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The Deep Determinants of the Middle-Income Trap

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The Deep Determinants of the Middle-Income Trap

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Abstract. The fundamental, underlying factors of development are often neglected when analyzing the question why countries experience a growth slowdown at the middle-income range. Although these so-called 'deep determinants' such as geography and institutions have been found to be decisive for the break out of stagnation and for explaining cross-country income differences by many empirical studies, so far, very little has been done to examine to which extent they are also crucial at more subtle stages of economic development. Our paper aims to contribute to close this gap by focusing on the phenomenon of the middle-income trap (MIT) which has reached increasing attention in the last 15 years. In particular, we are interested in whether the deep determinants have positive or negative impacts on the possibility of a country to experience a prolonged stay within the middle-income range. We focus especially on exogenous variables to avoid endogeneity/reverse causality problems. By using simple statistical hypothesis testing, we show that not all findings of the deep determinants literature can be easily transferred to the MIT phenomenon, especially regarding institutional variables. This may raise the question whether we need *new* deep determinants of growth for the MIT or at least a modified version taking into account the specific circumstances and characteristics of middle-income countries.

Keywords: deep determinants of growth, economic development, economic growth, middle-income trap, geography, institutions, culture

JEL Classification: O10, O11, O43, O50

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1 Introduction

A central issue of (development and growth) economics has always been the disparity in economic performance between rich and poor countries. The traditional approach for explaining these differences focuses on variables of the neoclassical and endogenous growth models, that is physical and human capital (accumulation) as well as total factor productivity. However, especially since the 1990s, a considerable body of literature has emerged, investigating the more fundamental factors underpinning growth, the so-called 'deep determinants' of economic growth and development. These deep determinants can be classified into three strands, namely *geography* (for example climate, resource endowment, and disease burden), *integration* (openness to trade), and *institutions* (including culture).[1] They (or rather, their proxies) can have direct and indirect effects on economic growth. For example, geography does not only directly affect per capita income (via its effects on morbidity and productivity in the agricultural sector) but also through its impact on institutions or integration (see Rodrik et al., 2004, and Bloch and Tang, 2004, for an overview of the interrelations between the factors).

Although the deep determinants have been found to be decisive for the break out of stagnation by many studies, so far, very little has been done to examine to which extent they are important at more subtle stages of economic development.[2] In this sense, our paper aims to provide a specification of the debate on the deep determinants of growth. Do they have such a formative influence that they are also crucial for explaining differences in economic performance at later stages of development? We are especially interested in whether the deep determinants have positive or negative impacts on the economic performance of middle-income countries (MICs). More precisely, we examine the relationship between the deep determinants and the possibility of experiencing a so-called 'middle-income trap'. In recent years, the middle-income trap (MIT) concept has tried to refine the law of growing income disparity by stating that various countries have managed to catch-up to the advanced countries; however, after initial strong growth, the developing country's growth rate decreases significantly when the country reaches the middle-income range (see Agénor, 2016, as well as Glawe and Wagner, 2016, for survey articles). So far, most deep determinants of economic growth have largely been ignored in the MIT literature. Although some studies take into account the effects of integration (via variables such as openness to trade or the export structure), there are only few studies that consider institutions.[3] Furthermore, to our knowledge, there is only one study that examines the impacts of culture on the MIT (namely Petrakis, 2014) and the geographical factors as well as other exogenous historical factors are largely ignored.[4]

This paper aims to shed light on these aspects, to provide a general overview and to identify topics for further research. In particular, we show that while some deep determinants identified by the general literature appear to be as well decisive for the growth performance of

[1] See Easterly and Levine (2003), Rodrik et al. (2004), Owen and Weatherstone (2007) and Spolaore and Wacziarg (2013) for a survey of the deep determinants of growth. In addition, Nunn (2009) provides a comprehensive survey on exogenous historical factors that shape economic development.

[2] The article of Lee and Kim (2009) is one of the few exceptions. The authors focus especially on the effectiveness of policies at different stages of economic development.

[3] For a meta-analysis of the MIT triggering factors see Glawe and Wagner (2017a). See also Section 2.2.

[4] The importance of several subsystems of a society (including the socio-cultural and ecological system) for a sustainable development is also emphasized by Wagner (2017).

MICs, others appear to be of minor importance at later stages of development (especially regarding the institutional variables). Note that we focus primarily on exogenous variables (such as latitude and coastal length) and instrumental variables (such as the colonial origin or the share of European settlers to capture institutional quality). Thus, we do not face the standard endogeneity problems. Moreover, we focus especially on institutional and geographical variables as there has not yet been much research regarding these aspects (in respect of the MIT phenomenon). However, when discussing the geographical variables we also refer to various geographical proxies for openness to trade.

The rest of the paper is structured as follows. In the next section, we give a brief overview on the MIT literature and the deep determinants of growth. In Section 3, we describe our data and our empirical methods. Section 4 presents our main results. Concluding remarks are provided in Section 6.

2 Literature review

This section briefly reviews the literature on the deep determinants of economic growth (in Subsection 2.1) as well as on the MIT literature (in Subsection 2.2).

2.1 Deep determinants of growth

Especially early contributions treat the deep determinants separately (Bhattacharyya, 2004) and disagree on which determinant is the most important. In particular, three strands of literature have emerged, supporting the primacy of either one of the three deep determinants (geography, institutions, or integration). However, more recent studies, taking into account the deep determinants simultaneously, support the view that among the three deep determinants, institutions are the key factor for explaining differences in per capita income (Rodrik et al., 2004; Bhattacharyya, 2004; see also Bennett et al., 2016, for an overview). In the following, we will briefly describe the different literature strands. A more detailed discussion of selected studies is provided in the different subsections of Section 4.

