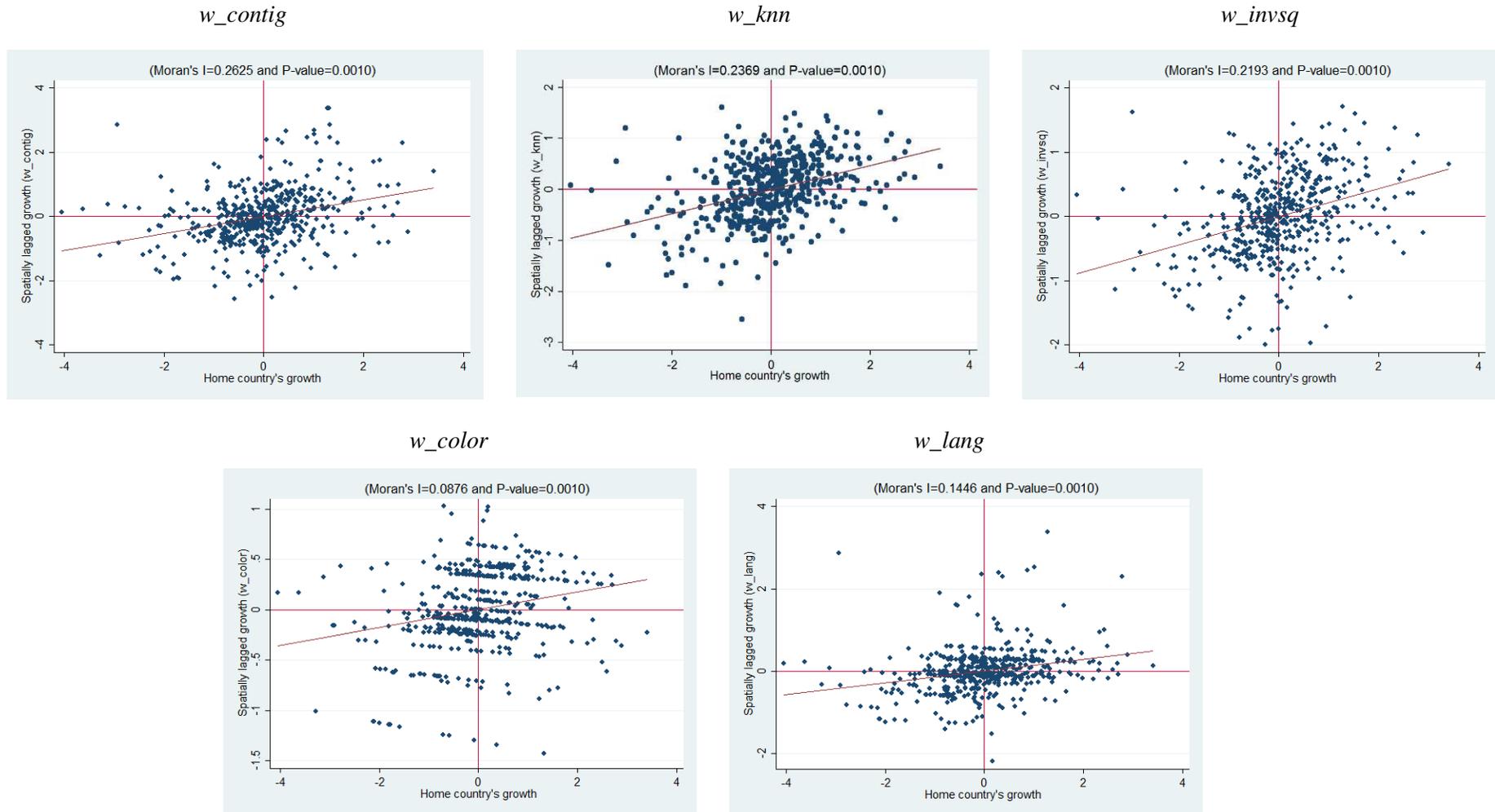


Table 2: Spatial fixed effect estimation of globalization-growth model with various matrices without the institutional variables

