Understanding the Sources of Regional Growth Heterogeneity

Moheb Zidan†

November 12, 2018$

Abstract

This paper takes a new approach to understanding the sources of regional growth heterogeneity. I integrate model averaging and decomposition methods to understand how cross-country growth differences arise from differences in explanatory variables versus differences in coefficients. My approach allows the growth of different economies to follow distinct processes and accounts for model uncertainty. I study growth rates between 1975-2014 for 135 countries grouped into 6 regions. My results reject the assumption of homogeneous coefficients that is commonly used in the growth literature. Factors that appear important in explaining growth heterogeneity in one region may not necessarily matter in other regions. Moreover, my findings indicate that regional dummies – commonly used in the literature – are insufficient in controlling for regional parameter and growth heterogeneity.

† Department of Economics, University of Wisconsin-Madison. Email: zidan@wisc.edu.

$ The latest version can be found on the following website: https://zidanm.github.io/

1. Introduction

One of the main puzzles in economics research is the large differences in income levels and in long-run growth rates across countries. Uncovering the sources of heterogeneity in countries' growth rates is not only a topic of perpetual interest within academic research, but is also critically important for policymakers. As usual in economics, there are both theoretical explanations to the puzzle – like human capital, geography, institutions, and more – as well as empirical tests that try to examine these theories. This paper focuses on these tests. The common structure of such empirical tests is a regression of the rate of growth (and sometimes of the level of income) on a number of "explanatory variables." These variables are related to the various theories that try to explain growth differences across countries.

While this literature exploring heterogeneity in countries' growth rates is rich, illuminating, and ever expanding, it has also been subject to criticism (see, for example, Durlauf, Johnson and Temple (2005) for an excellent survey). Some of these critiques claim that the explanatory variables selected are ad-hoc, that they are usually endogenous, and that these variables do not necessarily represent the growth theories. This paper raises another question on these empirical tests. The implicit assumption behind these tests is a common conditional expectation function throughout the sample: the relationship between expected growth and explanatory variables is the same across the globe. In this paper, I examine the possibility that countries can differ in the coefficients of the regression in addition to the values of the variables. More precisely, I assume in the paper that the coefficients can differ across regions.

The paper examines this assumption first by testing whether coefficients indeed differ across regions, and second, by trying to estimate how much of the differences in growth rates are explained by these differences in coefficients. To examine it, this paper employs Bayesian Model Averaging methods (BMA) to explicitly account for model uncertainty and it uses decomposition methods to provide estimates for how much of growth differences that can be explained by differences in explanatory variables and how much from differences in coefficients.

The basic idea I pursue can be presented by the following empirical model:

$$(1) \quad g_{i,r} = X_{i,r}\beta_r + \epsilon_{i,r}$$

where $g_{i,r}$ is the growth rate in country i that is a member of country group r (region r), X is a vector of explanatory variables, $\epsilon_{i,r}$ are the error terms and the coefficients β_r can differ across regions. Focusing on parameter heterogeneity, this framework allows growth heterogeneity to be generated either by heterogeneity in values of the explanatory variables (differences in X's), or by heterogeneity in coefficients (differences in β's). The contribution of this paper is to allow for region specific growth structure and shows how this approach can help uncover different sources of regional heterogeneity that cannot be detected under the assumption of common growth structure for all countries.

The empirical analysis in this paper uses two main methods. The first are decomposition methods (DM), first introduced to the economic literature by Oaxaca (1973) and Blinder (1973), initially for examining gender or race wage differences. These methods apportion differences, across groups, in an observable variable to variation due to differences in those groups' explanatory variables (explained differences), and variation due to differences in coefficients (unexplained differences).[1]

The second tool I use in this paper is Bayesian Model Averaging. This tool helps to overcome one of the main critiques on empirical growth regressions, which is already mentioned above and is called 'model uncertainty.' While there is a wide range of theories that explain economic growth, there is no consensus on which theories should be tested and which potential explanatory variables should be included in the growth regression. Furthermore, as these growth theories are deeply interrelated and are not mutually exclusive, as pointed out by Durlauf et al. (2008), "any empirical evidence about which variables affect growth and how they affect it has been shown to depend on which growth determinants appear in the regression." This paper addresses this issue systematically by using Bayesian Model Averaging (BMA) methods (e.g., Raftery, Madigan, and Hoeting (1997)). Using these methods enables me to average out the model uncertainty over the entire model space rather than relying on one model or on a subset of models.

Overall, the empirical results of the analysis reject the assumption that common growth theories explain growth for all countries. My findings provide strong evidence for parameter heterogeneity across regions, and more broadly, differences in the models that explain economic

[1] For a useful survey of the economic literature on decompositions see Fortin, Lemieux, Firpo (2011).

growth across regions. Factors that appear important in explaining growth heterogeneity in one region do not necessarily matter much in other regions. There are significant examples of such factors that have region specific effects. For instance, regulations of religion have a strong effect on growth in the Middle East and North Africa (MENA), but not in other regions. Investment has a significant effect on growth in East and South Asia (EAST). Population growth has a strong effect on growth in Sub-Saharan Africa (SSAF) and human capital is important for growth in Latin America and The Caribbean (LATIN). Initial income is the only variable that appears to be important in explaining growth differences across countries for all regions, but the coefficients on initial income are not identical across regions.

The differences across regions are not only between having an effect or not, but in some cases, coefficients may even have an opposite effect in different regions. For example, the tests show that the ratio of mining to GDP is positively associated with economic growth in MENA and SSAF, but negatively related in EAST. The decomposition of growth differences between regions shows that the differences in coefficients play an important role in explaining growth heterogeneity across regions. Surprisingly, despite all the evidence this paper provides for regional parameter heterogeneity, once the analysis follows the standard approach and uses common growth structure to explain growth for all regions, regional dummies appear insignificant in the global sample. The decomposition of growth heterogeneity shows that some differences that are due differences in coefficients are positive and some are negative, but the total sum is close to zero. This can explain why regional dummies in the common growth structure model are statistically insignificant.

I next try to clarify how this paper is related to the literature on empirical growth, or more precisely, to the literature that tries to find explanations to differences in growth across countries using growth regressions. As mentioned above, this literature suffers from many serious problems, like endogeneity issues, coefficient heterogeneity, model uncertainty and exclusion of other important growth determinants. These critiques are some of the main reasons why cross-country regressions became less prominent in recent years. This paper does not intend to add new criticism to these, but it tries to point at a potential way to overcome them and to improve the explanatory power of cross-country regressions.

The first step in this direction is to acknowledge that growth behaves differently across regions. Many researchers have already addressed this idea, but the way they dealt with it has been mainly to add regional dummies to the regressions. These dummies are a particularly problematic form of parameter heterogeneity because it just says that the constant terms are different without providing any insight on why they are different. The researchers understood it but still hoped that controlling for the "right" growth determinants should be sufficient to explain regional growth heterogeneity and to reduce the explanatory power of regional dummies. Barro (1991) for example, argues that we should control for human capital levels, but blames the "weak" proxies used for human capital levels for the African dummy still having significant influence on growth even when controlling for human capital.

Other studies were more successful in eliminating the explanatory power of regional dummies, by using more exogenous explanatory variables like ethnic heterogeneity (Easterly and Levine (1997), climate and coastal access (Bloom and Sachs (1998)) and quality of institutions (Acemoglu, Johnson, and Robinson (2001)). But even these studies share the common assumption of many growth regression studies, that the same variables explain growth for all countries and the association between these variables and growth is the same across countries. But we have significant accumulated evidence against these assumptions. For example, Durlauf and Johnson (1995) reject the coefficient homogeneity assumption in favor of multiple regime model in which different "groups" of countries obey different linear models. Other papers that support models with multiple regimes and show that coefficients differ across different country groups include Liu and Stengos (1999), Pedroni (2007), Henderson, Papageorgiou, and Parmeter (2012), and Kourtellos et al. (2013).[2] The assumption of identical coefficients across regions is a source of misspecification which produces biased estimates including those for the regional dummies, as I show in this paper. Hence, the line followed here is not only to acknowledge that different regions follow different models, but to use this result as a tool to explain differences in economic growth.

As discussed earlier, many studies address the issue of parameter heterogeneity, but most examine heterogeneity according to values of explanatory variables. One such study is Durlauf

[2] These are just some the papers that address the issue of parameter heterogeneity. Other examples include Durlauf, Kourtellos, and Minkin (2001), Canova (2004), Crespo Cuaresma and Doppelhofer (2007), Tan (2010), Eberhardt and Teal (2011), Eberhardt and Presbitero (2015)

and Johnson (1995), who split the countries in groups according to their initial income or literacy rates. Still, little attention was given to the issue of regional parameter heterogeneity. The closest paper to this, which examines regional parameters and growth heterogeneity is Masanjala and Papageorgiou (2008). Their paper focuses on the Sub-Sahara African region and by using BMA methods they show that the driving forces of economic growth in Africa are substantially different from those in the rest of the world. My paper differs from Masanjala and Papageorgiou (2008) in three main ways:

First, this paper extends the focus to four regions: Middle East and North Africa (MENA), Sub-Saharan Africa (SSAF), East and South Asia (EAST), and Latin America and the Caribbean (LATIN). I choose these regions because most of the empirical growth studies include regional dummies for at least one of these regions in their analysis, as we suspect that these regions have residual heterogeneity.

Second, Masanjala and Papageorgiou (2008) utilizes a different model to examine parameter heterogeneity, by assuming that there are interaction terms between the regressors and a dummy for Africa. But there is significant criticism in the literature with regard to this assumption. Crespo Cuaresma (2011) points at the problematic use of interaction terms in BMA and shows that the results of Masanjala and Papageorgiou (2008) are sensitive to an alternative prior model structure in considering interaction terms. The issue arises because BMA considers the entire model space that includes many models where the interaction appears without linear regressors corresponding to the interacted variables. Therefore, the coefficients of the interaction terms in these models do not capture the differences in coefficients between SSAF and the rest of the world. This paper circumvents this issue by using region specific growth structure model instead of interaction terms.[3]

Third, this paper takes the analysis a step forward by integrating model averaging and decomposition methods. It first employs model averaging to estimate the region-specific model. It then applies decomposition methods to these estimates to better explain how cross-country

[3] Although I do not show it in this paper, if one insists on using interaction terms to examine regional coefficient and growth heterogeneity in one general growth structure, then I propose using interaction terms for both SSAF and non-SSAF countries, i.e.: $g_i = (1 - D_{Africa})x_i\beta_1 + D_{Africa} \cdot x_i\beta_2 + \epsilon_i$. This exercise produces slightly different estimates than the ones I present in this paper, but our main conclusions remain the same.

growth differences arise from both differences in explanatory variables and differences in coefficients.

To summarize, this paper proposes a new approach to understanding the sources of regional growth heterogeneity. This approach allows researchers to simultaneously address two main limitations of the standard approaches: parameter heterogeneity and model uncertainty. The growth literature has already established that ignoring either of these limitations can produce biased estimates. This paper therefore combines decomposition and model averaging methods to address the issues of parameter heterogeneity model uncertainty respectively. Though one expects decomposition methods to reduce parsimony by allowing for coefficients to differ across regions, model averaging techniques restore it by identifying the robustly variables that explain differences in countries' growth rates. In this sense, these techniques complement each other.

The paper is structured as follows. Section 2 describes the data and in Section 3 presents the methodology. Section 4 shows the main empirical results of the paper, and Section 5 summarizes and concludes.

2. Data

The paper examines the GDP per capita growth rates of 135 countries[4] over the period 1975-2014. In this analysis I average these rates for ten-year periods beginning with 1975–84 and ending with 2005-2014. I collected data on some of the most commonly used explanatory variables in the literature without major loss in observations. Data was not available for 1975-1984 and 1985-1994 for some countries (mainly East European countries). Table 1 presents the number of countries by region for which data was available in each period. The total number of observations is 505. 145 for Sub-Saharan Africa (SSAF), 74 for Middle East & North Africa (MENA), 60 for East/South Asia (EAST), 84 for Latin America and the Caribbean (LATIN), 72 for West Europe and North America (WENA), and 70 for other regions (OTHER).

[4] The complete list of countries examined in this paper can be found in the appendix (Table A)

The dataset contains 48 variables including the dependent variable, the average annual growth rate of GDP per capita at Purchasing Power Parity (PPP) for each period[5]. I put together a broad cross-country data using various sources that include Penn World Tables 9.0 (PWT9.0), United Nations database, Freedom House, and International Religious Freedom Data. The complete list of the variables used in this paper, short descriptions, and sources can be found in the appendix[6].

Table 1 – Number of observations by region and period

Region\Period	1975-1984	1985-1994	1995-2004	2005-2014	Total
Middle East & North Africa (MENA)	18	18	19	19	74
East Asia (EAST)	15	15	15	15	60
Sub-Saharan Africa (SSAF)	35	36	37	37	145
Latin America & The Caribbean (LATIN)	21	21	21	21	84
West Europe & North America (WENA)	18	18	18	18	72
Other Regions (OTHER)	10	10	25	25	70
Global	117	118	135	135	505

This table provides the number of countries by region and period for which data was available. The last column shows the total number of observations for each region

I use the PWT9.0 data for some of the main explanatory variables. "Investment" is the logarithm of average share of gross capital formation at current PPPs. Initial Income is the logarithm of GDP per capita at the beginning of each period. Population growth is a logarithm of average population growth plus 0.06. Human capital index (in logs) is based on the average years of schooling from Barro and Lee (2013) and from Cohen and Leker (2014). Government spending is the average share of government consumption at current PPPs. Openness is the average share of exports plus imports in GDP, filtered for the usual relation of this share to the logs of population and area[7].

The set of religion variables include adherent shares to different religions, religious pluralism index[8], and two measures of the state's religion regulation introduced by Grim and Finke (2007). The first is the Government Regulation Index which they define as "the restrictions placed on the practice, profession, or selection of religion by the official laws, policies, or administrative

[5] The Penn World Tables 9.0 provide two measure of GDP, output side and expenditure side. I use GDP that is measured from the output side as it is more appropriate for analyzing productivity differences across countries (Feenstra et al. (2009))

[6] Table A1.

[7] Following Durlauf, Kourtellos, and Tan (2011)

[8] The religious pluralism index is the probability that two randomly selected persons from the population would belong to different religions

actions of the state." And the second, the Government Favoritism Index. This index is different from the standard measures (proxies) of religion regulation usually used in the growth literature[9]. This index measures the government's support to a selected religion. Or as Grim and Finke (2006) defines it: "subsidies, privileges, support, or favorable sanctions provided by the state to a select religion or a small group of religions." This measure has been used in several papers by Grim and Finke, and by various studies from other disciplines. In the context of cross-country growth regressions, Alon et al. (2017) for example, uses these measures to study the role of different types of religion restrictions on economic development.

I also consider three measures for political instability and violence. "Coups" is an index that captures the number of successful and attempted coups in each period. "War" is the overall interstate Major Episodes of Political Violence (MEPV) average over 1970-1984, 1980-1994, 1990-2004, and 2000-2014. And "Civil" is the overall societal MEPV average over 1970-1984, 1980-1994, 1990-2004, and 2000-2014. Measures of geography and history include percentage of land within 100km from ice-free coast (%Ice-free coast), percentage of land with tropical climate (%Tropical), a dummy variable for colonial history (ex-colony) where one indicates that the country was colonialized by Spain or France, and a dummy for English legal origin (common law) where one indicates that country was colonized by Britain and English legal code was transferred.

Other key measures include the percentage of population in malaria areas in 1994 (Malaria94), the share of mining in GDP (Mining), and the logs of birth ratio per 1,000 population (Birth Rate); indexes of political rights, rule of law, and linguistic fractionalization; and lastly, regional and time dummies.

Table 2 presents summary statistics – means and standard deviations – of key variables for MENA, EAST, SSAF, LATIN, and the entire sample (Global)[10]. The table shows that the averages of the growth rates are not the same across regions. For example, the average growth rate of EAST countries is substantially higher than the rest (3.86%); by contrast, the average growth of SSAF is well below the rest of the world (0.95%). Moreover, the standard deviations

---

[9] For example, Barro and McCleary (2003) uses a dummy variable that indicates whether the government appoints or approves church leaders or a measure of the presence or absence of a state religion.

[10] Summary statistics for all variables can be found in the appendix (Table A2)

differ across regions and indicate that there is more variation in growth rates within MENA and SSAF compared to other regions.