First, there is significant body of literature emphasizing the key role played by *geography* for explaining cross-country per capita differences. Although the early contributions can be treated back to Machiavelli (1519) and Montesquieu (1750) who recognized the positive impacts of a temperate climate on human activity, economists have largely ignored the importance of geographical variables for a long time.[5] However, especially since the 1990s, a body of literature has emerged, reexamining the role of geography for economic growth. One group of this literature supports the *geography/endowment hypothesis* (Easterly and Levine, 2003, p. 5; also labeled as 'geographical fundamentalism' by Owen and Weatherstone, 2007, p. 140) stating that geography directly influences the quality of land, labor and production technologies. For example, Sachs and Warner (1995b, 1999), Diamond (1997), Bloom and Sachs (1998), Landes (1998), Gallup et al. (1999), as well as McArthur and Sachs (2001) fall into this category.

Another strand of literature focuses on the importance of *institutions* and argues that factors such as property rights and the rule of law play a decisive role for economic growth.

[5] See Ros (2013) and Owen and Weatherstone (2007) for further evidence.

This strand of the literature is also referred to as the *institutional view* (Easterly and Levine, 2003, p. 5) and builds on the seminal contributions of North who argued that institutions "are the underlying determinant of economic performance" (1994, p. 359). North (1991) also coined the definition of institutions, distinguishing between formal rules (constitution, laws, and property rights) and informal constraints (called "culture") including sanctions, taboos, customs, traditions and codes of conduct. Many empirical studies have tested North's theory (examples include Knack and Kneefer, 1995; Mauro, 1995; Hall and Jones, 1999; Rodrik, 1999; Acemoglu et al., 2001; Easterly and Levine, 2003). They all confirm that institutions are a crucial factor for growth. More recent contributions by Rodrik et al. (2004) and Acemoglu et al. (2005a, b) go even a bit further by emphasizing the absolute primacy of institution as the decisive deep determinant.

The last strand of literature focuses on openness to trade and is labeled as '*integration view*' by Rodrik et al. (2004, p. 132). For example, Frankel and Romer (1999) and Brunner (2003) argue that openness is a key driver of productivity improvements. Sachs and Warner (1995a) derive similar results, however, they are a bit more radical by emphasizing the primacy of integration.[6]

It is noteworthy that studies of both, the institutional view and the integrational view often use geographical variables as proxies/instrumental variables. For example, regarding the integration view, Frankel and Romer (1999) use variables such as landlockedness to examine the effect of openness on growth. With respect to the institutional view, Acemoglu et al. (2001) argue that differences in the disease environment affected the type of institution that developed.

2.2 Middle-income trap literature

In recent years, a growing body of literature has emerged, dealing with the phenomenon of the so called 'middle-income trap' (MIT). The term MIT was introduced by Gill and Kharas in 2007 and usually refers to the often-observed case that a developing country's growth rate decreases significantly when the country reaches the middle-income range (Glawe and Wagner, 2016). Besides the growth model of Agénor and Canuto (2015) and the country specific models of Dabús et al. (2016) and Glawe and Wagner (2017b), focusing on the Argentinian and the Chinese economy, respectively, the MIT literature so far has been largely empirical. In particular, three main factors are considered as especially important for triggering an MIT (see meta-analysis in Glawe and Wagner, 2017a), namely the export structure, human capital, and total factor productivity (TFP). There are only very little studies that take into account institutions (Wang, 2016; Hill et al., 2012; Jitsuchon, 2012; Aiyar et al., 2013) and to our knowledge, there is only one study that takes into account culture (Petrakis, 2014). Research on geographical factors is nearly non-existing.

[6] See also Rodrik et al. (2004, p. 132), for a short discussion of the different views on the importance of integration.

3 Data and empirical methods

In this section, we first briefly describe our data (Subsection 3.1) and the construction of the three MIT country samples utilized in this paper (Subsection 3.2). We then present our main empirical methods in Subsection 3.3.

3.1 Data and descriptive statistics

Our analysis is based on three different MIT country samples and a variety of variables to capture geographical, institutional, and cultural differences. We use binomial and discrete data. The definitions and sources for all variables used in this article are provided in Table A1 in the Appendix A1. The MIT country samples – based on the definitions of Felipe et al. (2012), Aiyar et al. (2013), and the World Bank (2013) – are described extensively in Section 3.2. We use three different samples to ensure the robustness of our results in the sense that they are not biased by the choice of a specific MIT definition. Since we are combining various datasets, we have different numbers of observation for the different variables. In general, our sample size is relatively small, ranging from 35 to 101, which limits our analysis to some extent (for example, we have to use non-parametric tests in some cases).

Table 1 provides descriptive statistics for our discrete data; in particular, we report the mean values (and standard deviations) of our main variables separately for the MIT and the non-MIT country groups. Table 2 presents the descriptive statistics for our binomial data. We report the proportion of countries that show a certain country characteristic (for example, having a British colonial origin) for both country groups.

Table 1. Descriptive statistics – discrete data.