	<i>w_contig</i>	<i>w_knn</i>	<i>w_invsq</i>	<i>w_color</i>	<i>w_lang</i>
Rho, ρ	0.257*** (0.056)	0.372*** (0.076)	0.390*** (0.065)	0.330** (0.147)	0.397*** (0.089)
Economic globalization	0.650*** (0.219)	0.559** (0.230)	0.577*** (0.222)	0.610*** (0.231)	0.682*** (0.233)
Political globalization	0.165 (0.213)	0.147 (0.224)	0.161 (0.219)	0.196 (0.223)	0.217 (0.215)
Social globalization	0.032 (0.212)	0.072 (0.214)	0.004 (0.216)	0.027 (0.219)	-0.113 (0.231)
Initial GDP per capita	-4.007*** (0.693)	-3.772*** (0.757)	-3.821*** (0.709)	-4.031*** (0.761)	-3.885*** (0.768)
Investment	0.195*** (0.034)	0.195*** (0.034)	0.192*** (0.033)	0.198*** (0.036)	0.197*** (0.034)
Population growth	-0.602** (0.305)	-0.609** (0.305)	-0.646** (0.302)	-0.595* (0.309)	-0.606* (0.317)
Education	0.285 (1.149)	-0.022 (1.189)	0.256 (1.153)	0.123 (1.224)	0.247 (1.187)
Inflation	-0.001*** (0.000)	-0.002*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)
Constant	25.573*** (4.306)	24.479*** (4.666)	24.559*** (4.357)	25.901*** (4.688)	24.472*** (4.843)
No of observations	498	498	498	498	498
No of countries	83	83	83	83	83
Wald p-value	0.000	0.000	0.000	0.000	0.000
F-test p-value	0.000	0.000	0.000	0.000	0.000
R-squared	0.554	0.558	0.566	0.541	0.552
Adjusted R-squared	0.454	0.459	0.468	0.438	0.451
LLF	-967.798	-965.086	-960.954	-974.714	-968.754
AIC	3.007	2.975	2.926	3.092	3.019

Dependent variable is real GDP per capita growth. Robust standard error is in parentheses. Wald test is for null hypothesis that $\rho = 0 \sim \chi^2(9)$. ***, **, and * denote significance at 1%, 5% and 10 % respectively.

Table 3: Spatial fixed effect estimation of globalization-growth model with various matrices in the presence of institutional variables

	<i>w_contig</i>	<i>w_knn</i>	<i>w_invsq</i>	<i>w_color</i>	<i>w_lang</i>
Rho, ρ	0.247*** (0.057)	0.367*** (0.077)	0.383*** (0.067)	0.306** (0.151)	0.405*** (0.091)
Economic globalization	0.539** (0.225)	0.437** (0.237)	0.462** (0.228)	0.498** (0.241)	0.559** (0.240)
Political globalization	0.074 (0.203)	0.045 (0.209)	0.066 (0.206)	0.102 (0.209)	0.115 (0.201)
Social globalization	0.100 (0.209)	0.143 (0.212)	0.075 (0.211)	0.096 (0.217)	-0.034 (0.224)
Law & order	-0.075 (0.104)	-0.057 (0.108)	-0.073 (0.106)	-0.074 (0.115)	-0.105 (0.112)
Polity 2	0.169** (0.075)	0.182** (0.075)	0.175** (0.073)	0.174** (0.079)	0.189** (0.078)
Initial GDP per capita	-3.924*** (0.690)	-3.678*** (0.752)	-3.734*** (0.706)	-3.951*** (0.756)	-3.778*** (0.763)
Investment	0.196*** (0.033)	0.196*** (0.033)	0.193*** (0.032)	0.200*** (0.035)	0.198*** (0.033)
Population growth	-0.649** (0.288)	-0.657** (0.286)	-0.693** (0.285)	-0.645** (0.291)	-0.657** (0.297)
Education	0.148 (1.110)	-0.174 (1.147)	0.106 (1.111)	0.009 (1.178)	0.059 (1.145)
Inflation	-0.002*** (0.000)	-0.002*** (0.000)	-0.002*** (0.001)	-0.001*** (0.000)	-0.001*** (0.000)
Constant	25.212*** (4.372)	24.016*** (4.739)	24.177*** (4.410)	25.528*** (4.750)	24.051*** (4.878)
No of observations	498	498	498	498	498
No of countries	83	83	83	83	83
Wald p-value	0.000	0.000	0.000	0.000	0.000
F-test p-value	0.000	0.000	0.000	0.000	0.000
R-squared	0.563	0.569	0.575	0.550	0.563
Adjusted R-squared	0.462	0.469	0.477	0.447	0.463
LLF	-962.745	-959.221	-955.429	-969.554	-962.328
AIC	2.971	2.929	2.885	3.053	2.965

Dependent variable is real GDP per capita growth. Standard error is in parentheses. Wald test is for null hypothesis that $\rho, \rho = 0 \sim \chi^2(11)$. ***, ** and * denote significance at 1%, 5% and 10 % respectively.