Table 2- Summary Statistics

Variable	MENA	EAST	SSAF	LATIN	Global
GDP Per Capita Growth	1.946 (5.247)	3.863 (3.015)	0.949 (4.725)	2.131 (3.001)	2.193 (3.923)
Initial Income	9.237 (1.213)	8.479 (1.216)	7.469 (0.801)	8.551 (0.656)	8.541 (1.226)
Investment	-1.434 (0.436)	-1.487 (0.516)	-2.014 (0.626)	-1.687 (0.271)	-1.679 (0.519)
Human Capital	0.571 (0.267)	0.741 (0.313)	0.339 (0.228)	0.692 (0.211)	0.655 (0.351)
population growth	-2.422 (0.202)	-2.590 (0.103)	-2.452 (0.094)	-2.566 (0.090)	-2.564 (0.176)
Government Spending	0.211 (0.097)	0.176 (0.059)	0.192 (0.109)	0.152 (0.058)	0.188 (0.085)
Openness	1.455 (0.257)	1.599 (0.677)	1.341 (0.306)	1.355 (0.243)	1.462 (0.409)
Rule of Law	0.540 (0.165)	0.588 (0.246)	0.391 (0.148)	0.456 (0.148)	0.539 (0.229)
Political Rights	0.316 (0.263)	0.466 (0.382)	0.348 (0.267)	0.679 (0.234)	0.538 (0.348)
Coups	0.345 (0.672)	0.458 (1.198)	1.032 (1.270)	0.675 (1.380)	0.562 (1.096)
Mining	0.234 (0.224)	0.078 (0.116)	0.089 (0.135)	0.063 (0.080)	0.092 (0.146)
Malaria94	0.146 (0.260)	0.422 (0.417)	0.840 (0.312)	0.192 (0.308)	0.373 (0.435)
Religion Regulation	6.907 (1.410)	5.000 (3.368)	2.204 (2.321)	1.305 (1.092)	3.334 (2.931)
Religion Favoritism	7.813 (1.233)	5.156 (2.366)	3.211 (2.483)	4.817 (2.926)	5.140 (2.694)
Language Fractionalization	0.510 (0.205)	0.442 (0.308)	0.717 (0.267)	0.200 (0.232)	0.466 (0.308)
Religion Polarization	0.195 (0.187)	0.576 (0.244)	0.560 (0.185)	0.325 (0.179)	0.430 (0.244)

This table provides summary statistics – means and Standard errors (the latter in brackets) – for selected variables for each region and for the global sample.

Overall, Table 2 shows that regions are heterogeneous in many ways. I will summarize some of the key differences. MENA countries are the most reliant on output from mining (0.23) and have outlier values for regulation of religion (6.9) and (7.8). SSAF countries appear to be particularly different from other regions in that this region has the lowest Investment shares (-2.01), initial income (7.47), and human capital (0.34), and has outlier values for Malaria94 (0.84), and coups (1.03). On the other hand, EAST has outlier values for human capital (0.74) and openness (1.59). And lastly LATIN has outlier values for political rights (0.67) and government spending (0.15).

Table 2 shows that variables that we think explain economic growth have different values across regions. I will show in this paper that these difference in the values of the explanatory variables are not the only source for growth heterogeneity across regions. In particular, I will show that some of these variables can explain growth differences even when the values are the same across regions because the associations between these variables and growth differ across regions.

3. Methodology

The general framework of the growth analysis in this paper is based on the neoclassical growth theory. The growth structure is linear and is given by:

$$(2) \qquad g_{i,t} = X'_{i,t}\beta + \epsilon_{i,t} \quad where \;\; i = 1,2,\dots,N_t, \qquad t = 1,2,\dots,T$$

$g_{i,t}$ is the GDP per capital growth rate of country i in period t. $X_{i,t}$ is $(K+1)\times 1$ vector of K growth determinants[11] and a constant 1. β is $(K+1)\times 1$ vector of regression coefficients. And finally, $\epsilon_{i,t}$ is the error term.

Previous studies typically not only assume that the same variables explain growth for all countries but also the association between these variables and growth is the same. In other words, they also assume homogeneous coefficients across countries/regions. These studies estimate equation (2) using the whole sample of countries and allow for regional parameter heterogeneity only in the constant terms by using regional dummies. This approach ignores the issue of parameter heterogeneity and therefore it can produce biased estimates and does not allow the researcher to examine regional coefficient heterogeneity as a source of regional growth heterogeneity.

[11] I normalized the values of explanatory variables by their standard deviations.

In this paper I relax the assumption of identical coefficients across regions, and instead assume that the coefficients are identical across countries only within a region. In other words, I estimate equation (1) for each region $r = 1,2, \dots, R$ separately rather than for all countries jointly:

$$(3) \quad g_{i,t,r} = X'_{i,t,r}\beta_r + \epsilon_{i,t,r}$$

3.1 Model Uncertainty

Any empirical evidence about which variables explain growth and how they are associated with growth has been shown to depend on which explanatory variables appear in the regression. Therefore, if one ignores this issue, and considers only one possible model from the model space, either by including a subset of the potential growth determinants or by taking the "kitchen sink" approach and including all potential growth determinants in the regression, results are likely to be fragile (Kourtellos et al. 2017). I choose instead to address the issue of model uncertainty constructively using Bayesian Model Averaging methods following Brock et al. (2003) closely. Previous studies on BMA in the empirical growth literature include for example, Brock and Durlauf (2001), Duraluf et al. 2008, Sala-I-Martin et al. 2004, Masanjala and Papageorgiou (2008).

I extend the framework to include model uncertainty. To see how BMA works, suppose there are K candidate variables that can potentially explain growth and that there is no certainty about which variables to include in the model. This means that there are 2^K possible linear growth models. The idea of BMA is to estimate the coefficient on each variable conditional on the entire model space $M = (M_1, M_2, \dots, M_j, \dots, M_{2^K})$ instead of restricting the examination on one specific model. The expected value of the coefficients is the weighted average of the coefficients across all possible models, where the posterior probability (likelihood) of each model to be the correct model is used as weights.

The posterior probability that model M_j is the true model is constructed as the ratio of the marginal likelihood of model M_j relative to the sum of the marginal likelihoods of all possible models. Let $\Pr(M_j|D)$ be the posterior probability that model M_j is the correct model given the data:

$$(4) \quad \Pr\left(M_j \middle| D\right) = \Pr\left(D \middle| M_j\right) \frac{\Pr(M_j)}{\Pr(D)} = \Pr(D|M_j) \frac{\Pr(M_j)}{\sum_{m=1}^{2^K} \Pr\left(D \middle| M_j\right) \Pr(M_j)}$$

where $\Pr(M_j)$ is the prior probability that M_j is the true model. And $\Pr(D|M_j)$ is the integrated likelihood of model M_j:

$$(5) \qquad \Pr(D|M_j) = \int \Pr\left(D \middle| \beta^j, M_j\right) Pr\left(\beta^j \middle| M_j\right) d\beta^j$$

where β^j is the vector of parameters included in model M_j. And $\Pr\left(\beta^j \middle| M_j\right)$ is the prior probability distribution assigned to the parameters in model M_j.

The estimated posterior means and variances of the coefficient vector are then constructed as:

$$(6) \qquad E\left(\hat{\beta} \middle| D\right) = \sum_{j=1} \hat{\beta} Pr(M_j|D),$$

$$(7) \quad V\left(\hat{\beta} \middle| D\right) = \sum_{j=1}^{2^K} Var\left(\hat{\beta}|D, M_j\right) Pr(M_j|D) + \sum_{j=1}^{2^K} Pr\left(M_j \middle| D\right) \left[E\left(\hat{\beta}|D, M_j\right) - E\left(\hat{\beta}|D\right)\right]^2$$

Note that the estimated variances of the coefficients are the weighted average of the coefficients' variances across all models plus the variances across models of the expected values of the coefficients. The posterior probability of each model to be the correct model is used as weights.

To implement the BMA, we must specify the prior model probabilities and the prior distribution of the parameters. The choice of the prior probabilities should reflect the prior information the researcher has about which model is correct. With no prior information about which model is correct, it is reasonable to assume that all models are equally likely a priori and assign to each model in the model space a probability of $\Pr(M_j) = 2^{-K}$ (uniform prior model probability). Important to note that by using these prior probabilities I am assuming that the inclusion/exclusion of a regressor is independent a priori of the inclusion/exclusion other regressors.

Regarding the prior distributions of the coefficients, I use unit information priors (UIP) to again reflect the idea that there is little prior information. The UIP is a multivariate normal distribution centered at the maximum likelihood estimates. The idea here is to use priors that let the data speak for itself. In using these priors, I follow Eicher et al. (2011) who compares various alternative priors using growth data and simulation experiments. They conclude that the UIP with the uniform model prior as the most robust priors and best to identify the right regressors across all simulations.

I follow Raftery (1995) and employ a simple and accurate BIC (Bayesian Information Criterion) approximation for the integrated likelihood to construct the prior probabilities on the regressions' coefficients[12]. This approximation corresponds closely to the unit information prior (UIP).

$$\text{(8)} \qquad \Pr(D|M_j) \approx n\left(1 - R_j^2\right) + p_j \cdot \log(n) = BIC_j$$

where p_j is the number of regressors included in model M_j, and n is the number of observations. The posterior probability that model M_j is the correct model given the data, can then be computed using the BIC as follow:

$$\text{(9)} \qquad Pr\left(M_j\middle|D\right) = \exp\left(-\frac{BIC_j}{2}\right) / \sum_{i=1}^{K} \exp(-\frac{BIC_i}{2})$$

And lastly, I construct the posterior inclusion probability as a ranking measure to see how much the data favors the inclusion of an explanatory variable in the regression. The posterior inclusion probability of each coefficient, given the data, is the sum of all posterior probabilities of all the regressions including the specific variable k:

$$\text{(10)} \qquad \Pr(\beta_k \neq 0|D) = \sum_{j:\beta_k \in D} Pr\left(M_j\middle|D\right),$$

3.2 Decomposition Methods

In the next step, I use the BMA estimates and employ decomposition methods to understand how cross-country growth differences arise from differences in explanatory variables versus differences in coefficients. To see how these methods work I present first the standard decomposition (Oaxaca-Blinder Decomposition):

[12] I also examine a Zellner's g prior as alternative prior structures for the regression coefficients. Namely, UIP by setting $g = N$, and as in Fernandez, Ley and Steel (2001) using $g = Max(N, k^2)$.

Let $E_r(g) = \bar{X}_r\hat{\beta}_r$ the average growth rate in region r; and let $E_A^B(g) = \bar{X}_B\hat{\beta}_A$ be the expected average growth that the countries in region A would have achieved if they had the same levels of the growth determinants (same levels of X) as those of the countries in region *B*. The growth differences between the two groups can be written as

$$(11) \qquad E_A(g) - E_B(g) = \bar{X}_A\hat{\beta}_A - \bar{X}_B\hat{\beta}_B$$

$$E_A(g) - E_B(g) = \left(\bar{X}_A\hat{\beta}_A - \bar{X}_B\hat{\beta}_A\right) + (\bar{X}_B\hat{\beta}_A - \bar{X}_B\hat{\beta}_B)$$

$$(12) \qquad E_A(g) - E_B(g) = (\bar{X}_A - \bar{X}_B)\hat{\beta}_A + \left(\hat{\beta}_A - \hat{\beta}_B\right)\bar{X}_B$$

$$\hat{\Delta}_O = \hat{\Delta}_X + \hat{\Delta}_S$$

Where $\hat{\Delta}_X$ is the “explained” portion of growth heterogeneity across the two groups (differences in X’s), and $\hat{\Delta}_S$ is the “unexplained” portion (differences in coefficients).

Note here that the standard decomposition in equation (12) uses the coefficients of group A as the reference group to estimate $\hat{\Delta}_X$, and the X’s of group B as the reference group to estimate $\hat{\Delta}_S$. In in this paper I choose to follow a well-known approach in the literature suggested by Cotton (1988)[13], and use the weighted average (by sample size) of the coefficients over the two samples. Let $\widehat{\beta}^*$ be the weighted average coefficients vectors over both samples. The outcome difference can then be written as:

$$(13) \qquad E_A(g) - E_B(g) = (\bar{X}_A - \bar{X}_B)\widehat{\beta}^* + \left[\left(\hat{\beta}_A - \widehat{\beta}^*\right)\bar{X}_A + \left(\widehat{\beta}^* - \hat{\beta}_B\right)\bar{X}_B\right]$$

where $\widehat{\beta}^* = \frac{n_A}{n_A+n_B}\hat{\beta}_A + \frac{n_B}{n_A+n_B}\hat{\beta}_B$, n_r is the size of sample r.

Identification problem

As pointed out by Jones and Kelley (1984), the estimates of the individual contributions to the unexplained differences (differences in coefficients) are not invariant to simple changes in the scaling of the explanatory variables, namely shifting the variables by a constant[14]. This issue makes the interpretation of the estimates for the unexplained differences in the context of cross-

[13] I also tried other alternatives such as the standard decomposition $\widehat{\beta}^* = \hat{\beta}_A$ or $\widehat{\beta}^* = \hat{\beta}_B$, the average coefficient $\widehat{\beta}^* = 0.5\hat{\beta}_A + 0.5\hat{\beta}_B$ (Reimers, 1983), and finally the coefficients from the pooled sample as the reference coefficients (Neumark, 1988).
[14] To see this, see appendix C

country economic growth heterogeneity very problematic since many of the explanatory variables used in the literature do not have a natural zero point (including variables that are usually used in logs)

I deal with the scaling issue by choosing economically meaningful reference points (zero points) for each explanatory variable. I choose the "frontier" as a reference point[15]. In other words, instead of using the levels of the explanatory variables to explain growth differences, I use distances from the "frontier" to explain growth differential heterogeneity from the frontier. I assume the frontier is not fixed and is moving over time[16]. Following the growth literature (see for example, Acemoglu et al., 2006), I convert the data into distances from the United States' levels for each of the four periods. I estimate the following growth differential equations:

$$(14) \qquad \tilde{g}_{i,t,r} = \tilde{X}'_{i,t,r}\beta_r + \epsilon_{i,t,r}$$

where

$$\tilde{g}_{i,t,r} = g_{i,t,r} - g_{t,US},$$

$$\tilde{X}'_{i,t,r} = X'_{i,t,r} - X'_{t,US}$$

The decomposition of the differences in growth differentials from the US:

$$(15) \qquad E_A(\tilde{g}) - E_B(\tilde{g}) = \left(\bar{\tilde{X}}_A - \bar{\tilde{X}}_B\right)\widehat{\beta}^* + \left[\left(\hat{\beta}_A - \widehat{\beta}^*\right)\bar{\tilde{X}}_A + \left(\widehat{\beta}^* - \hat{\beta}_B\right)\bar{\tilde{X}}_B\right]$$

Note that the overall differences in growth differential from the US is equal to the standard differences in growth rates, $E_A(\tilde{g}) - E_B(\tilde{g}) = E_A(g) - E_B(g)$. The first component of the decomposition, $\left(\bar{\tilde{X}}_A - \bar{\tilde{X}}_B\right)\widehat{\beta}^*$ still represents the portion of growth rates differences that is due differences in explanatory variables since $(\bar{X}_A - \bar{X}_B) \approx \left(\bar{\tilde{X}}_A - \bar{\tilde{X}}_B\right)$.[17] On the other hand, the second component now represents the contributions of differences in coefficients to the differences in growth differential from the frontier (and not the differences in growth rates).

---

[15] I also examined other reference points like the mean or the median. My main conclusions about the importance of coefficient heterogeneity are robust to the choice of the reference point. Obviously, the estimates of the unexplained portion and their interpretation will be different in each case

[16] If I was to assume a fixed "frontier", then this exercise would have only affected the intercepts and there would be no change in the "explained" differences (e.g. $(\bar{X}_A - \bar{X}_B)\widehat{\beta}^* = \left(\bar{\tilde{X}}_A - \bar{\tilde{X}}_B\right)\widehat{\beta}^*$). Still, I find that this assumption (moving frontier) has very little impact on the explained differences.

[17] The two are not exactly equal because the panel data I am using is unbalanced

4. Findings

This section presents the paper's main empirical results. First, in Section 4.1 I apply BMA to identify the variables which robustly explain differences in growth rates within and across the subsamples. I estimate the posterior means and standard deviations (equations 6 & 7) and the posterior inclusion probabilities (equation 10) using the growth model specification given by equation (14). These exercises indicate that both the variables that appear to explain growth, and the ways these variables affect growth, differ across regions. Second, in Section 4.2 I present the results from my decompositions (equation 15). These decompositions illustrate that a substantial portion of the growth differences across regions is due to differences in the coefficients.

4.1 BMA findings

I present the key results of the BMA for each sample in Table 3. The table shows the posterior inclusion probabilities (PIP) (first column) as well as the posterior means and standard errors (second column) for selected variables. There is no consensus in the literature about the threshold value of PIP for a variable to be considered effective. Raftery (1995) for example defines five types of evidence corresponding to different values of PIP. He defines "No Evidence" corresponding to PIP<50%, 50%<PIP<75% as "Weak", 75%<PIP<95% as "Positive", 95%<PIP<99% as "Strong", and PIP>99% as "Very Strong" evidence. Masanjala and Papageorgiou (2008) uses the posterior mean to standard deviation ratio as a measure to identify the most effective variables and chooses the threshold value of 1.3. In this paper I choose a combination of these two approaches to identify the most effective variables and define PIP>90% or Mean/SD>1.65 as strong evidence for association with economic growth. I use this cutoff because it resembles statistical significance at the 10% in the frequentist sense. I present in Table 3 all the variables that appear effective in at least one of the samples (regions).