	Aiyar et al. (2013) Sample		**World Bank (2013) Sample**		**Felipe et al. (2012) Sample**	
	MIT countries	Non-MIT countries	MIT countries	Non-MIT countries	MIT countries	Non-MIT countries
Geographical variables						
Latitude (0-1)	0.24	0.47	0.24	0.46	0.30	0.48
	(0.143)	(0.171)	(0.145)	(0.171)	(0.178)	(0.142)
Coastal-area ratio[a]	195.362	89.60	52.39	99.38	36.25	114.25
	(945.517)	(167.808)	(205.589)	(173.503)	(63.780)	(251.521)
Coastal length	7180.08	18967.73	7295.01	22590.65	11488.76	20865.73
	(17526.73)	(48116.76)	(16134.52)	(51768.30)	(35233.27)	(37323.20)
Malaria (%)	18.86	0.33	27.28	0.00	13.01	0.09
	(31.812)	(1.780)	(37.181)	(0.002)	(26.777)	(0.341)
Oil reserves (100,000 of barrels per capita) [b]	2461.76	9310.37	5224.40	1132.43	67923.89	1797.29
	(8456.16)	(30649.83)	(21934.24)	(3886.78)	(23577.27)	(5864.62)

Table 1 continued.

	Aiyar et al. (2013) Sample		World Bank (2013) Sample		Felipe et al. (2012) Sample	
	MIT countries	Non-MIT countries	MIT countries	Non-MIT countries	MIT countries	Non-MIT countries
Institutional variables						
Settler mortality (log)	4.39	2.42	4.63	2.73	4.10	2.81
	(0.699)	(1.049)	(0.885)	(0.195)	(1.055)	(1.521)
Log of Euroshare	1.701	4.11	1.38	3.59	1.38	3.59
	(0.792)	(0.459)	(1.379)	(1.103)	(1.379)	(1.103)
Euroshare (in %)	7.20	65.42	82.50	51.96	13.90	80.69
	(5.538)	(23.828)	(12.437)	(32.882)	(20.785)	(-)
Cultural variables						
Ethnolinguistic frag.	0.29	0.14	0.34	0.17	0.34	0.17
	(0.275)	(0.111)	(0.288)	(0.160)	(0.288)	(0.160)
Language						
EngFrac	0.073	0.192	0.023	0.204	0.091	0.068
	(0.229)	(0.368)	(0.127)	(0.371)	(0.258)	(0.246)
EurFrac	0.367	0.332	0.239	0.463	0.346	0.392
	(0.417)	(0.442)	(0.378)	(0.453)	(0.418)	(0.469)
Religion						
Catholic (%)	45.77	28.12	34.66	38.03	40.01	29.92
	(41.140)	(33.643)	(40.027)	(36.363)	(40.943)	(35.564)
Muslim (%)	20.05	17.83	28.81	4.91	25.42	7.84
	(36.444)	(35.801)	(40.085)	(16.974)	(40.230)	(26.171)
Protestant (%)	10.66	23.62	5.98	21.88	10.79	25.58
	(17.441)	(31.665)	(12.524)	(30.052)	(20.876)	(31.514)
Other (%)	23.52	30.43	27.60	35.17	23.77	36.65
	(28.009)	(31.644)	(33.039)	(33.120)	(29.898)	(38.447)
Individualism	29.56	58.09	28.85	55.20	40.00	56.75
	(14.990)	(22.179)	(14.554)	(25.067)	(23.033)	(23.219)
Log of Individualism measure	3.25	3.97	3.24	3.88	3.51	3.93
	(0.569)	(0.482)	(0.517)	(0.570)	(0.636)	(0.528)

Notes: Standard deviations are in parentheses. [a] The Maldives included in the Aiyar et al. (2013) sample have an extremely high coastal area ratio (6672.66667), even in comparison to other small islands. If we exclude the Maldives from our sample, the mean coastal land ratio of the MIT country group is around 65.82 and that of the non-MIT group is ca. 92.02. [b] In the Aiyar et al. (2013) sample, Libya and Saudi Arabia are non-MIT countries (in contrast to the Felipe et al., 2012, and the World Bank, 2013, sample). If we classified them as MIT countries also in the Aiyar et al. (2013) study, we would have obtained an average value of 648,373.04 for the MIT country group and 339,490.97 for the non-MIT group.

Table 2. Descriptive statistics – binomial data.

	Aiyar et al. (2013) Sample		World Bank (2013) Sample		Felipe et al. (2012) Sample	
	MIT countries	Non-MIT countries	MIT countries	Non-MIT countries	MIT countries	Non-MIT countries
Geographical variables						
Continent						
Africa	.22	.03	.26	.06	.19	.00
Asia	.24	.34	.32	.28	.28	.38
Europe	.14	.55	.16	.53	.23	.54
Latin America	.41	.05	.28	.06	.28	.00
Landlocked	.10	.16	.09	.06	.08	.15
Disease						
Yellow fever	.60	.06	.63	.03	.59	.08
Malaria	.50	.11	.48	.17	.37	.08
Oil reserves	.60	.61	.65	.57	.65	.57
Institutional variables						
Colonial heritage	.92	.65	.92	.56	.84	.38
Colonial origin (all countries)						
British colony	.38	.38	.28	.34	.32	.23
French colony	.14	.00	.18	.00	.13	.00
Spanish colony	.28	.00	.25	.06	.26	.00
French or Spanish colony	.42	.00	.43	.06	.39	.00
Colonial origin (only colonies)						
British colony	.41	.58	.30	.61	.38	.60
French colony	.15	.00	.20	.00	.15	.00
Spanish colony	.30	.00	.27	.11	.31	.00
French and Spanish	.46	.00	.47	.11	.46	.00
Legal Origin						
British legal origin	.29	.37	.21	.34	.25	.23
French legal origin	.63	.24	.58	.31	.64	.15
Socialist legal origin	.21	.03	.06	.13	.08	.00
German legal origin	.00	.19	.02	.13	.00	.46
Scandinavian legal origin	.00	.13	.00	.13	.03	.15

Table 2 continued.