Finally, the results in all estimations support conditional convergence hypothesis where the coefficients of initial real GDP per capita are consistently negative and significant at 1%. The rate of growth convergence ranging from 3.7% to 4.0% is apparently greater than 0.7% previously found in the OLS estimation. This finding of higher rate of convergence when the growth model is spatially augmented is common in many spatial growth studies, see Arbia, Battisti, & Di Vaio (2010), Ahmad & Hall (2017) and Ho, Wang, & Yu (2013) to name a few; again another robust evidence against the omission of the spatial dependence in growth regressions which would otherwise biased the estimates. The coefficients of the other growth determinants namely investment, population growth and inflation are significant too with the expected signs. Education however is not.

5. Concluding remarks

Studies investigating globalization-growth nexus using explicit spatial econometrics methodology and incorporating the concept of institutional proximity are of recent vintage. The present paper thus seeks to contribute to the existing literature in this respect. By using a spatial panel fixed effect estimations on a panel dataset of 83 countries over 30 year periods, this study seeks to examine the effects of globalization on the countries' growth and spillovers. The results show that economic globalization is a significant determinant of growth, and when it is spatially modelled, economic globalization generates a positive spillover effect to the neighbouring countries. Not only countries located closer in term of geographical settings, this study shows that the spillover effect of globalization is also propagated across the countries sharing similar legal origins and spoken language. Additionally, the results are able to support the argument on the significant complementary policies supporting the positive effect of globalization, in this case a supportive political institution.

These results are expected to inform policymakers regarding the appropriate globalization and economic integration policies particularly with respect to the countries' institutional settings and development. Since economic globalization has been shown to be a significant growth determinant, coupled with a significant finding on the effect of political institutions, the results further illustrate the globalization-institutional interplay in ensuring the positive effect of globalization. Furthermore, the evidence on the presence of globalization spillover effects not only across countries located closer in the geographical sphere, but also across countries sharing similar institutional characteristics, the latter could pave the way for the aspiring countries seeking to integrate with higher income nations to focus on developing their institutional quality to the level similar to the prospective integration partners.

A potential extension to this study in the future is to consider various non-geographical weight matrices not limited to institutions per se and to combine two or more different matrices in an estimation for the purpose of appropriate comparison. Besides, latest estimation techniques in spatial analysis may also be explored to investigate spatially dependent growth dynamics.

Compliance with Ethical Standards

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Ethical approval: This article does not contain any studies with human participants or animals performed by any of the authors.

References:

- Acemoglu, D., Johnson, S., & Robinson, J. A. (2001). The Colonial Origins of Comparative Development : An Empirical Investigation. *The American Economic Review*, 91(5), 1369–1401. <https://doi.org/10.1257/aer.91.5.1369>
- Acemoglu, D., Johnson, S., & Robinson, J. A. (2002). Reversal of Fortune: Geography and Institutions in the Making of the Modern World Income Distribution*. *Source: The Quarterly Journal of Economics*, 117(4), 1231–1294. Retrieved from <http://www.jstor.org/stable/4132478>
- Acemoglu, D., Johnson, S., & Robinson, J. A. (2005). Institutions as a Fundamental Cause of Long-Run Growth. In P. Aghion & S. N. Durlauf (Eds.), *Handbook of Economic Growth* (Vol. 1A, pp. 386–471). Elsevier B.V. [https://doi.org/10.1016/S1574-0684\(05\)01006-3](https://doi.org/10.1016/S1574-0684(05)01006-3)
- Ahmad, M., & Hall, S. G. (2012a). Institutions-growth Spatial Dependence: An Empirical Test. *Procedia - Social and Behavioral Sciences*, 65, 925–930. <https://doi.org/10.1016/j.sbspro.2012.11.221>
- Ahmad, M., & Hall, S. G. (2012b). Institutions and growth: Testing the spatial effect using weight matrix based on the institutional distance concept. *MPRA Paper*, 6356. Retrieved from <http://ideas.repec.org/p/prapa/mprapa/42294.html>
- Ahmad, M., & Hall, S. G. (2017). Economic growth and convergence: Do institutional proximity and spillovers matter? *Journal of Policy Modeling*. <https://doi.org/10.1016/j.jpolmod.2017.07.001>
- Alesina, A., Devleeschauwer, A., Easterly, W., Kurlat, S., & Wacziarg, R. (2003). Fractionalization. *Journal of Economic Growth*, 8(2), 155–194. <https://doi.org/10.1023/A:1024471506938>
- Alesina, A., & Perotti, R. (1994). The Political Economy of Growth: A Critical Survey of the Recent Literature. *The World Bank Economic Review*, 8(3), 351–371. <https://doi.org/10.1093/wber/8.3.351>
- Anselin, L., Bera, A., Florax, R., & Yoon, M. (1996). Simple diagnostic tests for spatial dependence. *Regional Science and Urban Economics*, 26(1), 77–104. Retrieved from <http://www.sciencedirect.com/science/article/pii/0166046295021116>
- Anselin, L., Gallo, J. Le, Jayet, H., Le Gallo, J., & Jayet, H. (2008). Spatial panel econometrics. *The Econometrics of Panel Data*, 46, 625–660. https://doi.org/10.1007/978-3-540-75892-1_19
- Arbia, G., Battisti, M., & Di Vaio, G. (2010). Institutions and geography: Empirical test of spatial growth models for European regions. *Economic Modelling*, 27(1), 12–21. <https://doi.org/10.1016/j.econmod.2009.07.004>
- Barro, R. J., & Lee, J. W. (2013). A new data set of educational attainment in the world, 1950–2010. *Journal of Development Economics*, 104, 184–198. <https://doi.org/10.1016/j.jdeveco.2012.10.001>
- Beck, N., Gleditsch, K. S., & Beardsley, K. (2006). Space is more than geography: Using spatial econometrics in the study of political economy. *International Studies ...*, 50(1), 27–44. <https://doi.org/10.1111/j.1468-2478.2006.00391.x>
- Borensztein, E., De Gregorio, J., Lee, J.-W., Barro, R., Helpman, E., Jovanovic, B., ... Wickham, P. (1998). How does foreign direct investment affect economic growth? *Journal of International Economics*, 45(45), 115–135. Retrieved from <https://www.olemiss.edu/courses/inst310/BorenszteinDeGLee98.pdf>
- Calderón, C., & Poggioa, V. (2010, September 1). Trade and Economic Growth: Evidence on the Role of Complementarities for Cafta-Dr Countries. Retrieved from https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1680134
- Central Intelligence Agency, T. (2013). *The World Factbook 2013-2014*. Washington DC. Retrieved from <https://www.cia.gov/library/publications/the-world-factbook/index.html>