Overall, the results in Table 3 provide strong evidence for parameter heterogeneity across regions, and more broadly, differences in the driving forces of economic growth. Factors that appear important to explain growth heterogeneity in one region do not necessarily matter in other regions. Initial income is the only variable that appears important explaining growth differences across countries in all the samples, with posterior inclusion probabilities of 100%. Even so, the coefficients on initial income are not identical across regions, which indicates differences in the convergence rates. The convergence rates for MENA and EAST appear faster than for SAAF, LATIN, or the global sample. This result is related to the findings of previous studies that the

Table 3- BMA Estimates

	MENA		SSAF		EAST		LATIN		Global	
Explanatory Variable	**PIP**	**Post. Mean (S.D)**	**PIP**	**Post. Mean (S.D)**	**PIP**	**Post. Mean (S.D)**	**PIP**	**Post. Mean (S.D)**	**PIP**	**Post. Mean (S.D)**
Initial Income	100.0	-8.59*** (1.15)	100.0	-4.45*** (0.65)	100.0	-6.83*** (1.40)	100.0	-2.96*** (0.67)	100.0	-3.99*** (0.40)
Investment	27.9	0.31 (0.60)	0.1	0.00 (0.01)	100.0	1.85*** (0.42)	0.0	0.00 (0.00)	33.6	0.15 (0.23)
Human Capital	18.4	0.61 (1.35)	2.4	0.01 (0.14)	12.1	0.23 (0.68)	92.3	2.45** (1.08)	59.3	0.62 (0.58)
population growth	8.0	0.08 (0.30)	100.0	3.42*** (0.68)	0.2	0.00 (0.03)	0.0	0.00 (0.04)	50.7	0.34 (0.38)
Government Spending	78.6	-0.80 (0.55)	4.6	-0.01 (0.07)	98.1	-2.12** (0.84)	90.6	-1.06** (0.52)	42.1	-0.16 (0.21)
Openness	68.7	-1.32 (1.13)	2.2	-0.01 (0.10)	1.1	-0.01 (0.09)	90.0	1.58** (0.79)	0.0	0.00 (0.00)
Rule of Law	84.6	2.73* (1.47)	81.3	1.20 (0.77)	69.8	1.73 (1.42)	1.9	-0.02 (0.17)	100.0	1.42*** (0.29)
Malaria94	3.7	0.05 (0.30)	98.2	-2.02*** (0.66)	58.9	-1.92 (1.95)	10.2	-0.06 (0.20)	71.1	-0.52 (0.40)
Mining	100.0	1.43*** (0.38)	100.0	1.61*** (0.37)	99.9	-2.35*** (0.56)	1.7	0.02 (0.14)	100.0	1.04*** (0.17)
Birth Rate	3.0	0.06 (0.51)	98.7	-5.61*** (1.59)	2.6	-0.02 (0.18)	45.7	-0.93 (1.20)	99.5	-1.56*** (0.49)
# Neighboring Countries	79.3	2.36* (1.43)	0.0	0.00 (0.00)	94.7	1.42** (0.63)	2.5	-0.06 (0.39)	0.0	0.00 (0.00)
%Ice-Free Coast	99.5	5.86*** (1.38)	0.1	0.00 (0.02)	23.4	0.26 (0.58)	0.4	0.00 (0.03)	0.0	0.00 (0.00)
Religion Favoritism	99.5	5.37*** (1.77)	0.0	0.00 (0.00)	35.0	-0.59 (0.92)	3.8	-0.02 (0.11)	0.0	0.00 (0.00)
Period 2005	82.4	2.63 (1.61)	99.5	3.07*** (0.78)	97.7	2.62*** (0.86)	94.0	2.44** (0.96)	100.0	3.14*** (0.69)
Intercept	100.0	-17.74** (7.52)	100.0	1.02 (2.17)	100.0	0.77 (2.14)	100.0	0.77 (1.41)	100.0	-1.67*** (0.47)
# Observations	74		145		60		84		505	
R-squared	0.74		0.53		0.79		0.64		0.48	

This table provides BMA estimates for the per capita GDP growth regression (equation 14) in the text for each of the regions and for the global sample. The table presents all the variables that appear effective (PIP>90% or Mean/SD > 1.65) in at least one of the regions. For each region, the first column provides results on the posterior probability of inclusion for variables (equation 10), and the second column provides results on posterior means and standard deviations – equations (6) and (7) – (the latter in brackets). ***, **, and * denote significance at 1%, 5%, and 10%, respectively. The reported R-squared is the average R-squared of the best five models.

convergence rates differ across different groups of countries. Canova (2004) for instance, finds that poor countries converge faster to their steady state than rich countries. My findings show that convergence rates differ also across regions.

Economic growth heterogeneity within regions is shown to be associated with distinct factors playing a primary role in each region. Religion favoritism index is positively associated with economic growth for MENA with PIP=99.5%. This positive association with growth is distinct for MENA and is quite different from the findings of previous studies. Grim and Finke (2007) for example, finds a negative relationship between religion regulations in general and growth and argues that more regulations leads to less order and more violence, and therefore affects growth negatively[18]. These conflicting findings may indicate that the association between this measure and growth depends on which religion is being supported by the government. Islam is the dominant religion in this region but not in other regions. Moreover, this index measures the support of the state to a selected religion which can be viewed as government discrimination between different religions, which can explain the findings of Grim and Finke (2007). On the other hand, it is hard to argue that this index measures government discrimination in MENA because there is very little religion diversity in this region. In MENA countries, the probability that two randomly selected persons from the population would belong to different religions is equal 0.19, much smaller than the probability in any other regions. In MENA, this index is probably capturing the type of relation the state has with religion. My intuition of this positive association with economic growth is greater support to religion may assist to ensure political stability which in return has a positive effect on growth. Other important factors for MENA include mining (PIP=100%), access to water (99.5%), and to some degree, rule of law (PIP=84.6%).

The most important factor to explain growth heterogeneity in the EAST sample is investment with PIP=100%. This finding supports the view of policy makers in East Asia that on average, investment in infrastructure in East Asia has provided the underpinnings for economic growth

[18] I find similar results, namely a negative relationship for WENA. The BMA results for WENA can be found in the appendix (Table 8B)

better than other developing regions. According to the World Bank (2005)[19], the high infrastructure investments in this region were generally rapid and strategic responses to emerging infrastructure constraints which may explain why investment seems to matter to economic growth in this region distinctively. Another interesting finding is the negative association between mining and economic growth as opposed to the positive relationship found in MENA, SSAF or in the global sample. This might indicate that East Asian countries that rely more on mining are not following the overall economic development and structural changes that are happening in this region and therefore are left behind (high opportunity cost). And lastly, government spending negatively affects growth (PIP=98.1%).

What seems to explain growth differences across countries in SSAF, are generally the differences in demographic characteristics and in natural resources. For example, I find, similar to Masanjala and Papageorgiou's (2008) findings, that differences in natural resources (share of mining in GDP) can explain growth heterogeneity with PIP=100%. This is not surprising, of course, since countries in this region have very little alternative economic opportunities. Another example is the variable "Malaria94" with PIP=98.2%. Birth rate (PIP=98.7%) and population growth (PIP=100%) are also important growth determinants. The negative effect of fertility rates on economic growth support the findings of Barro and Lee (1994)[20] that suggests that this result can be related to the negative association between human capital and fertility rates. Table 3 shows, in contrast to previous studies, that population growth has a positive effect on economic growth. Controlling for fertility and net migration rates, high population growth can signal improvements in the overall health conditions which are in turn related positively to economic growth.

In Latin America I find that human capital is the key source of economic growth (PIP=92.3%). The economic growth literature has emphasized the potential positive influence of human capital formation on economic growth, especially in the developing countries. My findings show that this is not the case in other developing regions. These results may suggest that human capital is better materialized in Latin American countries to generate economic growth than other developing countries. Other factors that appear important to growth in this region are economic

[19] World Bank. 2005. "Connecting East Asia - a new framework for Infrastructure"
[20] This result can be found in Regression 12

policies. Government spending is negatively associated with growth (PIP=90.6%) and openness appears to have positive effect on growth (PIP=90%)

Overall, these findings reject the common growth structure model in favor of region-specific growth processes. These findings have several implications for cross-country growth regressions literature. The conclusions that reached about which factors explain growth heterogeneity using the assumption that the same variables explain growth for all countries – as it is done in most studies – can be misleading. First, the BMA results for the global sample indicate, for example, that government spending and regulation of religion are not associated with growth. As Table 3 shows, however, this is not true for the subsamples: government spending appears to explain growth well for EAST and for LATIN, and regulation of religion is important in explaining growth among MENA countries.

A second implication is that the observed effects of some variables in the global sample are driven almost entirely by their effects on growth in one region. For example, the negative global effect of the birth rate on growth appears to be induced entirely by its effect on growth in SSAF. This is because, as the table shows, birth rates appear unimportant in explaining growth in all the other regions. This finding may reconcile contradictory results in the literature on the relationship between countries' fertility and growth rates. For example, the global sample used by Durlauf et al. (2011) includes only two SSAF countries. In that paper, the authors conclude that fertility rates and growth are unrelated. On the other hand, the global sample used by Barro (1991) and Barro (1996) includes more than 20 SSAF countries. He finds that fertility rates and growth rates are significantly inversely related.

Another implication is that ignoring the issue of parameter heterogeneity can lead to the wrong conclusions about how variables explain growth in a specific region. For example, my findings show that the share of mining in GDP is negatively associated with growth for EAST, but if we only focused on the global sample, we would have concluded that mining has a positive effect on growth - not only for MENA and SSAF countries but also for EAST region. Lastly, the region-specific linear growth models appear to explain the variations in growth rates better than the one-model specification for all regions. In each of the subsamples, the R-squared[21] is higher than the

[21] The reported R-squared is the average R-squared of the five best models

R-squared in the global sample. It is important to note that this is also true for regions that have bigger variations in growth rates compared to the global sample, namely MENA and SSAF[22].

4.2 Decomposition Results

In this section, I use the BMA results to estimate the decomposition of the growth differences. I present in Tables 4-7 the decomposition results for the four regions: MENA, EAST, SSAF, and LATIN. In each table, I compare the posterior means and standard errors of the coefficients (columns 1 & 2), and the average distances from the US (columns 3 & 4) of each region versus the rest or the world. In the last two columns I present the estimates of decomposition equation (equation (15)):

$$(15) \qquad E_A(\tilde{g}) - E_B(\tilde{g}) = \left(\bar{\bar{X}}_A - \bar{\bar{X}}_B\right)\widehat{\beta}^{\,*} + \left[\left(\hat{\beta}_A - \widehat{\beta}^{\,*}\right)\bar{\bar{X}}_A + \left(\widehat{\beta}^{\,*} - \hat{\beta}_B\right)\bar{\bar{X}}_B\right]$$

The estimates of the differences in growth differential from the US that are due differences in explanatory variables levels $\left(\bar{\bar{X}}_A - \bar{\bar{X}}_B\right)\widehat{\beta}^{\,*}$ are presented in column (5), and those that are due differences in coefficients $\left[\left(\hat{\beta}_A - \widehat{\beta}^{\,*}\right)\bar{\bar{X}}_A + \left(\widehat{\beta}^{\,*} - \hat{\beta}_B\right)\bar{\bar{X}}_B\right]$ are presented in column (6).

In these tables I only present the estimates for variables that appear important to explain growth differences (statistically significant) between each region and rest of the world[23]. The coefficients that are statistically different one from another are in bold.

MENA vs Non-MENA

The results show that the growth process of MENA countries is fundamentally different from the rest of the world. Most of the coefficients listed in Table 4 (column 1 vs 2) are statistically different one from another. These differences as shown in the decomposition estimates (column (6)) play an important role in explaining differences in growth differential form the US.

I find that initial income affects the differences in growth differential from the frontier in two opposing ways. First, the higher initial income in MENA relative to the rest of the world explains the relatively lower growth rates in MENA (-2.96%). On the other hand, the higher growth convergence rate in the MENA countries (the differences in the coefficients -8.59 vs -3.68)

---

[22] Table 2 shows that the standard errors of GDP per capita growth rates differ across the different samples. 5.25% (MENA) and 4.72 (SSAF) compared to (3.92%) for the global sample

[23] The complete decomposition results can be found in the appendix (Tables 4B, 5B, 6B, 7B)

explains 5.45% of the differences in growth rates differentials. The overall effect of initial income is 2.49%. This result shows that employing a common growth regression for all countries (Table 3- global), as it is done in most studies, would have underestimated the growth differential of MENA and overestimated the growth differential of the rest of the world. This bias can be amended if the MENA Dummy was included. If there is no other source of residual regional heterogeneity, the regional dummy would have appeared positive and statistically

Table 4- Decomposition Estimates: MENA vs Non-MENA

	Posterior Mean (S.D)		**Distance from the US**		**Decomposition**	
Explanatory Variable	**MENA**	**Non-MENA**	**MENA**	**Non-MENA**	**Differences in X's**	**Differences in coefficients**
Initial Income	**-8.59*** (1.15)**	**-3.68*** (0.35)**	-1.011 (0.117)	-1.684 (0.046)	-2.96*** (0.24)	5.45*** (1.19)
Human Capital	0.61 (1.35)	1.05*** (0.39)	-1.880 (0.081)	-1.605 (0.048)	-0.27** (0.12)	0.80 (2.27)
population growth	**0.08 (0.30)**	**1.45*** (0.34)**	1.371 (0.136)	0.428 (0.044)	1.18*** (0.28)	-1.69*** (0.56)
Rule of Law	2.73* (1.47)	0.71* (0.40)	-1.582 (0.084)	-1.585 (0.050)	0.00 (0.05)	-3.19 (2.10)
Malaria94	**0.05 (0.30)**	**-0.91*** (0.24)**	0.336 (0.072)	0.943 (0.050)	0.47*** (0.13)	0.41*** (0.14)
Coups	**0.00 (0.03)**	**-0.48** (0.20)**	0.314 (0.072)	0.547 (0.051)	0.10** (0.04)	0.17*** (0.06)
Mining	1.43*** (0.38)	0.84*** (0.21)	1.453 (0.179)	0.313 (0.036)	1.06*** (0.22)	0.76 (0.55)
Birth Rate	**0.06 (0.51)**	**-2.33*** (0.44)**	1.464 (0.065)	1.129 (0.049)	-0.66*** (0.13)	3.38*** (0.85)
# Neighboring Countries	**2.36* (1.43)**	**0.00 (0.00)**	0.716 (0.114)	0.661 (0.048)	0.02 (0.03)	1.67* (0.91)
%Ice-Free Coast	**5.86*** (1.38)**	**0.00 (0.00)**	1.019 (0.117)	0.634 (0.048)	0.33*** (0.08)	5.63*** (1.34)
Religion Favoritism	**5.37*** (1.77)**	**0.00 (0.00)**	1.044 (0.054)	-0.118 (0.047)	0.92*** (0.30)	4.69*** (1.60)
Religion Polarization	0.04 (0.26)	-0.45** (0.22)	-2.087 (0.091)	-0.968 (0.045)	0.42** (0.21)	-0.94 (0.61)

This table provides the decomposition estimates for the GDP per capita growth differences between MENA and non-MENA countries (equation 15). The table presents the estimates for variables that appear important to explain growth differences (statistically significant). Columns 1 & 2 provide results on posterior mean and standard deviations (the latter in brackets) for MENA and for Non-MENA. The coefficients that are statistically different one from another are in bold. Columns 3 & 4 provide the averages and the standard deviations of the distances from the US (columns 3 & 4) for MENA versus the rest of the world. Column 5 provide the estimates of the differences in growth differential from the US that are due differences in explanatory variables levels $(\bar{\bar{X}}_A - \bar{\bar{X}}_B)\hat{\beta}^*$, and column (6) provide estimates for those that are due differences in coefficients $[(\hat{\beta}_A - \hat{\beta}^*)\bar{\bar{X}}_A + (\hat{\beta}^* - \hat{\beta}_B)\bar{\bar{X}}_B]$. ***, **, and * denote significance at 1%, 5%, and 10%, respectively.

significant[24]. Still, it cannot provide any details about the source of this regional fixed effects. This is not the case for MENA where there are various sources of residual heterogeneity. Examples include Religion regulations (4.69%) %Ice-Free Coast (5.63%), population growth (-1.69%).