	Aiyar et al. (2013) Sample		World Bank (2013) Sample		Felipe et al. (2012) Sample	
	MIT countries	Non-MIT countries	MIT countries	Non-MIT countries	MIT countries	Non-MIT countries
Cultural variables						
Language						
EngFrac0	.24	.28	.18	.37	.25	.15
EurFrac0	.64	.53	.50	.67	.62	.53
EngFrac10	.10	.22	.04	.23	.11	.08
EurFrac10	.44	.38	.29	.55	.41	.46
Religion						
Catholic	.47	.32	.40	.41	.44	.31
Protestant	.20	.18	.29	.03	.27	.08
Muslim	.08	.21	.03	.19	.06	.31
Other	.25	.29	.28	.38	.23	.31

Note: Regarding the legal origin, we also report our estimates of the socialist, German and Scandinavian legal origin dummies. However, the sample sizes are far too small to obtain reliable results, thus we do not include them in our further analysis.

As various variables are correlated with each other, Table A2 in the Appendix A2 presents a correlation matrix of various variables used in this study. For example, latitude is positively correlated with euroshare as well as the individualism index. A former British colonial origin is positively correlated with the fraction of Protestants in the country's population, whereas a former Spanish colonial origin is positively correlated with the fraction of Catholics in the country's population.

3.2 Middle-income trap country samples

We use three different MIT country samples based on the definitions and findings of Felipe et al. (2012), Aiyar et al. (2013), and the World Bank (2013).

Felipe et al. (2012): According to the definition of Felipe et al. (2012), a country is in the MIT if it stays for more than 28 years in the lower-middle-income range (LMIR) or for more than 14 years in the upper-middle-income range (UMIR), where LMIR stands for the income range between $2,000 and $7,250 and UMIR stands for the income range between $7,250 and $11,750. Our Felipe et al. (2012) sample consists of 77 countries, thereof 64 MIT-countries (either facing a lower-middle or an upper-middle income trap) and 13 non-MIT countries.

Aiyar et al. (2013): According to the definition of Aiyar et al. (2013), the country i experiences a growth slowdown if the residual (defined as the difference between the actual and the predicted growth rate of country i at time *t*) of country i in period t is considerably smaller than that in the previous period (*t-1*) and also stays smaller in the following period (t+*1*), where the period length is five years. Overall, this means that the drop in growth has to be strong and sustained (i.e. lasting for at least 10 years) to be classified as a growth slowdown. Our Aiyar et al. (2013) sample consists of 89 countries, thereof 51 MIT countries and 38 non-MIT countries.

World Bank (2013): According to the World Bank (2013) definition (based on Maddison 2010 data), a country faces an MIT if it stays within the range of 4.5 percent to 45 percent of the US per capita income (in 1990 international Geary-Khamis dollars) in the period from 1960 to 2008. As the World Bank (2013) study does not provide a comprehensive list of their identified MIT countries, we reproduce their results using their thresholds and the Maddison (2010) database. Our World Bank (2013) sample consists of 101 countries, thereof 69 MIT countries and 32 non-MIT countries.

3.3 Methods of analysis

We choose the method of hypothesis testing. In particular, we use the unpaired two-sample t-test (henceforth: two-sample t-test) as well as the Wilcoxon rank sum test (henceforth: Wilcoxon test) to analyze our discrete data and the two-proportions z-test as well as the Fisher's exact test to analyze our binomial data.

With the two-sample t-test we want to test whether the mean of various variables is greater (or less) in the MIT country sample than in the non-MIT country sample. With the two-proportions z-test we want to test whether the MIT country group has a higher (less) share of countries with a certain characteristic than the non-MIT country group. The Wilcoxon rank sum test and the Fisher's exact test are the non-parametric test alternatives for cases in which we cannot apply the parametric test due to data limitation (for example if the normality or sample size conditions are not valid). The four tests are briefly described in subsection 3.3.1 and 3.3.2.

3.3.1 Comparing means

The two-samples t-test and the Wilcoxon test are used when we want to analyze the relationship between a nominal and a discrete variable.

Unpaired two-samples t-test

The two-samples t-test is used to compare the mean of two independent groups, in our case MIT-countries (group M) and non-MIT countries (group NM). In particular, we want to test whether the mean of group M (μ_M) is greater (less) than the mean of group NM (μ_{NM}). We define the corresponding null hypothesis as follows: H_0: $\mu_M = \mu_{NM}$. The alternative hypotheses (H_a) are H_a: $\mu_M \neq \mu_{NM}$ (different) for the two-tailed test and H_a: $\mu_M > \mu_{NM}$ (greater) and, respectively, H_a: $\mu_M < \mu_{NM}$ (less) for the one-tailed tests.