- Dollar, D. (1992). Outward-oriented developing economies really do grow more rapidly: evidence from 95 LDCs, 1976–1985. *Economic Development and Cultural Change*, 40, 523–544.
- Dreher, A. (2006). Does globalization affect growth? Evidence from a new index of globalization. *Applied Economics*, 38(10), 1091–1110. <https://doi.org/10.1080/00036840500392078>
- Dreher, A., Gaston, N., & Martens, W. J. M. (2008). *Measuring globalisation : gauging its consequences*. Springer. Retrieved from [https://books.google.com.my/books?id=cieBVeRR8hYC&dq=Dreher,+A.,+Gaston,+N.,+%26+Martens,+P.+\(2008\).+Measuring+globalisation+-+gauging+its+consequences.+New+York:+Springer.&lr=&source=gbs_navlinks_s](https://books.google.com.my/books?id=cieBVeRR8hYC&dq=Dreher,+A.,+Gaston,+N.,+%26+Martens,+P.+(2008).+Measuring+globalisation+-+gauging+its+consequences.+New+York:+Springer.&lr=&source=gbs_navlinks_s)
- Easterly, W., Ritzen, J., & Woolcock, M. (2006). Social Cohesion, Institutions, and Growth. *Economics and Politics*, 18(2), 103–120.
- Edwards, S. (1998). Openness, productivity and growth: what do we really know? *Economic Journal*, 108, 383–398.
- Elhorst, J. P. (2003). Specification and Estimation of Spatial Panel Data Models. *International Regional Science Review*, 26(3), 244–268. <https://doi.org/10.1177/0160017603253791>
- Elhorst, J. P. (2009). Spatial Panel Data Models. In M. M. Fischer & A. Getis (Eds.), *Handbook of Applied Spatial Analysis* (pp. 377–407). Springer. https://doi.org/10.1007/978-3-642-03647-7_19
- Elhorst, J. P. (2010). Applied Spatial Econometrics: Raising the Bar. *Spatial Economic Analysis*, 5(1), 9–28. <https://doi.org/10.1080/17421770903541772>
- Florax, R. J., Folmer, H., & Rey, S. J. (2003). Specification searches in spatial econometrics: the relevance of Hendry’s methodology. *Regional Science and Urban Economics*, 33(5), 557–579. Retrieved from <http://www.sciencedirect.com/science/article/pii/S0166046203000024>
- Glaeser, E. L., & Shleifer, A. (2002). Legal Origins. *The Quarterly Journal of Economics*, 117(4), 1193–1229. <https://doi.org/10.1162/003355302320935016>
- Grossman, G. M., & Helpman, E. (2015). Globalization and growth. *American Economic Review*, 105(5), 100–104. <https://doi.org/10.1257/aer.p20151068>
- Gurgul, H., & Lach, L. (2014). Globalization and economic growth: Evidence from two decades of transition in CEE. *Economic Modelling*, 36, 99–107. <https://doi.org/10.1016/j.econmod.2013.09.022>
- Hadenius, A., & Teorell, J. (2007). Pathways from Authoritarianism. *Journal of Democracy*, 18(1), 143–156. Retrieved from <http://www.journalofdemocracy.org/article/pathways-authoritarianism-0>
- Ho, C. Y., Wang, W., & Yu, J. (2013). Growth spillover through trade: A spatial dynamic panel data approach. *Economics Letters*, 120, 450–453. <https://doi.org/10.1016/j.econlet.2013.05.027>
- La Porta, R., Lopez-de-Silanes, F., & Shleifer, A. (2008). The Economic Consequences of Legal Origins. *Journal of Economic Literature*, 46(2), 285–332. <https://doi.org/10.1257/jel.46.2.285>
- La Porta, R., Lopez-de-Silanes, F., Shleifer, A., & Vishny, R. W. (1998). Law and Finance. *The Journal of Political Economy*, 106(6), 1113–1155.
- Le Gallo, J., & Ertur, C. (2003). Exploratory spatial data analysis of the distribution of regional per capita GDP in Europe , 1980 – 1995. *Papers in Regional Science*, 201(2), 175–201. <https://doi.org/10.1111/j.1467-8276.2006.00866.x>
- LeSage, J. P., & Pace, R. K. (2009). *Introduction to spatial econometrics*. Chapman and Hall/CRC Press.
- Marshall, M. G., & Jaggers, K. (2014). *Polity IV Project: Political Regime Characteristics and Transitions 1800-2014*. Retrieved from <http://www.systemicpeace.org/polity/polity4.htm>
- North, D. C. (1990). *Institutions, Institutional Change and Economic Performance*. Cambridge: Cambridge University Press. <https://doi.org/10.1017/CBO9780511808678>
- Rao, B. B., & Vadlamannati, K. C. (2011). Globalization and growth in the low income African countries with the extreme bounds analysis ☆. *Economic Modelling*, 28, 795–805. <https://doi.org/10.1016/j.econmod.2010.10.009>
- Rodriguez, F., & Rodrik, D. (2000). Trade policy and economic growth: a skeptic’s guide to the cross-national evidence. *NBER Macroeconomics Annual*, 15, 261–325.
- Rodrik, D. (1998). Who needs capital account convertibility? In S. Fischer (Ed.), *Should the IMF pursue capital account convertibility? Essays in international finance* (pp. 55–65). Princeton: Department of Economics, Princeton University.
- Sachs, J. D., Warner, A., Aslund, A., & Fischer, S. (1995). Economic reform and the process of global integration. *Brookings Papers in On Economic Activity*, 1–118.
- Samimi, P., & Jenatabadi, H. S. (2014). Globalization and economic growth: Empirical evidence on the role of complementarities. *PLoS ONE*, 9(4), 1–7. <https://doi.org/10.1371/journal.pone.0087824>
- Shehata, E. A. E., & Mickaiel, S. K. A. (2013). SPREGFEXT: Stata module to compute Spatial Panel Fixed Effects Regression: Lag and Durbin Models. *Statistical Software Components*, S457524. Retrieved from <https://ideas.repec.org/c/boc/bocode/s457524.html>