The results in this section are good examples of why regional dummies alone are insufficient to categorize regional parameters and growth heterogeneity. The MENA dummy appears unimportant in the global sample with posterior inclusion probability of only 25%[25] in spite of all the differences presented in Table 4. This can occur because the coefficients and explanatory variable levels can vary in a way that the regional dummies appear to be insignificant. Some of the estimates for the differences in coefficients are positive and some are negative. The total sum of all these estimates is very close to zero (-0.13%)[26], so it is not surprising that the regional dummy in the common growth structure model is statistically insignificant.

EAST vs Non-EAST

I found similar results for the other regions. Table 5 shows that the huge differences in the mining/growth relationship between EAST (-2.35) and the rest of the world (1.22) explain -1.41% of the differences in growth differentials. Investment also play an important role in explaining growth heterogeneity between EAST and the rest of the world. The high investments in EAST relative to other countries explains why the average growth rate of EAST is higher by 0.09%. On the other hand, since the coefficient on investment is bigger for EAST (1.85 vs 0.00), having lower investment than the frontier is "costlier" and that explains -0.42% of the differences in growth differentials from the frontier. Another important source of growth heterogeneity is the strong negative association between government spending and growth in EAST relative to the rest of the world (-2.12vs -0.20) which explains -1.52% of the differences in growth differentials. The overall differences in coefficients explain 1.00%[27] differences in growth differentials from the US between EAST and the rest of the world.

[24] The coefficient on the dummy won't be equal 5.44 because I'm not using in this exercise the coefficient from the "pooled" sample (global) as reference coefficients. But this does not affect the point I am trying to make here.
[25] See Table 4B in the appendix.
[26] See Table 3B in the appendix.
[27] See Table 5B in the appendix.

Table 5- Decomposition Estimates: EAST vs Non-EAST

Explanatory Variable	Posterior Mean (S.D) EAST	Posterior Mean (S.D) Non-EAST	Distance from the US EAST	Distance from the US Non-EAST	Decomposition: Differences in X's	Decomposition: Differences in coefficients
Initial Income	**-6.83*** (1.40)**	**-4.32*** (0.37)**	-1.625 (0.124)	-1.580 (0.047)	0.21*** (0.07)	4.06* (2.11)
Investment	**1.85*** (0.42)**	**0.00 (0.04)**	-0.180 (0.133)	-0.593 (0.048)	0.09*** (0.03)	-0.42* (0.23)
Human Capital	0.23 (0.68)	1.08** (0.47)	-1.394 (0.110)	-1.680 (0.046)	0.28** (0.13)	1.22 (1.04)
Government Spending	**-2.12** (0.84)**	**-0.20 (0.22)**	0.775 (0.091)	0.937 (0.049)	0.07 (0.05)	-1.52** (0.62)
Rule of Law	1.73 (1.42)	1.50*** (0.29)	-1.371 (0.140)	-1.614 (0.047)	0.37*** (0.10)	-0.32 (1.77)
Coups	**-0.01 (0.06)**	**-0.42* (0.23)**	0.418 (0.142)	0.526 (0.047)	0.04 (0.02)	0.18* (0.10)
Mining	**-2.35*** (0.56)**	**1.22*** (0.18)**	0.383 (0.103)	0.493 (0.048)	-0.09*** (0.03)	-1.41*** (0.38)
Birth Rate	**-0.02 (0.18)**	**-1.93*** (0.48)**	0.976 (0.100)	1.206 (0.047)	0.39*** (.11)	1.92*** (0.48)
# Neighboring Countries	**1.42** (0.63)**	**0.00 (0.00)**	0.332 (0.174)	0.714 (0.045)	-0.06** (0.03)	0.54* (0.29

This table provides the decomposition estimates for the GDP per capita growth differences between EAST and non-EAST countries (equation 15). The table presents the estimates for variables that appear important to explain growth differences (statistically significant). Columns 1 & 2 provide results on posterior mean and standard deviations (the latter in brackets) for EAST and for Non-EAST. The coefficients that are statistically different one from another are in bold. Columns 3 & 4 provide the averages and the standard deviations of the distances from the US (columns 3 & 4) for EAST versus the rest of the world. Column 5 provide the estimates of the differences in growth differential from the US that are due differences in explanatory variables levels $(\bar{\bar{X}}_A - \bar{\bar{X}}_B)\widehat{\beta}^*$, and column (6) provide estimates for those that are due differences in coefficients $[(\hat{\beta}_A - \widehat{\beta}^*)\bar{\bar{X}}_A + (\widehat{\beta}^* - \hat{\beta}_B)\bar{\bar{X}}_B]$. ***, **, and * denote significance at 1%, 5%, and 10%, respectively.

SSAF vs Non-SSAF

Table 6 shows that mining shares in GDP are the same in SSAF vs. the rest of the world, but mining appear more important to growth for SSAF countries than for the rest of the world (1.61 vs 0.84) which explains 0.36% of the differences. Initial income is another important factor, if initial income was the only source of regional growth heterogeneity, the low initial income in SSAF would explain why SSAF average growth is higher by 5.53% than the rest of world. The overall contribution of population growth to the differences in growth rates between the SSAF and the rest of the world is 4.10%, where higher population growth rates explain 0.87%, and

Table 6- Decomposition Estimates: SSAF vs Non-SSAF

	Posterior Mean (S.D)		Distance from the US		Decomposition	
Explanatory Variable	**SSAF**	**Non-SSAF**	**SSAF**	**Non-SSAF**	**Differences in X's**	**Differences in coefficients**
Initial Income	-4.45*** (0.65)	-4.58*** (0.35)	-2.453 (0.057)	-1.236 (0.046)	5.53*** (0.38)	-0.28 (1.33)
Investment	**0.00 (0.01)**	**0.71** (0.29)**	-1.193 (0.104)	-0.283 (0.041)	-0.46** (0.19)	0.66** (0.26)
Human Capital	**0.01 (0.14)**	**1.53*** (0.36)**	-2.542 (0.050)	-1.285 (0.044)	-1.38*** (0.38)	3.32*** (0.72)
Population Growth	**3.42*** (0.68)**	**0.00 (0.00)**	1.199 (0.045)	0.312 (0.055)	0.87*** (0.17)	3.23*** (0.60)
Government Spending	**-0.01 (0.07)**	**-0.78*** (0.21)**	0.956 (0.105)	0.903 (0.046)	-0.03 (0.02)	0.73*** (0.17)
Rule of Law	1.20 (0.77)	1.12*** (0.28)	-2.231 (0.054)	-1.325 (0.053)	-1.03*** (0.27)	-0.15 (1.34)
Malaria94	**-2.02*** (0.66)**	**0.00 (0.00)**	1.932 (0.060)	0.421 (0.039)	-0.88*** (0.29)	-3.03*** (0.92)
Mining	**1.61*** (0.37)**	**0.84*** (0.18)**	0.458 (0.077)	0.489 (0.054)	-0.03 (0.02)	0.36** (0.15)
Birth Rate	**-5.61*** (1.59)**	**-1.37*** (0.35)**	2.060 (0.028)	0.823 (0.048)	-3.19*** (0.64)	-7.24*** (2.43)

This table provides the decomposition estimates for the GDP per capita growth differences between SSAF and non-SSAF countries (equation 15). The table presents the estimates for variables that appear important to explain growth differences (statistically significant). Columns 1 & 2 provide results on posterior mean and standard deviations (the latter in brackets) for SSAF and for Non-SSAF. The coefficients that are statistically different one from another are in bold. Columns 3 & 4 provide the averages and the standard deviations of the distances from the US (columns 3 & 4) for SSAF versus the rest of the world. Column 5 provide the estimates of the differences in growth differential from the US that are due differences in explanatory variables levels $\left(\bar{\bar{X}}_A - \bar{\bar{X}}_B\right)\hat{\beta}^*$, and column (6) provide estimates for those that are due differences in coefficients $\left[\left(\hat{\beta}_A - \hat{\beta}^*\right)\bar{\bar{X}}_A + \left(\hat{\beta}^* - \hat{\beta}_B\right)\bar{\bar{X}}_B\right]$. ***, **, and * denote significance at 1%, 5%, and 10%, respectively.

differences in coefficients explain 3.23%. The relatively high birth rates and malaria prevalence in SSAF explain -3.19% and -0.88% respectively of the growth differences between the SSAF and the rest of the world. The coefficients on those variables are more negative for SSAF which explains -7.24% and -3.03% of the differences in growth differentials. Overall, the decomposition shows that -1.12%[28] of the differences between SSAF and non-SSAF can be explained by differences in all coefficients.

[28] See Table 6B in the appendix.

Table 7- Decomposition Estimates: LATIN vs Non-LATIN

	Posterior Mean (S.D)		Distance from the US		Decomposition	
Explanatory Variable	**LATIN**	**Non-LATIN**	**LATIN**	**Non-LATIN**	**Differences in X's**	**Differences in coefficients**
Initial Income	**-2.96*** (0.67)**	**-4.35*** (0.38)**	-1.566 (0.058)	-1.589 (0.052)	-0.10*** (0.03)	-2.18** (1.02)
Human Capital	2.45** (1.08)	0.57 (0.55)	-1.535 (0.059)	-1.668 (0.050)	0.12 (0.08)	-2.92* (1.59)
Government Spending	**-1.06** (0.52)**	**-0.02 (0.09)**	0.488 (0.076)	1.004 (0.050)	0.10* (0.06)	-0.60** (0.24)
Openness	**1.58** (0.79)**	**0.00 (0.00)**	-0.637 (0.047)	-0.348 (0.048)	-0.08* (0.04)	-0.93** (0.43)
Rule of Law	**-0.02 (0.17)**	**1.82*** (0.30)**	-1.944 (0.071)	-1.513 (0.051)	-0.65*** (0.11)	3.45*** (0.58)
Mining	**0.02 (0.14)**	**1.23*** (0.19)**	0.277 (0.060)	0.521 (0.051)	-0.25*** (0.04)	-0.39*** (0.09)
Birth Rate	-0.93 (1.20)	-2.06*** (0.47)	1.372 (0.053)	1.140 (0.051)	-0.43*** (0.11)	1.51 (1.50)

This table provides the decomposition estimates for the GDP per capita growth differences between LATIN and non-LATIN countries (equation 15). The table presents the estimates for variables that appear important to explain growth differences (statistically significant). Columns 1 & 2 provide results on posterior mean and standard deviations (the latter in brackets) for LATIN and for Non-LATIN. The coefficients that are statistically different one from another are in bold. Columns 3 & 4 provide the averages and the standard deviations of the distances from the US (columns 3 & 4) for LATIN versus the rest of the world. Column 5 provide the estimates of the differences in growth differential from the US that are due differences in explanatory variables levels $(\bar{\bar{X}}_A - \bar{\bar{X}}_B)\hat{\beta}^*$, and column (6) provide estimates for those that are due differences in coefficients $[(\hat{\beta}_A - \hat{\beta}^*)\bar{\bar{X}}_A + (\hat{\beta}^* - \hat{\beta}_B)\bar{\bar{X}}_B]$. ***, **, and * denote significance at 1%, 5%, and 10%, respectively.

LATIN vs Non-LATIN

Finally, Table 7 shows that, similar to the results for EAST, the negative association between government spending and growth in LATIN is much stronger than in the rest world (-1.06 vs -0.02) which explains -0.60% of the differences in growth differentials. The results also show that there are small differences between human capital levels in LATIN vs. the rest of the world, but the coefficient on human capital in LATIN is bigger than the coefficient for the rest of the world (2.45 vs 0.57) which implies that lower human capital levels relative to the frontier are more "costly" for LATIN than for the rest of the world, and that explains -2.92% of the differences. Similar to human capital, low openness levels are more costly for LATIN than for the rest of the world because the coefficients on openness is bigger for LATIN than for other countries (1.58 vs

0.00) which explains -0.93% of the differences. The overall growth differences that can be explained by differences in coefficients is 1.09%[29].

As discussed before, these differences cannot be uncovered by regional dummies alone. None of the regional dummies (EAST, SSAF, LATIN) appear significant in the common growth structure model[30]. These findings reject the assumption of homogeneous coefficients and cast doubts on the usefulness of regional dummies and show how the estimates of the coefficients on regional dummies can be misleading.

In summary, the results of the different decomposition exercises show that a considerable portion of the differences in growth rates across regions are due to differences in the coefficients. This finding has broad implications for cross-country growth literature and therefore for policy makers. I will explore these implications with two examples.

First, the decomposition results in Table 6 indicate that there are two channels in which human capital explains some of the differences in growth rates between SSAF and the rest of the world. The first is through the differences in the human capital levels, and the second is through differences in the coefficients on human capital. The table illustrates that the bigger portion of the differences in growth rates is attributed to the differences in how human capital affects growth in SSAF versus the rest of the world – in other words, to the differences in coefficients. The coefficient on human capital in SSAF is very close to zero (0.01), compared to 1.36 for the rest of the world, which indicates that human capital has no effect on growth in SSAF. Therefore, an increase in human capital in SSAF countries will not necessarily lead to higher growth rates. These findings suggest that policy makers in SSAF should, in addition to increasing human capital, take the productivity of human capital into consideration in order to find ways to better materialize the existing human capital. For example, by exploring ways to increase the demand for skilled workers and to create suitable jobs to match the qualifications of the skilled workers.

Second, as discussed earlier, the share of mining in GDP appears to have a positive effect on growth for MENA and SSAF regions but is negatively associated with growth for EAST. The opposing effects of mining in these different regions indicate that growth processes can differ

[29] See Table 7B in the appendix.
[30] See Table 3B in the appendix.

substantially across regions, and that what appears to be good for growth in one region is not necessarily beneficial for growth in other regions. Therefore, this example shows that in order to achieve the desired outcomes, one must understand what the region-specific driving forces of economic growth are. Failure to adjust for the distinct characteristics of each regional economy – simply imitating economic policies because they were successful in other regions – can lead to the opposite of the desired outcomes.

5. Conclusions

This paper takes a new approach to understanding the sources of the differences in growth rates across regions. My approach allows for region-specific linear growth models, and I use decomposition techniques to estimate how much of the differences in growth rates are explained by differences in the coefficients versus differences in the values of the explanatory variables. In addition, I also use model averaging to address model uncertainty. My findings show that the differences in the coefficients play an important role in explaining the differences in growth rates across regions. Moreover, I show that factors that appear important in explaining growth heterogeneity in one region do not necessarily matter much in other regions.

The findings of this paper support the importance of region-specific models and have implications for the growth literature in general. Specifically, they indicate that the conclusions reached about which factors explain growth heterogeneity using the homogenous coefficient assumption for the entire sample of countries – as it is done in most studies – can be misleading. For instance, I show that the observed effects of some variables in the global sample can be driven almost entirely by their effects on growth in one region, and in some cases, they may even have an opposite effect in other regions. Moreover, ignoring the issue of parameter heterogeneity can produce biased estimates which may conceal the importance of various factors in explaining growth differences for some regions.

The contribution of this paper is to address two of main the limitations of the standard approaches in the growth literature – parameter heterogeneity and model uncertainty. An additional limitation of the standard approaches is that it ignores the potential endogeneity of some the explanatory variables used to explain growth. My future work will address this issue by incorporating the use of instruments in the model averaging methods.

References

1. Acemoglu, D., S. Johnson, and J. Robinson, (2001), "The Colonial Origins of Comparative Development: An Empirical Investigation," *American Economic Review*, 91, 5, 1369-1401.

2. Acemoglu, D., P. Aghion, and F. Zilibotti. (2006), "Distance to Frontier, Selection, and Economic Growth," *Journal of the European Economic Association*, 37-74.

3. Alon, I., S. Li, and J. Wu, (2017), "An institutional perspective on religious freedom and economic growth," *Politics and religion*, 689-716.

4. Barro, R., (1991), "Economic Growth in a Cross Section of Countries," *Quarterly Journal of Economics*, 106, 2, 407-43.

5. Barro, R., (1996), "Democracy and Growth," *Journal of Economic Growth*, 1,1, 1-27.

6. Barro, R. and J.-W. Lee, (1994), "Sources of Economic Growth," *Carnegie-Rochester Conference Series on Public Policy*, 40, 1-57.

7. Barro, R. and J.-W. Lee, (2013), "A New Data Set of Educational Attainment in the World, 1950-2010." *Journal of Development Economics*, vol 104, pp.184-198.

8. Barro, R. and R. McCleary, (2003), "Religion and Economic Growth Across Countries," *American Sociological Review*, 68, 5, 760-781.

9. Blinder, A. (1973), "Wage Discrimination: Reduced Form and Structural Estimates," *Journal of Human Resources* 8:436.455.

10. Bloom, D. and J. Sachs, (1998), "Geography, Demography, and Economic Growth in Africa," *Brookings Papers on Economic Activity* (2), 207–295.