Before performing the test, we need to check the three independent t-test assumptions, namely whether the two groups of samples M and NM (1) are independent, (2) follow a normal distribution, and (3) have the same variances. Since the samples from MIT-countries and non-MIT countries are not related, assumption 1 is fulfilled in all cases. We apply a Shapiro-Wilk normality test and an F-test to test for the normal distribution of the data and the homogeneity in variances, respectively.

Unpaired two-samples Wilcoxon test

The Wilcoxon test (Wilcoxon, 1945; also known as Mann-Whitney test, henceforth: Wilcoxon test) is the nonparametric alternative to the test described above when the assumption of normality (assumption no. 2) is not fulfilled.[7] In contrast to the two-samples t-test, the ranks of the values rather than the values themselves are used by this test. In other words, it is based solely on the order in which the observations from the two samples fall. We define the corresponding null hypothesis as follows: $H_0: F_M(x) = F_{NM}(x - \Delta)$ – that is, $H_0: \Delta = 0$. The corresponding alternative hypotheses are $H_a: F_M(x) \neq F_{NM}(x - \Delta)$ (different) for the two-tailed test as well as $H_a: F_M(x) > F_{NM}(x - \Delta)$ (greater) and, respectively, $H_a: F_M(x) < F_{NM}(x - \Delta)$ (less) for the one-tailed tests. $F_M(x)$ ($F_{NM}(x - \Delta)$) is the cumulative distributive function (c.d.f.) of a specific characteristic (e.g. the settler mortality) of the MIT country group (non-MIT country group). Δ is a location shift of the c.d.f. for the non-MIT country group relative to the MIT country group. If $\Delta > 0$ ($\Delta < 0$) then MIT countries tend to have a higher (lower) value for the specific characteristic.[8]

3.3.2 Comparing proportions

The two-proportions z-test and the Fisher's (1935) exact tests are used when we want to analyze the relationship between two nominal variables.

Two-proportions z-test

The two-proportions z-test is used to compare two observed proportions. As before, we have two groups of individuals: group M, that is MIT countries and group NM, that is non-MIT ("success") countries. n_M (n_{NM}) denotes the number of MIT countries (non MIT countries). The number of countries with a specific characteristic (e.g., colonial heritage) in each group is x_M in group M and x_{NM} in group NM. π_M (π_{NM}) denotes the proportion of countries with this specific characteristic in group M (group NM), that is $\pi_M = x_M/n_M$ ($\pi_{NM} = x_{NM}/n_{NM}$). The overall proportion of countries with the specific characteristic is defined as

[7] In this case, the Wilcoxon rank-sum test (Mann–Whitney U test) is considerably more efficient than the t-test (see Conover 1980, pp. 225-6). When the normality assumption holds, the Wilcoxon rank-sum test has an (asymptotic) efficiency of $3/\pi$ (≈ 0.95) when compared to the t-test (Lehamnn, 1999, p. 176).

[8] In the case that the distributions of the two groups have the same shape (that its, they are not skewed etc.), we can additionally make statements on the differences in the medians of the two groups. The median test (Mood 1954) presents another non-parametric test alternative which examines whether it is likely that two samples come from populations with the same median. It does not require such strict assumptions as the Wilcoxon test. Note, however, that the median test has a very low power (Ramsey, 1971; Conover et al., 1978) and Freidlin and Gastwirth (2000) even suggest that it should be 'retired' from routine use (p. 161). Therefore, we opt for the Wilcoxon test.

$\pi = \frac{x_M + x_{NM}}{n_M + n_{NM}}$

and the overall proportion of countries which do not share this specific characteristic is defined as $q = 1 - \pi$. We can define the corresponding null hypothesis (H_0) as follows: $H_0: \pi_M = \pi_M$. The corresponding alternative hypotheses are $H_a: \pi_M \neq \pi_{NM}$ (different) for the two-tailed test and $H_a: \pi_M > \pi_{NM}$ (greater) and, respectively, $H_a: \pi_M < \pi_{NM}$ (less) for the one-tailed tests.

According to Rosner (2011, p. 355), the formula of the z-statistic is valid only when sample size $n(= n_M + n_{NM})$ is large enough. In particular, the following two conditions must be satisfied: $n_M \pi q \geq 5$ and $n_{NM} \pi q \geq 5$.

Fisher's exact test

We apply the Fisher's exact test when the normal approximation to the binomial distribution is not valid. It gives exact levels of significance for 2x2 tables and is especially suited for very small expected values (as in our case). Let P_1 denote the probability that a country faces an MIT given that it has a certain characteristic (e.g. being a former British colony) and let P_2 denote the probability that a country faces an MIT given that it has not that certain characteristic (e.g., it is not a former British colony). We test the null hypotheses $H_0: P_1 = P_2$ against the respective alternative hypothesis $H_a: P_1 \neq P_2$ (different) for the two-tailed test and $H_a: P_1 > P_2$ (greater) and, respectively, $H_a: P_1 < P_2$ (less) for the one-tailed tests.

In the tables, we use the following notation to indicate the different alternative hypotheses (here exemplified for the two-sample t-test, however, analogous statements can be made for the other tests): "g" stands for $H_a: \mu_M > \mu_{NM}$ (greater) and "l" for $H_a: \mu_M < \mu_{NM}$ (less) for the one-tailed tests. "≠" indicates $H_a: \mu_M \neq \mu_{NM}$ (different) for the two-tailed test (however, it is rarely used in our analysis).

4 Results

In this section, we discuss our main results regarding our various variables. Subsection 4.1 is devoted to the discussion of geographical variables, Subsection 4.2 deals with the institutional variables, and Subsection 4.3 discusses the results with respect to the cultural variables.