- Stiglitz, J. E. (2004). Globalization and growth in emerging markets. *Journal of Policy Modeling*, 26(4), 465–484.
<https://doi.org/10.1016/j.jpolmod.2004.04.010>
- Wikipedia. (2016). List of official languages by country and territory. Retrieved from
https://en.wikipedia.org/wiki/List_of_official_languages_by_country_and_territory
- World Bank, T. (2016). *World Development Indicators*.

Appendix A1: Summary statistics of the variables

Variable		Mean	Std. Dev.	Min	Max	Observations
Real GDP per capita Growth	Overall	1.875579	2.53119	-7.9031	10.2627	N = 498
	between		1.468461	-1.02268	8.457117	n = 83
	within		2.066939	-7.68199	8.836363	T = 6
Economic globalization	overall	5.586101	1.891513	0.985663	9.699946	N = 498
	between		1.736164	2.063475	9.486454	n = 83
	within		0.770638	3.438966	8.011595	T = 6
Political globalization	overall	7.020247	1.842193	2.500156	9.766173	N = 498
	between		1.585015	3.71687	9.618632	n = 83
	within		0.952196	3.98315	9.623624	T = 6
Social globalization	overall	4.732116	2.294499	0.765438	9.268679	N = 498
	between		2.170847	1.476488	8.939209	n = 83
	within		0.774311	1.889316	6.86453	T = 6
Law and order	overall	3.708752	1.502133	1	6	N = 498
	between		1.291637	1.361112	6	n = 83
	within		0.777728	0.73653	5.680973	T = 6
Polity 2	overall	7.196787	3.290959	0	10	N = 498
	between		2.875481	0	10	n = 83
	within		1.626408	0.696787	12.19679	T = 6
Initial real GDP per Capita	overall	8.21337	1.619595	4.98296	11.1091	N = 498
	between		1.612197	5.392032	10.91767	n = 83
	within		0.223733	7.199182	9.333042	T = 6
Investment	overall	21.76353	5.952979	3.95817	50.7982	N = 498
	between		4.601394	11.24735	36.2663	n = 83
	within		3.805015	8.351484	41.79017	T = 6
Population growth	overall	1.604638	1.111919	-1.25586	7.85673	N = 498
	between		0.980568	-0.67101	4.024323	n = 83
	within		0.533407	-0.58438	5.437045	T = 6
Education	overall	1.853539	0.530289	-0.24846	2.578701	N = 498
	between		0.506187	0.177629	2.532596	n = 83
	within		0.166009	1.230684	2.351885	T = 6
Inflation	overall	27.30661	159.4564	-6.21548	2522.81	N = 498
	between		74.06475	-0.19184	427.0513	n = 83
	within		141.407	-394.908	2123.065	T = 6

Appendix A2: Description of variables and sources

Variable	Description	Sources
Real GDP per capita growth	Annual percentage change in Gross Domestic Product per capita (constant 2005 US\$) – average over five year interval (in natural logarithmic form)	World Development Indicator (the World Bank, 2014)
Initial Real GDP per capita	Initial value of GDP per capita (constant 2005 US\$) at the start of the five year interval (in natural logarithmic form)	
Investment	Gross fixed capital formation as a percentage of GDP	
Population growth	Annual percentage change in population size	
Inflation	Annual percentage change in GDP deflator. GDP deflator is the ratio of GDP in current local currency to GDP in constant local currency.	
Human capital	Average years of total schooling for population age 15 and above as a percentage of population	Barro and Lee (2013)
Law and Order	An assessment of the strength and impartiality of the legal system, and public observance of the law.	ICRG dataset (The PRS, 2014)
Polity2	Measures key qualities in executive recruitment, constraints on executives, and political competition. It gives indication whether a regime is an institutionalised democracy or institutionalised autocracy or anocracies (mixed, or incoherent, authority regimes).	Polity IV dataset (Marshall and Jaggers, 2014)
Economic Globalization	An index measuring economic integration comprises of actual trade, FDI, portfolio investment flows, as well as trade restrictions policies.	KOF index of globalization (Dreher et al., 2008)
Political Globalization	An index measuring political integration comprises of data on embassies, membership in international organizations and participation in the UN Security Council commissions.	
Social Globalization	An index measuring social integration comprises of data on personal contact across countries, information flows, and cultural proximity.	