11. Brock, W. and S. Durlauf, (2001), "Growth Empirics and Reality," *World Bank Economic Review*, 15, 2, 229-272.

12. Brock, W., S. Durlauf, and K. West, (2003), "Policy evaluation in uncertain economic environments," *Brookings Papers on Economic Activity* 1: 235-322.

13. Canova, F., (2004), "Testing for Convergence Clubs in Income Per Capita: A Predictive Density Approach," *International Economic Review*, 45, 1, 49-77.

14. Cohen, D. and L. Leker (2014), "Health and Education: Another Look with the Proper Data," *CEPR Discussion Papers No 9940. London: Centre for Economic Policy Research.*

15. Cotton, J. (1988), “On the Decomposition of Wage Differentials*,” The Review of Economics and Statistics* 70: 236–243.

16. Crespo Cuaresma, J. (2011), “How different is Africa? a comment on Masanjala and Papageorgiou,” *Journal of Applied Econometrics* 26, 1041–47.

17. Crespo Cuaresma, J. and G. Doppelhofer, (2007), “Nonlinearities in cross-country growth regressions: a Bayesian averaging of thresholds (BAT) approach,” *Journal of Macroeconomics* 29(3): 541–554.

18. Desmet, K., I. OrtuÒo-OrtÌn and R. Wacziarg (2012), "The Political Economy of Linguistic Diversity," *Journal of Development Economics*, vol. 97, no. 2, pp. 322-338.

19. Durlauf, S.N., A. Kourtellos, and A. Minkin, (2001), “The Local Solow Growth Model,” *European Economic Review*, 45, 4-6, 928-40.

20. Durlauf, S.N., A. Kourtellos, and C.M. Tan, (2008), “Are Any Growth Theories Robust?,” *Economic Journal*, 118, 329–346.

21. Durlauf, S.N. and P. Johnson, (1995), “Multiple Regimes and Cross-Country Growth Behavior,” *Journal of Applied Econometrics*, 10, 4, 365-84.

22. Durlauf, S.N., P. Johnson and J. Temple, (2005), “Growth Econometrics,” in *Handbook of Economic Growth*, ed. by P. Aghion and S.N. Durlauf, pp. 555–677 (North Holland, Amsterdam)

23. Eberhardt M. and A. F. Presbitero, (2015), “Public debt and growth: Heterogeneity and non-linearity,” *Journal of International Economics*, vol. 97, n. 1, pp. 45-58.

24. Eberhardt, M. and F. Teal, (2011), “Econometrics for Grumblers: A New Look at the Literature on Cross-Country Growth Empirics,” *Economic Surveys*, 25: 109-155.

25. Easterly, W. and R. Levine, (1997), “Africa's Growth Tragedy: Policies and Ethnic Divisions,” *Quarterly Journal of Economics*, 112, 4, 1203-50.

26. Eicher, T.S., C. Papageorgiou, and A.E. Raftery, (2011), “Default Priors and Predictive Performance in Bayesian Model Averaging, with Application to Growth Determinants,” *Journal of Applied Econometrics* 26, 30–55.

27. Feenstra, R. C., Hong Ma, and D. S. Prasada Rao, (2009), "Consistent Comparisons of Real Incomes across Time and Space," *Macroeconomic Dynamics* 13 (S2), 169-93.

28. Feenstra, R. C., R. Inklaar, and M. P. Timmer (2015), "The Next Generation of the Penn World Table," *American Economic Review*, 105(10), 3150-3182

29. Fernandez, C., E. Ley and M. Steel, (2001), "Model Uncertainty in Cross-Country Growth Regressions," *Journal of Applied Econometrics*, 16, 5, 563-76.

30. Fortin, N., T. Lemieux, T., and S. Firpo, (2011), "Decomposition Methods in Economics," *Handbook of Labor Economics*, 4, 1-102.

31. Freedom House, (2017), "Freedom in the World 2017," *Washington, DC: Freedom House*. Retrieved February 05, 2018 from https://freedomhouse.org/report-types/freedom-world

32. Gallup, J. L., A. D. Mellinger, and J. D. Sachs, (2010), "Geography Datasets," *Centre for International Development, Harvard University*

33. Grim, B. J., (2007), "God's Economy: Religious Freedom and Socio-Economic Wellbeing," in *Religious Freedom in the World*, edited by P. A. Marshall, 42–47. Lanham, MD: Rowan & Littlefield.

34. Grim, B. J., and R. Finke, (2006), "International Religion Indexes: Government Regulation, Government Favoritism, and Social Regulation of Religion," *Interdisciplinary Journal of Research on Religion* 2 (1): 3-40.

35. Henderson, D. J., Papageorgiou, C. and Parmeter, C. F. (2012), 'Growth empirics without parameters', *Economic Journal*, Vol. 122, pp. 125-154.

36. Jann, B. (2008), "The Oaxaca-Blinder Decomposition for Linear Regression Models," *Stata Journal* 8: 435.479.

37. Jones, F. L., and J. Kelley, (1984), "Decomposing Differences Between Groups. A Cautionary Note on Measuring Discrimination," *Sociological Methods and Research* 12: 323–343.

38. Kourtellos, A., T. Stengos, and C.M. Tan, (2013), "The effect of public debt on growth in multiple regimes," *Journal of Macroeconomics*, 38(A), 35-43.

39. Kourtellos, A., A. Lenkoski, and K. Petrou, "Measuring the Strength of the Theories of Government Size," (November 29, 2017). Available at SSRN: https://ssrn.com/abstract=3080090

40. Kauffmann, D. and A. Kraay, (2017), "The Worldwide Governance Indicators", available online at http://info.worldbank.org/governance/wgi/#home.

41. Liu, Z. and T. Stengos, (1999), "Non-Linearities in Cross Country Growth Regressions: A Semiparametric Approach," *Journal of Applied Econometrics*, 14, 5, 527-38.
42. Marshall, M. G., (2017), "Major Episodes of Political Violence (MEPV) and Conflict Regions, 1946–2016," *Center for Systemic Peace.*

43. Maoz, Z., and E. A. Henderson. 2013. "The World Religion Dataset, 1945–2010: Logic, Estimates, and Trends," *International Interactions* 39 (3): 265–291.

44. Masanjala W. and C. Papageorgiou, (2008), "Rough and lonely road to prosperity: a reexamination of the sources of growth in Africa using Bayesian model averaging," *Journal of Applied Econometrics,* 23: 671-682.

45. Neumark, D., (1988), "Employers' Discriminatory Behavior and the Estimation of Wage Discrimination," *The Journal of Human Resources* 23: 279–295.

46. Nunn, N. and D. Puga., (2012), "Ruggedness: The Blessing of Bad Geography in Africa," *The Review of Economics and Statistics* 94(1): 20-36.

47. Oaxaca, R., (1973), "Male-Female Wage Differentials in Urban Labor Markets," *International Economic Review* 14: 693-709.

48. Pedroni, P., (2007), "Social capital, barriers to production and capital shares: implications for the importance of parameter heterogeneity from a nonstationary panel approach," *Journal of Applied Econometrics* 22(2): 429–451.

49. Raftery, A., (1995), "Bayesian model selection in social research," *Sociological methodology* pp. 111–163.

50. Raftery, A., D. Madigan, and J. Hoeting, (1997), "Bayesian Model Averaging for Linear Regression Models," *Journal of the American Statistical Association* 92, 179–191.

51. Reimers, C. W., (1983), "Labor Market Discrimination Against Hispanic and Black Men," *Review of Economics and Statistics,* 65: 570.579.

52. Sala-i Martin, X., G. Doppelhofer, and R. Miller, (2004), "Determinants of Long-term Growth: a Bayesian Averaging of Classical Estimates (BACE) Approach," *American Economic Review* 94, 813–835.

53. Tan, C. M., (2010), "No one true path: uncovering the interplay between geography, institutions, and fractionalization in economic development," *Journal of Applied Econometrics*, 25 (2010), pp. 1100-1127.

54. United Nations, Department of Economic and Social Affairs, Population Division (2017). World Population Prospects: The 2017 Revision. New York: United Nations.

55. United Nations Statistics Division - National Accounts (2017). Retrieved from https://unstats.un.org/unsd/nationalaccount/madt.asp?od=1&

56. United Nations Statistics Division- Commodity Trade Statistics Database (2017). Retrieved from https://comtrade.un.org/data/

57. World Bank, (2005), "Connecting East Asia - a new framework for Infrastructure (English)," *Washington, DC: World Bank*.

Appendix

Appendix A – Data Appendix

Table A- List of Countries

Middle East and North Africa	EAST and South Asia	Sub-Saharan Africa	Latin America and the Caribbean	West Europe and North America	Other regions (East Europe & Central Asia)
Algeria	Australia	Angola	Argentina	Austria	Albania
Bahrain	Cambodia	Benin	Bolivia	Belgium	Armenia
Cyprus	China	Botswana	Brazil	Canada	Bangladesh
Egypt	Indonesia	Burkina Faso	Chile	Denmark	Bulgaria
Iran	Japan	Burundi	Colombia	Finland	Croatia
Iraq	Korea, South	Cameroon	Costa Rica	France	Czech Republic
Israel	Laos	Central Afr. Rep.	Dominican Rep.	Germany	Estonia
Jordan	Malaysia	Congo	Ecuador	Greece	Hungary
Kuwait	Mongolia	Congo, Dem. Rep.	El Salvador	Ireland	India
Lebanon	Myanmar	Cote d'Ivoire	Guatemala	Italy	Kazakhstan
Morocco	New Zealand	Ethiopia	Haiti	Netherlands	Kyrgyzstan
Oman	Philippines	Gabon	Honduras	Norway	Latvia
Qatar	Singapore	Gambia	Jamaica	Portugal	Lithuania
Saudi Arabia	Thailand	Ghana	Mexico	Spain	Moldova
Syria	Vietnam	Kenya	Nicaragua	Sweden	Nepal
Tunisia		Lesotho	Panama	Switzerland	Pakistan
Turkey		Liberia	Paraguay	United Kingdom	Poland
The Emirates		Madagascar	Peru	United States	Romania
Yemen		Malawi	Trinidad & Tobago		Russia
		Mali	Uruguay		Serbia
		Mauritania	Venezuela		Slovakia
		Mauritius			Slovenia
		Mozambique			Sri Lanka
		Namibia			Tajikistan
		Niger			Ukraine
		Nigeria			
		Rwanda			
		Senegal			
		Sierra Leone			
		South Africa			
		Sudan			
		Swaziland			
		Tanzania			
		Togo			
		Uganda			
		Zambia			
		Zimbabwe			

Table A1- Data

Variable	Description	Source
GDP Growth	Average annual growth of real GDP at chained PPPs (output side) over each period	Penn World Tables 9.0
Initial Income	Logarithm of per capita GDP at 1975, 1985, 1995 and 2005.	Ibid
Population Growth	Logarithm of average population growth rates plus 0.06 over each period.	Ibid
Investment	Logarithm of average shares of gross capital formation at current PPPs over each period.	Ibid
Human Capital	Logarithm of Human capital index at 1975, 1985, 1995 and 2005.	Ibid
Government Spending	Logarithm of average shares of government spending at current PPPs over each period.	Ibid
Terms of Trade	The growth rate of the terms of trade over each period, interacted with the average ratio of exports plus imports to GDP	Ibid
Openness	Average ratios for each period of exports plus imports to GDP, filtered for the usual relation of this ratio to the logs of population and area.	Ibid
Political Rights	The average of the Freedom House measure of democracy for each period	Freedom House
Government Regulation Index	The value of 2001-2005 aggregate index	Grim & Finke (2006)
Government Favoritism Index	The value of 2001-2005 aggregate index	Ibid
Buddhism	Buddhism share in 1980, 1990, 2000 and 2010 expressed as a fraction of the population who expressed adherence to some religion.	Maoz, Z., and E. A. Henderson. (2013), World Religion Project - National Religion Dataset
Catholic	Catholic share in 1980, 1990, 2000 and 2010 expressed as a fraction of the population who expressed adherence to some religion.	Ibid
Eastern Religion	Eastern religion share in 1980, 1990, 2000 and 2010 expressed as a fraction of the population who expressed adherence to some religion.	Ibid
Hindu	Hindu share in 1980, 1990, 2000 and 2010 expressed as a fraction of the population who expressed adherence to some religion.	Ibid
Jew	Jewish share in 1980, 1990, 2000 and 2010 expressed as a fraction of the population who expressed adherence to some religion.	Ibid

Variable	Description	Source
Muslim	Muslim share in 1980, 1990, 2000 and 2010 expressed as a fraction of the population who expressed adherence to some religion.	Ibid
Orthodox	Orthodox share in 1980, 1990, 2000 and 2010 expressed as a fraction of the population who expressed adherence to some religion.	Ibid
Protestant	protestant share in 1980, 1990, 2000 and 2010 expressed as a fraction of the population who expressed adherence to some religion.	Ibid
Other Religion	Other religions share in 1980, 1990, 2000 and 2010 expressed as a fraction of the population who expressed adherence to some religion.	Ibid
Religious Pluralism	The probability that two randomly selected persons from the population would belong to different religions in 1980, 1990, 2000, and 2010.	Ibid
Rule of Law	The value in 1996 is given to 1975-1984 and 1985-1994. The average value over each period is used for 1995-2004 and 2005-2014	The Worldwide Governance Indicators, 2017 Update
Linguistic Fractionalization index	Linguistic Fractionalization index	Desmet, K., I. OrtuÒo-OrtÌn and R. Wacziarg (2012)
Life Expectancy	1/Life expectancy at age 15 in 1970,1980,1990, and 2000	United Nations: World Population Prospects (The 2017 Revision)
Birth Rate	Logs of birth ratio per 1,000 population [log(#/1000)] 1970,1980,1990, and 2000	Ibid
Migration	Net migration ratio (per 1,000 population) [#/1000] at the beginning of each period	Ibid
Ex Colony	Ex Colony of Spain or Portugal (dummy)	N. Nunn & D. Puga (2012)
English Legal Origin	Coded zero or one. One indicates that country was colonized by Britain and English legal code was transferred.	Ibid
Tropical	% Tropical Climate	Ibid
Desert	% Desert	Ibid
Ruggedness	Ruggedness (Terrain Ruggedness Index, 100 m.)	Ibid
Ice-Free Coast	% Within 100 km. of ice-free coast	Ibid
Mining	Fraction of Mining in GDP in the years 1980, 1990, 2000, 2010 when possible, or the closest available year.	UN Data

Variable	Description	Source
Prime Exports	The share of primary exports in all merchandise exports in the years 1980, 1990, 2000, and 2010 when possible, or the closest available year. Primary exports include "Food and live animals", "Beverages and tobacco", "Crude materials, inedible, except fuels", "Mineral fuels, lubricants and related materials", "Animal and vegetable oils and fats", and "Nonferrous metals" (codes 0-4 and 68)	UN Data
Malaria94	% of population living in areas affected by malaria in 1994 weighted by 1995 population in that areas	Gallup et al. (2010). CID at Harvard University.
Coups	The average number of coups over each period. The number of coups is a weighted average over 4 different types of coups. (1 x successful coups + 0.7 x failed coups + 0.4 x coup plots + 0.1 x alleged coup plots)	Marshall (2017). *Major Episodes of Political Violence and Conflict Regions, 1946–2016*. Center for Systemic Peace
# neighboring countries	Average number of neighboring countries (with the years some countries got split)	Ibid
Wars	The overall interstate Major Episodes of Political Violence (MEPV) average over 1970-1984, 1980-1994, 1990-2004, and 2000-2014.	Ibid
Civil	The overall societal MEPV average over 1970-1984, 1980-1994, 1990-2004, and 2000-2014.	Ibid
Time Dummy Variables	Three dummy variables for the periods 1985-1994, 1995-2004, and 2005-2014	
Regional Dummy Variables	Five dummy variables for MENA, EAST, SSAF, LATIN, and WENA	