4.1 Geographic variables

Subsection 4.1 is dedicated to the discussion of geographical variables. As pointed out by Rodrik et al. (2004), these variables are exogenous and thus, we do not have endogeneity or reverse causality problems. Moreover, as geographical variables also have indirect effects on per capita income via the other deep determinants, it seems to be a good starting point for our analysis. In particular, we investigate the relationship between the MIT phenomenon and continent dummies, latitude, landlockedness, coastal length and coastal-area ratio, the disease environment (malaria and yellow fewer) and the oil reserves. Note that landlockedness, coastal length, and coastal-area ratio can be interpreted as measures of trade openness/integration.

4.1.1 Continent

Many MIT studies emphasize that most MIT countries are located in Asia and Latin America (see Glawe and Wagner, 2016, for an overview), whereas North American and European countries are more successful in avoiding a growth slowdown at the middle-income level.[9] As continent dummies are also widely used as control variables in cross-country growth regression analysis, it appears worth investigating their relationship with the MIT dummy. In particular, we test whether the proportion of African, Asian, and Latin American countries is greater in the MIT-country group than in the non-MIT country group and whether the proportion of European countries is less in the MIT-country group than in the non-MIT country group. Our sample size condition is fulfilled for the Aiyar et al. (2013) and the World Bank (2013) sample, but not for the Felipe et al. (2012) sample for which we therefore conduct a Fisher's exact test.

Africa: Our results regarding the Aiyar et al. (2013) sample indicate that proportion of countries located in Africa is greater in the MIT group ($\pi_M^A = .22$) than in the non-MIT group ($\pi_{NM}^A = .03$), $z^A = 2.59, p^A = 0.005$,. This result is supported by our findings regarding the World Bank (2013) sample ($\pi_M^{WB} = .26$, $\pi_{NM}^{WB} = .06$, $z^{WB} = 2.33$, $p^{WB} = 0.010$) and the Felipe et al. (2012) sample ($\pi_M^F = .19, \pi_{NM}^F = .00, p^F = 0.089, OR^F = Inf$).

Asia: Our sample data does not show a statistically significant relationship between being an Asian country and facing an MIT. For example, when analyzing the World Bank (2013) sample, our results indicate that there is not sufficient evidence to conclude that the proportion of countries located in Asia is greater in the MIT group ($\pi_M^{WB} = .32$) than in the non-MIT group ($\pi_{NM}^{WB} = .28$), $z^A = 0.38, p^A = 0.352$. Our results regarding the Aiyar et al. (2013) sample ($\pi_M^A = .24$, $\pi_{NM}^A = .34, z^A = -1.11$, $p^A = 0.866$) and the Felipe et al. (2012) sample ($\pi_M^F = .28$, $\pi_{NM}^F = .38, p^F = 0.858$, $OR^F = 0.63$) confirm this finding and even indicate a trend in the opposite direction.

Latin America: Analyzing the Aiyar et al. (2013) sample, we find that the proportion of countries located in Latin America is statistically significantly greater in the MIT country group ($\pi_M^A = .41$) than in the non-MIT country group ($\pi_{NM}^A = .05$), $z^A = 4.17$, $p^A < 0.001$. This findings is confirmed by our results regarding the World Bank (2013) sample ($\pi_M^{WB} = .28$, $\pi_{NM}^{WB} = 06.$, $z^{WB} = 2.45$, $p^{WB} = 0.007$) and the Felipe et al. (2012) sample ($\pi_M^F = .28$, $\pi_{NM}^F = .00, p^F = 0.022, OR^F = Inf$).

Europe: We find strong evidence that there is a negative relationship between being a European country and being an MIT country. Analyzing the Aiyar et al. (2013) sample, we find that the proportion of countries located in Europe is statistically significantly less in the MIT country group ($\pi_M^A = .14$) than in the non-MIT country group ($\pi_{NM}^A = .55$), $z^A = -4.17$, $p^A < 0.001$. Our findings regarding the World Bank (2013) sample ($\pi_M^{WB} = .16$, $\pi_{NM}^{WB} = .53$,

[9] As the number of North American countries is relatively small in each of our three MIT country samples (only one or two countries), we omit the North American country dummy in our analysis.

$z^{WB} = -3.88$, $p^{WB} < 0.001$) and the Felipe et al. (2012) sample ($\pi_M^F = .23$, $\pi_{NM}^F = .54, p^F = 0.034, OR^F = Inf$) confirm this result.

Our main findings are only partly in line with the standard MIT literature. Although there is sufficient evidence to conclude that the proportion of Latin American (European) countries is greater (less) in the MIT group, our sample data does not show significant evidence that the proportion of Asian countries is greater in the MIT sample. This might probably stem from the fact that, although various MIT countries are actually located in Asia, there are also various (East) Asian success countries (the so-called "Asian Tigers"). We also find statistical evidence that the proportion of African countries is significantly greater (at the 5-percent level using the World Bank, 2013, sample and at the 1-percent level using Aiyar et al., 2013, sample) in the MIT country group (relative to the non-MIT country group). Detailed results are provided in Table 3. Again, it is important to note that the continent dummies might be correlated with other variables. Table A2 in the Appendix A2 reveals that there is a positive correlation between being a Latin American country and having a Spanish legal origin and with the share of Catholics of the country's total population.