Appendix A3: List of countries (83)

- Albania, Algeria, Argentina, Australia, Austria,
- Bahrain, Bangladesh, Belgium, Bolivia, Botswana, Brazil, Bulgaria,
- Cameroon, Canada, Chile, China, Colombia, Congo, Costa Rica, Cote d'Ivoire, Cyprus,
- Denmark, Dominican Republic,
- Ecuador, Egypt, El Salvador,
- Finland, France,
- Gabon, Gambia, Ghana, Greece, Guatemala, Guyana,
- Honduras,
- India, Indonesia, Iran, Ireland, Israel, Italy,
- Jamaica, Japan, Jordan,
- Kenya,
- Malawi, Malaysia, Mali, Mexico, Mongolia, Morocco, Mozambique,
- Netherlands, New Zealand, Niger, Norway,
- Pakistan, Panama, Peru, Philippines, Portugal,
- Saudi Arabia, Senegal, Sierra Leone, Singapore, South Africa, South Korea, Spain, Sudan, Sweden, Switzerland,
- Thailand, Togo, Trinidad & Tobago, Tunisia, Turkey,
- Uganda, United Kingdom, United States, Uruguay,
- Venezuela, Vietnam, and
- Zimbabwe.

Appendix A4: Theoretical arguments on the historical determinants of institutions.

The use of legal origins, colonial origins and language homogeneity as the possible historical determinants of institutions are based on the arguments of the following important studies: Acemoglu et al. (2001, 2002) on the impact of colonial origins; La Porta, Lopez-de-Silanes, Shleifer, and Vishny (1998), La Porta, Lopez-de-Silanes, and Shleifer (2008) and Glaeser and Shleifer (2002) on the impact of legal origins to the current institutions; Alesina, Devleeschauwer, Easterly, Kurlat, and Wacziarg (2003) on linguistic fractionalization roles in explaining the institutions, and Easterly, Ritzen, and Woolcock, (2006)'s proposition that social cohesion (instrumented with linguistic homogeneity) leads to better institutions. The theoretical underpinnings supporting their arguments are as the following:

By using settlers' mortality as a proxy for settlement strategy, Acemoglu et al., (2001, 2002) show that European colonizers settled down and replicated their home institutions in colonies with low or no disease environment. On the other hand, at the other colonies with unfavorable environment for settlement, colonizers merely set up extractive states to transfer resources home. Thus, conditional on settlement strategy, this paper assumes different colonizers adopted and replicated different institutions and that differences persisted until today. Similarly, non-colonized countries are assumed to have developed a different set of institutions too.

Meanwhile, legal origin theory according to La Porta et al., (1998, 2008) explains the transplanting process of ideas and strategies of the common and civil laws (developed by England and France respectively centuries ago) into specific legal rules, and onto the organization of the legal systems, the human capitals and the beliefs of its participants in much of the world typically via conquest and colonization. Despite a much localized legal evolution, the fundamental strategies and ideas of the two legal systems survived and have continued to exert substantial influence on economic outcomes. It is therefore assumed that these different types of legal origin to eventually have developed distinctive legal systems leading to different economic outcomes.

Although Alesina et al. (2003) provide three measures of fractionalization namely ethnic, linguistic and religious fractionalizations and re-estimate these measures' impact on the quality of institutions and growth, this paper is only interested in their findings with regards to linguistic fractionalization. They find negative impact of linguistic fractionalization on the quality of institutions measured by the extent of corruption and political freedom. In the same vein, Easterly et al. (2006) show that societies with linguistic homogeneity have more social cohesion and thus better institutions, and that these better institutions lead to higher growth.