Table A2- Summary Statistics

Variables	MENA	EAST	SSAF	LATIN	Global
GDP Per Capita Growth	1.946 (5.247)	3.863 (3.015)	0.949 (4.725)	2.131 (3.001)	2.193 (3.923)
Initial Income	9.237 (1.213)	8.479 (1.216)	7.469 (0.801)	8.551 (0.656)	8.541 (1.226)
Investment	-1.434 (0.436)	-1.487 (0.516)	-2.014 (0.626)	-1.687 (0.271)	-1.679 (0.519)
Human Capital	0.571 (0.267)	0.741 (0.313)	0.339 (0.228)	0.692 (0.211)	0.655 (0.351)
population growth	-2.422 (0.202)	-2.590 (0.103)	-2.452 (0.094)	-2.566 (0.090)	-2.564 (0.176)
Terms of Trade	0.006 (0.179)	0.016 (0.075)	0.008 (0.086)	0.014 (0.059)	0.010 (0.092)
Government Spending	0.211 (0.097)	0.176 (0.059)	0.192 (0.109)	0.152 (0.058)	0.188 (0.085)
Openness	1.455 (0.257)	1.599 (0.677)	1.341 (0.306)	1.355 (0.243)	1.462 (0.409)
Rule of Law	0.540 (0.165)	0.588 (0.246)	0.391 (0.148)	0.456 (0.148)	0.539 (0.229)
Political Rights	0.316 (0.263)	0.466 (0.382)	0.348 (0.267)	0.679 (0.234)	0.538 (0.348)
Common Law Dummy	0.216 (0.414)	0.267 (0.446)	0.421 (0.495)	0.095 (0.295)	0.248 (0.432)
Ex-Colony	0.270 (0.447)	0.267 (0.446)	0.359 (0.481)	0.857 (0.352)	0.317 (0.466)
Coups	0.345 (0.672)	0.458 (1.198)	1.032 (1.270)	0.675 (1.380)	0.562 (1.096)
Civil War	0.955 (1.636)	1.349 (2.087)	0.827 (1.600)	0.626 (1.349)	0.773 (1.574)
War	0.370 (1.084)	0.288 (1.082)	0.053 (0.209)	0.019 (0.094)	0.121 (0.595)
Mining	0.234 (0.224)	0.078 (0.116)	0.089 (0.135)	0.063 (0.080)	0.092 (0.146)
Prime Exports	0.647 (0.299)	0.472 (0.330)	0.792 (0.225)	0.681 (0.246)	0.578 (0.312)
Birth Rate	-3.422 (0.311)	-3.669 (0.419)	-3.120 (0.170)	-3.468 (0.271)	-3.569 (0.508)
Life Expectancy at age 15	0.018 (0.001)	0.019 (0.005)	0.021 (0.002)	0.018 (0.001)	0.019 (0.003)

Variables	MENA	EAST	SSAF	LATIN	Global
Migration	0.008 (0.024)	0.001 (0.005)	-0.001 (0.006)	-0.003 (0.003)	0.000 (0.011)
Malaria94	0.146 (0.260)	0.422 (0.417)	0.840 (0.312)	0.192 (0.308)	0.373 (0.435)
# Neighboring Countries	3.705 (2.317)	2.790 (3.183)	4.273 (2.099)	2.810 (1.979)	3.591 (2.380)
%Ice-Free Coast	0.509 (0.372)	0.550 (0.382)	0.172 (0.239)	0.544 (0.375)	0.388 (0.371)
%Tropical	0.000 (0.000)	0.517 (0.440)	0.590 (0.392)	0.718 (0.349)	0.367 (0.428)
%Desert	0.120 (0.190)	0.012 (0.030)	0.046 (0.142)	0.008 (0.033)	0.035 (0.114)
%Land Rugged	1.362 (1.081)	1.428 (0.772)	0.865 (1.156)	1.317 (0.681)	1.254 (1.143)
Land Area	9.425 (2.209)	10.552 (2.135)	10.163 (1.621)	9.965 (1.921)	9.982 (1.842)
Religion Regulation	6.907 (1.410)	5.000 (3.368)	2.204 (2.321)	1.305 (1.092)	3.334 (2.931)
Religion Favoritism	7.813 (1.233)	5.156 (2.366)	3.211 (2.483)	4.817 (2.926)	5.140 (2.694)
Language Fractionalization	0.510 (0.205)	0.442 (0.308)	0.717 (0.267)	0.200 (0.232)	0.466 (0.308)
Religion Polarization	0.195 (0.187)	0.576 (0.244)	0.560 (0.185)	0.325 (0.179)	0.430 (0.244)
Fraction Protestant	0.004 (0.006)	0.104 (0.162)	0.161 (0.122)	0.138 (0.173)	0.141 (0.210)
Fraction Muslim	0.820 (0.258)	0.125 (0.238)	0.271 (0.309)	0.004 (0.014)	0.251 (0.358)
Fraction Buddhism	0.002 (0.005)	0.401 (0.336)	0.000 (0.001)	0.001 (0.001)	0.055 (0.183)
Fraction Catholic	0.029 (0.069)	0.121 (0.217)	0.225 (0.184)	0.795 (0.223)	0.318 (0.351)
Fraction Hindu	0.018 (0.058)	0.012 (0.022)	0.015 (0.078)	0.012 (0.053)	0.025 (0.111)
Fraction Orthodox	0.061 (0.168)	0.005 (0.011)	0.013 (0.072)	0.004 (0.013)	0.061 (0.198)
Fraction Other Religion	0.023 (0.028)	0.202 (0.212)	0.315 (0.206)	0.043 (0.050)	0.138 (0.185)
Fraction no religion	0.007 (0.011)	0.149 (0.190)	0.008 (0.013)	0.048 (0.058)	0.061 (0.110)

This table provides summary statistics, means and Standard errors (the latter in brackets) for all the variables for each region and for the global sample.

Appendix B – Empirical Results

Table 3B- BMA Estimates

Explanatory Variable	MENA PIP	MENA Post. Mean (S.D)	SSAF PIP	SSAF Post. Mean (S.D)	EAST PIP	EAST Post. Mean (S.D)	LATIN PIP	LATIN Post. Mean (S.D)	Global PIP	Global Post. Mean (S.D)
Initial Income	100.0	-8.59*** (1.15)	100.0	-4.45*** (0.65)	100.0	-6.83*** (1.40)	100.0	-2.96*** (0.67)	100.0	-3.99*** (0.40)
Investment	27.9	0.31 (0.60)	0.1	0.00 (0.01)	100.0	1.85*** (0.42)	0.0	0.00 (0.00)	33.6	0.15 (0.23)
Human Capital	18.4	0.61 (1.35)	2.4	0.01 (0.14)	12.1	0.23 (0.68)	92.3	2.45** (1.08)	59.3	0.62 (0.58)
population growth	8.0	0.08 (0.30)	100.0	3.42*** (0.68)	0.2	0.00 (0.03)	0.0	0.00 (0.04)	50.7	0.34 (0.38)
Terms of Trade	16.0	0.05 (0.15)	19.2	0.10 (0.25)	3.1	-0.02 (0.12)	0.3	0.00 (0.03)	21.8	0.07 (0.14)
Government Spending	78.6	-0.80 (0.55)	4.6	-0.01 (0.07)	98.1	-2.12** (0.84)	90.6	-1.06** (0.52)	42.1	-0.16 (0.21)
Openness	68.7	-1.32 (1.13)	2.2	-0.01 (0.10)	1.1	-0.01 (0.09)	90.0	1.58** (0.79)	0.0	0.00 (0.00)
Rule of Law	84.6	2.73* (1.47)	81.3	1.20 (0.77)	69.8	1.73 (1.42)	1.9	-0.02 (0.17)	100.0	1.42*** (0.29)
Political Rights	68.2	-1.51 (1.33)	1.8	0.01 (0.11)	1.0	0.01 (0.09)	49.1	0.44 (0.54)	0.0	0.00 (0.00)
Malaria94	3.7	0.05 (0.30)	98.2	-2.02*** (0.66)	58.9	-1.92 (1.95)	10.2	-0.06 (0.20)	71.1	-0.52 (0.40)
Common Law Dummy	15.2	0.40 (1.12)	8.3	0.07 (0.29)	52.8	1.04 (1.20)	49.6	-1.89 (3.03)	0.0	0.00 (0.00)
Ex-Colony	0.0	0.00 (0.04)	0.0	0.00 (0.00)	20.3	-0.72 (1.52)	3.1	-0.24 (1.50)	0.0	0.00 (0.00)
Coups	0.1	0.00 (0.03)	24.9	-0.11 (0.24)	3.3	-0.01 (0.06)	7.8	-0.02 (0.10)	80.0	-0.38 (0.24)
Civil War	72.4	-0.81 (0.65)	0.0	0.00 (0.00)	0.2	0.00 (0.02)	0.0	0.00 (0.00)	0.0	0.00 (0.00)
War	6.5	0.02 (0.11)	0.9	-0.01 (0.11)	-	-	3.8	-0.02 (0.12)	0.0	0.00 (0.00)
Mining	100.0	1.43*** (0.38)	100.0	1.61*** (0.37)	99.9	-2.35*** (0.56)	1.7	0.02 (0.14)	100.0	1.04*** (0.17)
Prime Exports	0.6	0.01 (0.09)	0.0	0.00 (0.00)	4.1	0.03 (0.16)	1.5	0.01 (0.10)	0.0	0.00 (0.00)
Birth Rate	3.0	0.06 (0.51)	98.7	-5.61*** (1.59)	2.6	-0.02 (0.18)	45.7	-0.93 (1.20)	99.5	-1.56*** (0.49)
Life Expectancy at age 15	0.0	0.00 (0.00)	0.0	0.00 (0.00)	1.4	0.00 (0.03)	4.5	-0.06 (0.33)	0.0	0.00 (0.00)

Table 3B- BMA Estimates (Continued)

	MENA		SSAF		EAST		LATIN		Global	
Explanatory Variable	**PIP**	**Post. Mean (S.D)**	**PIP**	**Post. Mean (S.D)**	**PIP**	**Post. Mean (S.D)**	**PIP**	**Post. Mean (S.D)**	**PIP**	**Post. Mean (S.D)**
migration	2.8	0.01 (0.06)	3.6	-0.02 (0.13)	4.6	-0.05 (0.27)	0.4	0.00 (0.09)	4.4	-0.02 (0.08)
# Neighboring Countries	79.3	2.36* (1.43)	0.0	0.00 (0.00)	94.7	1.42** (0.63)	2.5	-0.06 (0.39)	0.0	0.00 (0.00)
%Ice-Free Coast	99.5	5.86*** (1.38)	0.1	0.00 (0.02)	23.4	0.26 (0.58)	0.4	0.00 (0.03)	0.0	0.00 (0.00)
%Tropical	-	-	1.0	-0.01 (0.09)	49.6	-1.77 (2.05)	18.1	0.17 (0.43)	0.0	0.00 (0.00)
%Desert	-	-	0.0	0.00 (0.00)	-	-	-	-	0.0	0.00 (0.00)
%Land Rugged	0.3	0.00 (0.05)	0.0	0.00 (0.00)	25.3	-0.53 (1.20)	0.0	0.00 (0.02)	0.0	0.00 (0.00)
Land Area	23.4	0.79 (1.57)	0.0	0.00 (0.00)	0.2	0.00 (0.04)	1.1	0.00 (0.09)	0.0	0.00 (0.00)
Religion Regulation	20.6	-0.58 (1.35)	0.5	0.00 (0.04)	18.5	0.11 (0.27)	5.7	0.10 (0.49)	1.9	0.01 (0.07)
Religion Favoritism	99.5	5.37*** (1.77)	0.0	0.00 (0.00)	35.0	-0.59 (0.92)	3.8	-0.02 (0.11)	0.0	0.00 (0.00)
Language Fractionalization	6.0	0.07 (0.34)	0.0	0.00 (0.00)	72.8	1.48 (1.17)	20.8	0.20 (0.45)	0.0	0.00 (0.00)
Religion Polarization	3.1	0.04 (0.26)	0.0	0.00 (0.00)	7.9	0.07 (0.30)	25.7	0.30 (0.58)	35.5	-0.19 (0.28)
Protestant	-	-	0.0	0.00 (0.01)	-	-	6.9	-0.03 (0.17)	0.0	0.00 (0.00)
Muslim	-	-	2.4	0.01 (0.09)	0.5	0.00 (0.08)	-	-	0.0	0.00 (0.00)
Buddhism	-	-	-	-	7.8	-0.01 (0.16)	-	-	6.5	0.03 (0.11)
Catholic	-	-	0.0	0.00 (0.00)	3.1	0.04 (0.25)	18.2	0.18 (0.49)	0.4	0.00 (0.02)
Hindu	-	-	-	-	-	-	-	-	0.0	0.00 (0.00)
Orthodox	-	-	-	-	-	-	-	-	0.0	0.00 (0.00)
Other Religion	-	-	3.9	-0.01 (0.07)	78.9	-1.19 (0.73)	0.3	0.00 (0.08)	0.0	0.00 (0.00)
No Religion	-	-	-	-	2.9	-0.01 (0.11)	14.2	0.19 (0.51)	5.5	-0.02 (0.10)
Africa Dummy	-	-	-	-	-	-	-	-	58.6	-1.21 (1.08)

Table 3B- BMA Estimates (Continued)

Explanatory Variable	MENA PIP	MENA Post. Mean (S.D)	SSAF PIP	SSAF Post. Mean (S.D)	EAST PIP	EAST Post. Mean (S.D)	LATIN PIP	LATIN Post. Mean (S.D)	Global PIP	Global Post. Mean (S.D)
Middle East Dummy	-	-	-	-	-	-	-	-	25.2	0.51 (0.95)
East Asia Dummy	-	-	-	-	-	-	-	-	33.7	0.51 (0.76)
Latin America Dummy	-	-	-	-	-	-	-	-	21.4	0.34 (0.69)
WENA Dummy	-	-	-	-	-	-	-	-	0.0	0.00 (0.00)
Period 1985	40.0	-0.78 (1.16)	10.6	-0.15 (0.54)	16.4	0.13 (0.36)	0.3	0.00 (0.04)	0.1	0.00 (0.03)
Period 1995	6.4	0.16 (0.68)	11.0	0.13 (0.46)	10.7	-0.14 (0.46)	2.5	-0.04 (0.29)	49.5	0.54 (0.60)
Period 2005	82.4	2.63 (1.61)	99.5	3.07*** (0.78)	97.7	2.62*** (0.86)	94.0	2.44** (0.96)	100.0	3.14*** (0.69)
Intercept	100.0	-17.74** (7.52)	100.0	1.02 (2.17)	100.0	0.77 (2.14)	100.0	0.77 (1.41)	100.0	-1.67*** (0.47)
# Observations	74		145		60		84		505	
R-squared	0.74		0.53		0.79		0.64		0.48	

This table provides BMA estimates for the per capita GDP growth regression in (14) of the text for each of the regions and for the global sample. For each region, the first column provides results on the posterior probability of inclusion for variables (equation 10), and the second column provides results on posterior means and standard deviations – equations 6 and 7 – (the latter in brackets). ***, **, and * denote significance at 1%, 5%, and 10%, respectively. The reported R-squared is the average R-squared of the best five models.

Table 4B- Decomposition Estimates: MENA vs Non-MENA

	Posterior Mean (S.D)		Distance from the US		Decomposition	
Explanatory Variable	**MENA**	**Non-MENA**	**MENA**	**Non-MENA**	**Differences in X's**	**Differences in coefficients**
Initial Income	**-8.59*** (1.15)**	**-3.68*** (0.35)**	-1.011 (0.117)	-1.684 (0.046)	-2.96*** (0.24)	5.45*** (1.19)
Investment	0.31 (0.60)	0.14 (0.24)	-0.077 (0.100)	-0.625 (0.050)	0.09 (0.13)	-0.03 (0.07)
Human Capital	0.61 (1.35)	1.05*** (0.39)	-1.880 (0.081)	-1.605 (0.048)	-0.27** (0.12)	0.80 (2.27)
Population Growth	**0.08 (0.30)**	**1.45*** (0.34)**	1.371 (0.136)	0.428 (0.044)	1.18*** (0.28)	-1.69*** (0.56)
Terms of Trade	0.05 (0.15)	0.00 (0.00)	0.076 (0.228)	0.130 (0.035)	0.00 (0.01)	0.00 (0.01)
Government Spending	-0.80 (0.55)	0.00 (0.21)	1.188 (0.133)	0.872 (0.047)	-0.09 (0.07)	-0.70 (0.61)
Openness	-1.32 (1.13)	0.05 (0.13)	-0.401 (0.068)	-0.395 (0.047)	0.00 (0.02)	0.55 (0.40)
Rule of Law	2.73* (1.47)	0.71* (0.40)	-1.582 (0.084)	-1.585 (0.050)	0.00 (0.05)	-3.19 (2.10)
Political Rights	-1.51 (1.33)	0.09 (0.22)	-1.968 (0.089)	-1.218 (0.048)	0.11 (0.21)	2.97 (2.27)
Malaria94	**0.05 (0.30)**	**-0.91*** (0.24)**	0.336 (0.072)	0.943 (0.050)	0.47*** (0.13)	0.41*** (0.14)
Common Law Dummy	0.40 (1.12)	0.00 (0.00)	-0.784 (0.049)	-0.747 (0.021)	0.00 (0.01)	-0.31 (0.76)
Ex-Colony	0.00 (0.04)	0.00 (0.00)	0.270 (0.052)	0.325 (0.023)	0.00 (0.00)	0.00 (0.01)
Coups	**0.00 (0.03)**	**-0.48** (0.20)**	0.314 (0.072)	0.547 (0.051)	0.10** (0.04)	0.17*** (0.06)
Civil War	-0.81 (0.65)	0.01 (0.04)	0.606 (0.122)	0.472 (0.048)	-0.02 (0.02)	-0.48 (0.35)
War	0.02 (0.11)	0.00 (0.00)	-0.715 (0.282)	-1.214 (0.075)	0.00 (0.01)	-0.02 (0.07)
Mining	1.43*** (0.38)	0.84*** (0.21)	1.453 (0.179)	0.313 (0.036)	1.06*** (0.22)	0.76 (0.55)
Prime Exports	0.01 (0.09)	0.00 (0.00)	1.379 (0.112)	1.128 (0.047)	0.00 (0.00)	0.01 (0.11)
Birth Rate	**0.06 (0.51)**	**-2.33*** (0.44)**	1.464 (0.065)	1.129 (0.049)	-0.66*** (0.13)	3.38*** (0.85)
Life Expectancy at age 15	0.00 (0.00)	0.00 (0.00)	0.488 (0.046)	0.877 (0.050)	0.00 (0.00)	0.00 (0.00)