Table 3. Continent dummies.

Variable	Sample	Test	H_a	n_M	n_{NM}	π_M	π_{NM}	p-value	z	OR
Africa	Aiyar et al. (2013)	Two-proportions z-test (one-sided)	g	51	38	.22	.03	0.005	2.59	-
	World Bank (2013)	Two-proportions z-test (one-sided)	g	69	32	.26	.06	0.010	2.33	-
	Felipe et al. (2012)	Fisher’s exact test (one-sided)	g	64	13	.19	.00	0.089	-	Inf
Asia	Aiyar et al. (2013)	Two-proportions z-test (one-sided)	g	51	38	.24	.34	0.866	-1.11	
	World Bank (2013)	Two-proportions z-test (one-sided)	g	69	32	.32	.28	0.352	0.38	-
	Felipe et al. (2012)	Fisher’s exact test (one-sided)	g	64	13	.28	.38	0.858	-	0.63
Europe	Aiyar et al. (2013)	Two-proportions z-test (one-sided)	l	51	38	.14	.55	< 0.001	-4.17	
	World Bank (2013)	Two-proportions z-test (one-sided)	l	69	32	.16	.53	< 0.001	-3.88	-
	Felipe et al. (2012)	Fisher’s exact test (one-sided)	l	64	13	.23	.54	0.034	-	Inf
Latin America	Aiyar et al. (2013)	Two-proportions z-test (one-sided)	g	51	38	.41	.05	< 0.001	4.17	-
	World Bank (2013)	Two-proportions z-test (one-sided)	g	69	32	.28	.06	0.007	2.45	-
	Felipe et al. (2012)	Fisher’s exact test (one-sided)	g	64	13	.28	.00	0.022	-	Inf

4.1.2 Latitude

Latitude, that is the distance from the equator, is a commonly used geographical indicator in cross-country growth regressions. Easterly and Levine (2003) use it as an objective measure of tropics as countries closer to the equator will tend to have a more tropical climate.

In general, it is argued that countries farther away from that equator (i.e. with higher latitude) have a higher per capita income. There are different explanations for this positive correlation between latitude and GDP per capita. For example, Hall and Jones (1999) argue that latitude is a measure of distance from Western Europe (and thus, Western influences) which affects the adoption of social infrastructure, which in turn is related to per capita income.

We want to know whether the average MIT country's latitude is greater than the average non-MIT country latitude. As the normality assumption as well as the assumption of variance homogeneity is fulfilled for all three country samples, we perform a two-sample t-test.

Regarding the Aiyar et al. (2013) sample, we find strong empirical evidence that the mean latitude is significantly lower in the MIT country group ($\pi_M^A = .24$) than in the non-MIT country group ($\pi_{NM}^A = .47$), $t^A = -6.63, p^A < 0.001$. This finding is confirmed by our results with respect to the World Bank (2013) sample ($\pi_M^{WB} = .24$, $\pi_{NM}^{WB} = .46$, $t^{WB} = -6.38$, $p^{WB} < 0.001$) and the Felipe et al. (2012) sample ($\pi_M^F = .30$, $\pi_{NM}^F = .48$, $t^F = -3.45$, $p^F < 0.001$) (see Table 4 for detailed results)

Table 4. Latitude.

Sample	Test	H_a	n_M	n_{NM}	μ_M	μ_{NM}	p-value	t
Aiyar et al. (2013)	Unpaired two sample t-test (one-sided)	1	48	36	0.24 (0.143)	0.47 (0.171)	< 0.001	-6.63
World Bank (2013)	Unpaired two sample t-test (one-sided)	1	62	29	0.24 (0.145)	0.46 (0.171)	< 0.001	-6.38
Felipe et al. (2012)	Unpaired two sample t-test (one-sided)	1	63	12	0.30 (0.178)	0.48 (0.142)	< 0.001	-3.45

4.1.3 Coast – Landlocked, coastal length and coastal-area ratio

Another important geographical aspect is the access to the open seas. We want to investigate whether the landlockedness, coastal length and coastal-area ratio are also important against the background of a growth slowdown at the middle-income range.

We start with a dummy variable indicating whether a country is *landlocked* (that is, with no access to open seas) or not. The general growth literature agrees that landlocked countries are geographically disadvantaged (for example regarding (global) market access) and are thus likely to engage less in trade compared to countries with direct access to the coast (Frankel and Romer, 1996).[10] We test whether the proportion of landlocked countries in the MIT country group is

[10] This challenge of distance faced by landlocked countries was already recognized by Adam Smith (1776) who argued that coastal regions enjoyed better access to larger markets than geographically remote regions due to the