Table 4B- Decomposition Estimates: MENA vs Non-MENA (Continued)

	Posterior Mean (S.D)		Distance from the US		Decomposition	
Explanatory Variable	**MENA**	**Non-MENA**	**MENA**	**Non-MENA**	**Differences in X's**	**Differences in coefficients**
Migration	0.01 (0.06)	-0.72 (0.51)	0.436 (0.259)	-0.384 (0.024)	-0.50 (0.37)	0.23 (0.25)
# Neighboring Countries	**2.36*** **(1.43)**	**0.00** **(0.00)**	0.716 (0.114)	0.661 (0.048)	0.02 (0.03)	1.67* (0.91)
%Ice-Free Coast	**5.86***** **(1.38)**	**0.00** **(0.00)**	1.019 (0.117)	0.634 (0.048)	0.33*** (0.08)	5.63*** (1.34)
%Land Rugged	0.00 (0.05)	-0.01 (0.04)	0.252 (0.111)	0.142 (0.049)	0.00 (0.01)	0.00 (0.01)
Land Area	0.79 (1.57)	0.00 (0.00)	-2.336 (0.140)	-1.982 (0.046)	-0.04 (0.09)	-1.81 (3.16)
Religion Regulation	-0.58 (1.35)	0.00 (0.04)	1.674 (0.056)	0.246 (0.044)	-0.12 (0.29)	-0.86 (1.92)
Religion Favoritism	**5.37***** **(1.77)**	**0.00** **(0.00)**	1.044 (0.054)	-0.118 (0.047)	0.92*** (0.30)	4.69*** (1.60)
Language Fractionalization	0.07 (0.34)	0.00 (0.00)	0.508 (0.078)	0.343 (0.050)	0.00 (0.01)	0.03 (0.15)
Religion Polarization	0.04 (0.26)	-0.45** (0.22)	-2.087 (0.091)	-0.968 (0.045)	0.42** (0.21)	-0.94 (0.61)
Period 1985	-0.78 (1.16)	0.00 (0.00)	0.243 (0.051)	0.232 (0.020)	0.00 (0.01)	-0.19 (0.25)
Period 1995	0.16 (0.68)	0.00 (0.00)	0.257 (0.051)	0.269 (0.021)	0.00 (0.01)	0.04 (0.15)
Period 2005	2.63 (1.61)	2.58*** (0.42)	0.257 (0.051)	0.269 (0.021)	-0.03 (0.03)	0.01 (0.37)
Intercept	-17.74	-1.03	-	-	-	-16.71
Total					0.01	-0.13

This table provides the decomposition estimates for the GDP per capita growth differences between MENA and non-MENA countries (equation 15). Columns 1 & 2 provide results on posterior mean and standard deviations (the latter in brackets) for MENA and for Non-MENA. The coefficients that are statistically different one from another are in bold. Columns 3 & 4 provide the averages and the standard deviations of the distances from the US (columns 3 & 4) for MENA versus the rest of the world. Column 5 provide the estimates of the differences in growth differential from the US that are due differences in explanatory variables levels $(\bar{\bar{X}}_A - \bar{\bar{X}}_B)\widehat{\beta}^*$, and column (6) provide estimates for those that are due differences in coefficients $[(\hat{\beta}_A - \widehat{\beta}^*)\bar{\bar{X}}_A + (\widehat{\beta}^* - \hat{\beta}_B)\bar{\bar{X}}_B]$. ***, **, and * denote significance at 1%, 5%, and 10%, respectively.

.

Table 5B- Decomposition Estimates: EAST vs Non-EAST

Explanatory Variable	Posterior Mean (S.D) EAST	Posterior Mean (S.D) Non-EAST	Distance from the US EAST	Distance from the US Non-EAST	Decomposition: Differences in X's	Decomposition: Differences in coefficients
Initial Income	**-6.83*** (1.40)**	**-4.32*** (0.37)**	-1.625 (0.124)	-1.580 (0.047)	0.21*** (0.07)	4.06* (2.11)
Investment	**1.85*** (0.42)**	**0.00 (0.04)**	-0.180 (0.133)	-0.593 (0.048)	0.09*** (0.03)	-0.42* (0.23)
Human Capital	0.23 (0.68)	1.08** (0.47)	-1.394 (0.110)	-1.680 (0.046)	0.28** (0.13)	1.22 (1.04)
Population Growth	0.00 (0.03)	0.16 (0.31)	0.421 (0.076)	0.586 (0.050)	-0.02 (0.05)	-0.07 (0.12)
Terms of Trade	-0.02 (0.12)	0.08 (0.16)	0.179 (0.105)	0.114 (0.049)	0.00 (0.02)	-0.02 (0.03)
Government Spending	**-2.12** (0.84)**	**-0.20 (0.22)**	0.775 (0.091)	0.937 (0.049)	0.07 (0.05)	-1.52** (0.62)
Openness	-0.01 (0.09)	0.00 (0.00)	-0.041 (0.205)	-0.444 (0.037)	0.00 (0.01)	0.00 (0.01)
Rule of Law	1.73 (1.42)	1.50*** (0.29)	-1.371 (0.140)	-1.614 (0.047)	0.37*** (0.10)	-0.32 (1.77)
Political Rights	0.01 (0.09)	0.00 (0.00)	-1.535 (0.143)	-1.300 (0.047)	0.00 (0.00)	-0.01 (0.12)
Malaria94	-1.92 (1.95)	-0.23 (0.39)	0.970 (0.125)	0.843 (0.048)	-0.05 (0.09)	-1.61 (1.72)
Common Law Dummy	1.04 (1.20)	0.00 (0.00)	-0.733 (0.058)	-0.755 (0.020)	0.00 (0.01)	-0.76 (0.78)
Ex-Colony	-0.72 (1.52)	0.00 (0.00)	0.267 (0.058)	0.324 (0.022)	0.00 (0.02)	-0.20 (0.36)
Coups	**-0.01 (0.06)**	**-0.42* (0.23)**	0.418 (0.142)	0.526 (0.047)	0.04 (0.02)	0.18* (0.10)
Civil War	0.00 (0.02)	0.00 (0.01)	0.857 (0.173)	0.442 (0.045)	0.00 (0.00)	0.00 (0.00)
Mining	**-2.35*** (0.56)**	**1.22*** (0.18)**	0.383 (0.103)	0.493 (0.048)	-0.09*** (0.03)	-1.41*** (0.38)
Prime Exports	0.03 (0.16)	0.00 (0.00)	0.812 (0.132)	1.212 (0.046)	0.00 (0.01)	0.03 (0.12)
Birth Rate	**-0.02 (0.18)**	**-1.93*** (0.48)**	0.976 (0.100)	1.206 (0.047)	0.39*** (.11)	1.92*** (0.48)
Life Expectancy at age 15	0.00 (0.03)	-0.01 (0.09)	0.796 (0.225)	0.824 (0.039)	0.00 (0.02)	0.01 (0.06)

Table 5B- Decomposition Estimates: EAST vs Non-EAST (Continued)

	Posterior Mean (S.D)		Distance from the US		Decomposition	
Explanatory Variable	**EAST**	**Non-EAST**	**EAST**	**Non-EAST**	**Differences in X's**	**Differences in coefficients**
Migration	-0.05 (0.27)	0.00 (0.00)	-0.208 (0.055)	-0.271 (0.050)	0.00 (0.01)	0.01 (0.05)
# Neighboring Countries	**1.42**** **(0.63)**	**0.00** **(0.00)**	0.332 (0.174)	0.714 (0.045)	-0.06** (0.03)	0.54* (0.29
%Ice-Free Coast	0.26 (0.58)	0.00 (0.01)	1.129 (0.134)	0.631 (0.047)	0.02 (0.04)	0.28 (0.58)
%Tropical	-1.77 (2.05)	-0.03 (0.13)	1.199 (0.134)	0.803 (0.047)	-0.09 (0.12)	-2.00 (2.19)
%Land Rugged	-0.53 (1.20)	0.00 (0.00)	0.310 (0.088)	0.138 (0.049)	-0.01 (0.03)	-0.15 (0.33)
Land Area	0.00 (0.04)	0.00 (0.01)	-1.725 (0.151)	-2.076 (0.046)	0.00 (0.00)	0.00 (0.06)
Religion Regulation	0.11 (0.27)	0.00 (0.02)	1.024 (0.150)	0.378 (0.045)	0.01 (0.03)	0.10 (0.25)
Religion Favoritism	-0.59 (0.92)	0.00 (0.00)	0.058 (0.114)	0.051 (0.048)	0.00 (0.01)	-0.03 (0.08)
Language Fractionalization	1.48 (1.17)	0.00 (0.00)	0.288 (0.130)	0.378 (0.047)	-0.02 (0.02)	0.44 (0.35)
Religion Polarization	0.07 (0.30)	-0.17 (0.25)	-0.523 (0.134)	-1.214 (0.046)	-0.10 (0.016)	-0.15 (0.19)
Muslim	0.00 (0.08)	0.00 (0.00)	0.317 (0.087)	0.717 (0.049)	0.00 (0.00)	0.00 (0.02)
Buddhism	-0.01 (0.16)	0.00 (0.00)	2.141 (0.239)	-0.006 (0.018)	0.00 (0.04)	-0.03 (0.29)
Catholic	0.04 (0.25)	0.00 (0.03)	-0.577 (0.081)	0.060 (0.048)	0.00 (0.03)	-0.02 (0.13)
Other Religion	-1.19 (0.73)	0.00 (0.00)	0.765 (0.158)	0.356 (0.048)	-0.06 (0.04)	-0.85 (0.52)
No Religion	-0.01 (0.11)	0.00 (0.00)	0.072 (0.229)	-0.867 (0.038)	0.00 (0.01)	0.00 (0.01)
Period 1985	0.13 (0.36)	-0.10 (0.30)	0.250 (0.057)	0.231 (0.20)	0.00 (0.02)	0.06 (0.10)
Period 1995	-0.14 (0.46)	0.10 (0.34)	0.250 (0.057)	0.270 (0.021)	0.00 (0.02)	-0.06 (0.13)
Period 2005	2.62*** (0.86)	2.64*** (0.50)	0.250 (0.057)	0.270 (0.021)	-0.05 (0.04)	0.00 (0.22)

Table 5B- Decomposition Estimates: EAST vs Non-EAST (Continued)

	Posterior Mean (S.D)		Distance from the US		Decomposition	
Explanatory Variable	**EAST**	**Non-EAST**	**EAST**	**Non-EAST**	**Differences in X's**	**Differences in coefficients**
Intercept	0.77	-1.01	-	-	-	1.78
Total					0.93	1.00

This table provides the decomposition estimates for the GDP per capita growth differences between EAST and non-EAST countries (equation 15). Columns 1 & 2 provide results on posterior mean and standard deviations (the latter in brackets) for EAST and for Non-EAST. The coefficients that are statistically different one from another are in bold. Columns 3 & 4 provide the averages and the standard deviations of the distances from the US (columns 3 & 4) for EAST versus the rest of the world. Column 5 provide the estimates of the differences in growth differential from the US that are due differences in explanatory variables levels $(\bar{\bar{X}}_A - \bar{\bar{X}}_B)\widehat{\beta}^*$, and column (6) provide estimates for those that are due differences in coefficients $[(\hat{\beta}_A - \widehat{\beta}^*)\bar{\bar{X}}_A + (\widehat{\beta}^* - \hat{\beta}_B)\bar{\bar{X}}_B]$. ***, **, and * denote significance at 1%, 5%, and 10%, respectively.

Table 6B- Decomposition Estimates: SSAF vs Non-SSAF

	Posterior Mean (S.D)		Distance from the US		Decomposition	
Explanatory Variable	**SSAF**	**Non-SSAF**	**SSAF**	**Non-SSAF**	**Differences in X's**	**Differences in coefficients**
Initial Income	-4.45*** (0.65)	-4.58*** (0.35)	-2.453 (0.057)	-1.236 (0.046)	5.53*** (0.38)	-0.28 (1.33)
Investment	**0.00 (0.01)**	**0.71** (0.29)**	-1.193 (0.104)	-0.283 (0.041)	-0.46** (0.19)	0.66** (0.26)
Human Capital	**0.01 (0.14)**	**1.53*** (0.36)**	-2.542 (0.050)	-1.285 (0.044)	-1.38*** (0.38)	3.32*** (0.72)
Population Growth	**3.42*** (0.68)**	**0.00 (0.00)**	1.199 (0.045)	0.312 (0.055)	0.87*** (0.17)	3.23*** (0.60)
Terms of Trade	0.10 (0.25)	0.03 (0.10)	0.091 (0.078)	0.135 (0.054)	0.00 (0.01)	0.01 (0.02)
Government Spending	**-0.01 (0.07)**	**-0.78*** (0.21)**	0.956 (0.105)	0.903 (0.046)	-0.03 (0.02)	0.73*** (0.17)
Openness	-0.01 (0.10)	0.10 (0.18)	-0.681 (0.056)	-0.281 (0.052)	-0.03 (0.05)	0.06 (0.10)
Rule of Law	1.20 (0.77)	1.12*** (0.28)	-2.231 (0.054)	-1.325 (0.053)	-1.03*** (0.27)	-0.15 (1.34)
Political Rights	0.01 (0.11)	0.00 (0.00)	-1.874 (0.064)	-1.108 (0.053)	0.00 (0.02)	-0.02 (0.15)
Malaria94	**-2.02*** (0.66)**	**0.00 (0.00)**	1.932 (0.060)	0.421 (0.039)	-0.88*** (0.29)	-3.03*** (0.92)
Common Law Dummy	0.07 (0.29)	0.00 (0.02)	-0.579 (0.041)	-0.822 (0.020)	0.00 (0.02)	-0.04 (0.14)
Ex-Colony	0.00 (0.00)	-0.02 (0.15)	0.359 (0.040)	0.300 (0.024)	0.00 (0.01)	0.01 (0.04)
Coups	-0.11 (0.24)	-0.05 (0.14)	0.942 (0.097)	0.340 (0.046)	-0.04 (0.07)	-0.05 (0.19)
Civil War	0.00 (0.00)	0.00 (0.00)	0.525 (0.085)	0.478 (0.052)	0.00 (0.00)	0.00 (0.00)
War	-0.01 (0.11)	0.00 (0.00)	-1.239 (0.113)	-1.102 (0.097)	0.00 (0.01)	0.01 (0.10)
Mining	**1.61*** (0.37)**	**0.84*** (0.18)**	0.458 (0.077)	0.489 (0.054)	-0.03 (0.02)	0.36** (0.15)
Prime Exports	0.00 (0.00)	0.19 (0.25)	1.843 (0.059)	0.891 (0.50)	0.13 (0.17)	-0.30 (0.33)
Birth Rate	**-5.61*** (1.59)**	**-1.37*** (0.35)**	2.060 (0.028)	0.823 (0.048)	-3.19*** (0.64)	-7.24*** (2.43)

Table 6B- Decomposition Estimates: SSAF vs Non-SSAF (Continued)

	Posterior Mean (S.D)		Distance from the US		Decomposition	
Explanatory Variable	SSAF	Non-SSAF	SSAF	Non-SSAF	Differences in X's	Differences in coefficients
Life Expectancy at age 15	0.00 (0.00)	0.00 (0.00)	1.744 (0.054)	0.448 (0.044)	0.00 (0.00)	0.00 (0.00)
Migration	-0.02 (0.13)	0.00 (0.00)	-0.399 (0.048)	-0.209 (0.059)	0.00 (0.01)	0.01 (0.04)
# Neighboring Countries	0.00 (0.00)	0.00 (0.00)	0.955 (0.073)	0.553 (0.054)	0.00 (0.00)	0.00 (0.00)
%Ice-Free Coast	0.00 (0.02)	0.00 (0.02)	0.109 (0.054)	0.925 (0.054)	0.00 (0.01)	0.00 (0.01)
%Tropical	-0.01 (0.09)	0.00 (0.00)	1.371 (0.076)	0.641 (0.050)	0.00 (0.02)	-0.01 (0.09)
%Desert	0.00 (0.00)	0.00 (0.00)	0.383 (0.104)	0.247 (0.046)	0.00 (0.00)	0.00 (0.00)
%Land Rugged	0.00 (0.00)	-0.01 (0.06)	-0.183 (0.084)	0.295 (0.051)	0.00 (0.02)	0.00 (0.01)
Land Area	0.00 (0.00)	0.00 (0.00)	-1.936 (0.073)	-2.074 (0.055)	0.00 (0.00)	0.00 (0.00)
Religion Regulation	0.00 (0.04)	0.04 (0.14)	0.070 (0.066)	0.610 (0.055)	-0.01 (0.06)	-0.01 (0.03)
Religion Favoritism	0.00 (0.00)	0.00 (0.00)	-0.664 (0.077)	0.340 (0.046)	0.00 (0.00)	0.00 (0.00)
Language Fractionalization	0.00 (0.00)	0.00 (0.00)	1.181 (0.072)	0.040 (0.045)	0.00 (0.00)	0.00 (0.00)
Religion Polarization	0.00 (0.00)	0.00 (0.00)	-0.590 (0.064)	-1.351 (0.053)	0.00 (0.00)	0.00 (0.00)
Protestant	0.00 (0.01)	0.00 (0.00)	-1.768 (0.054)	-1.888 (0.060)	0.00 (0.00)	0.00 (0.01)
Muslim	0.01 (0.09)	0.00 (0.00)	0.727 (0.072)	0.646 (0.055)	0.00 (0.00)	0.01 (0.05)
Catholic	0.00 (0.00)	0.04 (0.13)	-0.280 (0.044)	0.091 (0.059)	-0.01 (0.04)	0.01 (0.03)
Other Religion	-0.01 (0.07)	0.00 (0.00)	1.369 (0.098)	0.016 (0.035)	0.00 (0.03)	-0.01 (0.07)
Period 1985	-0.15 (0.54)	0.00 (0.00)	0.248 (0.036)	0.228 (0.022)	0.00 (0.01)	-0.04 (0.10)
Period 1995	0.13 (0.46)	0.10 (0.28)	0.255 (0.036)	0.272 (0.024)	0.00 (0.02)	0.01 (0.11)

Table 6B- Decomposition Estimates: SSAF vs Non-SSAF (Continued)

	Posterior Mean (S.D)		Distance from the US		Decomposition	
Explanatory Variable	**SSAF**	**Non-SSAF**	**SSAF**	**Non-SSAF**	**Differences in X's**	**Differences in coefficients**
Period 2005	3.07*** (0.78)	2.22*** (0.45)	0.255 (0.036)	0.272 (0.024)	-0.04* (0.02)	0.22 (0.18)
Intercept	1.02	-0.39	-	-	-	1.41
Total					-0.06	-1.12

This table provides the decomposition estimates for the GDP per capita growth differences between SSAF and non-SSAF countries (equation 15). Columns 1 & 2 provide results on posterior mean and standard deviations (the latter in brackets) for SSAF and for Non-SSAF. The coefficients that are statistically different one from another are in bold. Columns 3 & 4 provide the averages and the standard deviations of the distances from the US (columns 3 & 4) for SSAF versus the rest of the world. Column 5 provide the estimates of the differences in growth differential from the US that are due differences in explanatory variables levels $(\bar{\bar{X}}_A - \bar{\bar{X}}_B)\widehat{\beta}^*$, and column (6) provide estimates for those that are due differences in coefficients $[(\hat{\beta}_A - \widehat{\beta}^*)\bar{\bar{X}}_A + (\widehat{\beta}^* - \hat{\beta}_B)\bar{\bar{X}}_B]$. ***, **, and * denote significance at 1%, 5%, and 10%, respectively.

Table 7B- Decomposition Estimates: LATIN vs Non-LATIN

	Posterior Mean (S.D)		Distance from the US		Decomposition	
Explanatory Variable	**LATIN**	**Non-LATIN**	**LATIN**	**Non-LATIN**	**Differences in X's**	**Differences in coefficients**
Initial Income	**-2.96***** **(0.67)**	**-4.35***** **(0.38)**	-1.566 (0.058)	-1.589 (0.052)	-0.10*** (0.03)	-2.18** (1.02)
Investment	0.00 (0.00)	0.10 (0.22)	-0.565 (0.061)	-0.540 (0.054)	0.00 (0.02)	0.06 (0.11)
Human Capital	2.45** (1.08)	0.57 (0.55)	-1.535 (0.059)	-1.668 (0.050)	0.12 (0.08)	-2.92* (1.59)
Population Growth	0.00 (0.04)	0.04 (0.17)	0.553 (0.056)	0.569 (0.053)	0.00 (0.01)	-0.02 (0.08)
Terms of Trade	0.00 (0.03)	0.07 (0.15)	0.162 (0.070)	0.114 (0.052)	0.00 (0.01)	-0.01 (0.02)
Government Spending	**-1.06**** **(0.52)**	**-0.02** **(0.09)**	0.488 (0.076)	1.004 (0.050)	0.10* (0.06)	-0.60** (0.24)
Openness	**1.58**** **(0.79)**	**0.00** **(0.00)**	-0.637 (0.047)	-0.348 (0.048)	-0.08* (0.04)	-0.93** (0.43)
Rule of Law	**-0.02** **(0.17)**	**1.82***** **(0.30)**	-1.944 (0.071)	-1.513 (0.051)	-0.65*** (0.11)	3.45*** (0.58)
Political Rights	0.44 (0.54)	0.00 (0.00)	-0.925 (0.074)	-1.408 (0.051)	0.04 (0.04)	-0.44 (0.44)
Malaria94	-0.06 (0.20)	-0.33 (0.43)	0.442 (0.078)	0.942 (0.050)	0.14 (0.19)	0.14 (0.19)
Common Law Dummy	-1.89 (3.03)	0.00 (0.00)	-0.905 (0.032)	-0.722 (0.022)	0.06 (0.09)	1.65 (2.31)
Ex-Colony	-0.24 (1.50)	-0.05 (0.22)	0.857 (0.039)	0.209 (0.020)	-0.05 (0.20)	-0.15 (1.08)
Coups	-0.02 (0.10)	-0.33 (0.28)	0.616 (0.138)	0.492 (0.046)	-0.03 (0.05)	0.18 (01.6)
Civil War	0.00 (0.00)	0.00 (0.00)	0.398 (0.094)	0.510 (0.050)	0.00 (0.00)	0.00 (0.00)
War	-0.02 (0.12)	0.00 (0.00)	-1.298 (0.149)	-1.110 (0.087)	0.00 (0.01)	0.03 (0.13)
Mining	**0.02** **(0.14)**	**1.23***** **(0.19)**	0.277 (0.060)	0.521 (0.051)	-0.25*** (0.04)	-0.39*** (0.09)
Prime Exports	0.01 (0.10)	0.00 (0.00)	1.484 (0.084)	1.101 (0.049)	0.00 (0.01)	0.02 (0.13)
Birth Rate	-0.93 (1.20)	-2.06*** (0.47)	1.372 (0.053)	1.140 (0.051)	-0.43*** (0.11)	1.51 (1.50)
Life Expectancy at age 15	-0.06 (0.33)	0.00 (0.00)	0.513 (0.046)	0.882 (0.051)	0.00 (0.02)	-0.03 (0.15)
Migration	0.00 (0.09)	0.00 (0.00)	-0.551 (0.031)	-0.206 (0.053)	0.00 (0.01)	0.00 (0.04)

Table 7B- Decomposition Estimates: LATIN vs Non-LATIN (Continued)

	Posterior Mean (S.D)		Distance from the US		Decomposition	
Explanatory Variable	**LATIN**	**Non-LATIN**	**LATIN**	**Non-LATIN**	**Differences in X's**	**Differences in coefficients**
# Neighboring Countries	-0.06 (0.39)	0.00 (0.00)	0.340 (0.091)	0.734 (0.050)	0.00 (0.03)	-0.02 (0.12)
%Ice-Free Coast	0.00 (0.03)	0.01 (0.07)	1.112 (0.111)	0.606 (0.048)	0.00 (0.03)	-0.01 (0.07)
%Tropical	0.17 (0.43)	0.00 (0.00)	1.671 (0.089)	0.686 (0.046)	0.03 (0.07)	0.26 (0.59)
%Land Rugged	0.00 (0.02)	0.00 (0.00)	0.213 (0.065)	0.147 (0.052)	0.00 (0.00)	0.00 (0.00)
Land Area	0.00 (0.09)	0.00 (0.00)	-2.043 (0.114)	-2.032 (0.048)	0.00 (0.00)	0.00 (0.15)
Religion Regulation	0.10 (0.49)	0.06 (0.18)	-0.237 (0.041)	0.593 (0.050)	-0.06 (0.14)	0.00 (0.11)
Religion Favoritism	-0.02 (0.11)	0.00 (0.00)	-0.068 (0.119)	0.076 (0.048)	0.00 (0.00)	0.00 (0.01)
Language Fractionalization	0.20 (0.45)	0.00 (0.00)	-0.497 (0.083)	0.540 (0.047)	-0.03 (0.08)	-0.07 (0.19)
Religion Polarization	0.30 (0.58)	-0.04 (0.14)	-1.551 (0.073)	-1.049 (0.050)	-0.01 (0.08)	-0.50 (0.78)
Protestant	-0.03 (0.17)	0.00 (0.00)	-1.879 (0.097)	-1.849 (0.051)	0.00 (0.00)	0.05 (0.26)
Catholic	0.18 (0.49)	0.00 (0.00)	1.341 (0.069)	-0.286 (0.040)	0.05 (0.13)	0.19 (0.55)
Other Religion	0.00 (0.08)	0.00 (0.00)	-0.091 (0.037)	0.504 (0.054)	0.00 (0.01)	0.00 (0.01)
No Religion	0.19 (0.51)	-0.25 (0.26)	-0.856 (0.057)	-0.736 (0.053)	0.02 (0.04)	-0.36 (0.42)
Period 1985	0.00 (0.04)	0.00 (0.03)	0.250 (0.048)	0.230 (0.021)	0.00 (0.00)	0.00 (0.01)
Period 1995	-0.04 (0.29)	0.18 (0.43)	0.250 (0.048)	0.271 (0.022)	0.00 (0.02)	-0.06 (0.11)
Period 2005	2.44** (0.96)	2.81*** (0.59)	0.250 (0.048)	0.271 (0.022)	-0.06 (0.04)	-0.09 (0.24)
Intercept	0.77	-1.56	-	-	-	2.33
Total					-1.19	1.09

This table provides the decomposition estimates for the GDP per capita growth differences between LATIN and non-LATIN countries (equation 15). Columns 1 & 2 provide results on posterior mean and standard deviations (the latter in brackets) for LATIN and for Non-LATIN. The coefficients that are statistically different one from another are in bold. Columns 3 & 4 provide the averages and the standard deviations of the distances from the US (columns 3 & 4) for LATIN versus the rest of the world. Column 5 provide the estimates of the differences in growth differential from the US that are due differences in explanatory variables levels $(\bar{\bar{X}}_A - \bar{\bar{X}}_B)\hat{\beta}^*$, and column (6) provide estimates for those that are due differences in coefficients $[(\hat{\beta}_A - \hat{\beta}^*)\bar{\bar{X}}_A + (\hat{\beta}^* - \hat{\beta}_B)\bar{\bar{X}}_B]$.
***, **, and * denote significance at 1%, 5%, and 10%, respectively.

Table 8B- BMA results: West Europe and North America

Explanatory Variable	Posterior Inclusion Prob.	Posterior Mean	Posterior Standard Errors
Initial Income	100.0	-7.295***	1.033
Investment	43.0	-0.616	0.856
Human Capital	1.8	0.005	0.080
population growth	31.0	0.452	0.797
Terms of Trade	5.6	0.014	0.080
Government Spending	99.5	-1.765***	0.599
Openness	98.4	0.795***	0.274
Rule of Law	1.4	-0.003	0.111
Common Law Dummy	1.5	0.015	0.154
Civil War	4.9	0.046	0.241
War	9.5	0.012	0.074
Mining	100.0	-1.656***	0.416
Prime Exports	99.4	1.461***	0.491
Birth Rate	6.3	-0.028	0.157
Life Expectancy at age 15	81.8	2.336	1.513
migration	0.0	0.000	0.005
# Neighboring Countries	31.6	0.135	0.239
%Ice-Free Coast	77.4	0.497	0.333
%Land Rugged	91.0	0.625**	0.298
Land Area	69.1	0.397	0.324
Religion Regulation	2.0	-0.008	0.080
Religion Favoritism	95.7	-0.700**	0.304
Language Fractionalization	4.5	-0.010	0.113

Table 8B- BMA results: West Europe and North America (Continued)

Explanatory Variable	Posterior Inclusion Prob.	Posterior Mean	Posterior Standard Errors
Religion Polarization	1.6	0.002	0.036
Fraction Protestant	100.0	1.069***	0.213
Fraction Muslim	91.4	7.280**	3.401
Fraction Catholic	99.9	1.043***	0.264
Fraction Other Religion	2.3	-0.007	0.082
Fraction no religion	2.1	0.008	0.066
Period 1985	1.2	0.004	0.047
Period 1995	0.5	0.000	0.034
Period 2005	43.9	0.318	0.464
Intercept	100.0	-0.324	0.359
R-Squared	0.696		

This table provides BMA estimates for the per capita GDP growth regression in (14) of the text for WENA. The first column provides results on the posterior probability of inclusion for variables (equation 10), the second column provides results on posterior means (equation 6), and the third column provides results on posterior standard deviations (equation 7). ***, **, and * denote significance at 1%, 5%, and 10%, respectively. The reported R-squared is the average R-squared of the best five models

Appendix C – Identification Problem

As pointed out by Jones and Kelley (1984), the estimates of the individual contributions to the unexplained differences (differences in coefficients) are not invariant to simple changes in the scaling of the explanatory variables, namely shifting the variables by a constant. To see this, we can look at the standard decomposition of growth differences:

$$(13) \qquad E_A(g) - E_B(g) = (\bar{X}_A - \bar{X}_B)\hat{\beta}_A + \underbrace{(\hat{\beta}_A - \hat{\beta}_B)\bar{X}_B}_{unexplained\ differences}$$

Which can be written as:

$$(13a)\ \ E_A(g) - E_B(g) = \sum_{k=1}^{K}(\bar{x}_{kA} - \bar{x}_{kB})\hat{\beta}_{kA} + \underbrace{\overbrace{\hat{\beta}_{0A} - \hat{\beta}_{0B}}^{u0} + \overbrace{(\hat{\beta}_{1A} - \hat{\beta}_{1B})\bar{x}_{1B}}^{u1} + \overbrace{(\hat{\beta}_{2A} - \hat{\beta}_{2B})\bar{x}_{2B}}^{u2} + \cdots + \overbrace{(\hat{\beta}_{KA} - \hat{\beta}_{KB})\bar{x}_{KB}}^{u_K}}_{unexplained\ differences}$$

Suppose now I add a constant "a" to one of the explanatory variables, say x_1. This of course only affects the intercepts and has no influence on the coefficient vector $(\hat{\beta}_1, \hat{\beta}_2, \dots, \hat{\beta}_K)$. The explained differences (detailed or overall) are invariant to such shifts since the constant cancels out when I take the differences $(\bar{x}_{kA} - \bar{x}_{kB})$. With this shift, equation (13a) becomes:

$$(13b)\ \ E_A(g) - E_B(g) = \sum_{k=1}^{K}(\bar{x}_{kA} - \bar{x}_{kB})\hat{\beta}_{kA} + \underbrace{\overbrace{\hat{\beta}_{0A} - \hat{\beta}_{0B} - (\hat{\beta}_{1A} - \hat{\beta}_{1B})a}^{u0} + \overbrace{(\hat{\beta}_{1A} - \hat{\beta}_{1B})\bar{x}_{1B} + (\hat{\beta}_{1A} - \hat{\beta}_{1B})a}^{u1} + \overbrace{(\hat{\beta}_{2A} - \hat{\beta}_{2B})\bar{x}_{2B}}^{u2} + \cdots + \overbrace{(\hat{\beta}_{KA} - \hat{\beta}_{KB})\bar{x}_{KB}}^{u_K}}_{unexplained\ differences}$$

Note that the overall unexplained differences (i.e. the sum $u_0 + u_1 + u_2 + \cdots + u_K$) do not change in this case. On the other hand, we can see from equation (13b) that this transformation of the data transfers a portion $(\hat{\beta}_{1A} - \hat{\beta}_{1B})a$ from the differences in the coefficients on x_1 to the differences in the intercepts (from u_1 *to* u_0). "The conclusion is that the detailed decomposition results for the unexplained part only have a meaningful interpretation for variables for which scale shifts are not allowed, that is, for variables that have a natural zero point" (Jann 2008)