greater than in the non-MIT country group. Because the sample size condition is not fulfilled for any of the three samples, we perform the Fisher's exact test instead of the two-proportions t-test. We do not find statistical evidence that the proportion of landlocked countries is significantly greater in the MIT country group (see Table 5). For example, when analyzing the World Bank (2013) sample, the results indicate that there is not sufficient evidence to conclude that the proportion of landlocked countries ($\pi_M^{WB} = .09$) is greater than in the non-MIT group ($\pi_{NM}^{WB} = .06$), ($p^{WB} = 0.481$, $OR^{WB} = 1.49$). Also regarding the Aiyar et al. (2013) sample ($\pi_M^A = .10$, $\pi_{NM}^A = .00$, $p^A = 0.879$, $OR^A = 0.58$) and the Felipe et al. (2012) sample ($\pi_M^F = .08$, $\pi_{NM}^F = .15$, $p^F = 0.911$, $OR^F = 0.47$) we find no statistical evidence; the results even indicate a (non-significant) trending in the opposite direction (that is, a less share of landlocked countries in the MIT country group). However, this may be due to the fact that the number of landlocked countries in our three samples is very small (ranging from 7 to 11 countries). Therefore, in a next step, we focus on the two variables *coastal length* and *coastal-area ratio* which might provide us with more detailed information. In particular, we want to know whether the average MIT country's coastal length (coastal-area ratio) is less than the average non-MIT country's coastal length (coastal-area ratio). We exclude the zeros (that is landlocked countries), because we have already performed a test regarding landlockedness in the previous section.[11] Furthermore, we convert both variables to logarithmic scales to satisfy the normality and variance homogeneity assumptions.[12] Our results are presented in Tables 6 and 7.

Table 5. Landlocked dummy.

Sample	Test	H_a	n_M	n_{NM}	π_M	π_{NM}	p-value	OR
Aiyar et al. (2013)	Fisher's exact test (one-sided)	g	51	38	.10	.16	0.879	0.58
World Bank (2013)	Fisher's exact test (one-sided)	g	66	32	.09	.06	0.481	1.49
Felipe et al. (2012)	Fisher's exact test (one-sided)	g	64	13	.08	.15	0.911	0.47

difficulty and high costs of land transportation. Faye et al. (2004) show that landlocked countries also face the challenge of dependence on transit neighbor countries (e. g. on the neighbors' infrastructure, administrative practices, peace and stability as well as sound cross-border political relations).

[11] We also repeat the tests performed in this section with alternative samples including the landlocked countries. However, in most cases, the normality and variance homogeneity assumptions are not satisfied. For the cases in that we can perform a Wilcoxon test, our results presented in this section are confirmed. (For the Felipe et al., 2012, sample, the Wilcoxon test reveals that there is not sufficient evidence to conclude that the MIT country's coastal length ($\tilde{□}_{□}^{□} = 2046.90$) is less than the non-MIT country's coastal length ($\tilde{□}_{□□}^{□} = 3623.73$), $□^{□} = 0.200$, $□^{□} = -0.84$, and for the World Bank (2013) sample, we find strong empirical evidence that the MIT country's coastal-area ratio ($\tilde{□}_{□}^{□□} = 5.94$) is less than the non-MIT country's coastal-area ratio ($\tilde{□}_{□□}^{□□} = 56.25$), $□^{□□} < 0.001$, $□^{□□} = -3.88$).

[12] For the small number of cases in that we can perform a Wilcoxon test for the not log transformed data, our results presented in this section are confirmed.

Logarithm of coastal length (excluding zeros): The normality and variance homogeneity assumptions are satisfied for all three samples, however, for all three samples, the results are not significant at the 5-percent level and the zero is included in the confidence interval.

Table 6. Coastal length.

Sample	Test	H_a	n_M	n_{NM}	μ_M	μ_{NM}	p-value	t
Aiyar et al. (2013)	Unpaired two sample t-test (one-sided)	1	46	32	7.66 (1.642)	8.18 (2.234)	0.124*	-1.17
World Bank (2013)	Unpaired two sample t-test (one-sided)	1	60	30	7.740 (1.699)	8.38 (2.151)	0.065*	-1.53
Felipe et al. (2012)	Unpaired two sample t-test (one-sided)	1	59	11	7.94 (1.730)	8.77 (2.098)	0.083*	-1.40

Note: An asterisk (*) indicates that the zero is included in confidence interval.

Logarithm of coastal-area ratio (excluding zeros): As the normality and the variance homogeneity assumptions are both satisfied for all three samples, we perform a two-sample t-test. The results for all of our three samples indicate that there is strong evidence that MIT countries have a smaller coastal-area ratio. For example, regarding the World Bank (2013) sample, our results indicate that the mean coastal-area ratio in the MIT country group ($\mu_M^{WB} = 2.23$) is significantly less than in the non-MIT country group ($\mu_{NM}^{WB} = 3.83$), $t^{WB} = -4.31, p^{WB} < 0.001$. Our results regarding the Aiyar et al. (2013) sample ($\mu_M^A = 2.70$, $\mu_{NM}^A = 3.73, t^A = -2.36, p^A = 0.011$) and the Felipe et al. (2012) sample ($\mu_M^F = 2.56$, $\mu_{NM}^F = 3.76, t^F = -2.19, p^F = 0.016$) support this findings.

Table 7. Coastal-area ratio.

Sample	Test	H_a	n_M	n_{NM}	μ_M	μ_{NM}	p-value	t
Aiyar et al. (2013)	Unpaired two sample t-test (one-sided)	1	46	32	2.70 (2.096)	3.73 (1.561)	0.011	-2.36
World Bank (2013)	Unpaired two sample t-test (one-sided)	1	60	30	2.23 (1.781)	3.83 (1.390)	< 0.001	-4.31
Felipe et al. (2012)	Unpaired two sample t-test (one-sided)	1	59	11	2.56 (1.670)	3.76 (1.595)	0.016	-2.19

4.1.4 Disease environment – Malaria and yellow fever

Various studies have emphasized the importance of disease environment for economic growth. For example, Diamond (1997) points out that germs (along with crop) had a direct effect on the technological development of a country in the long run.

In addition, in several works by Sachs and his coauthors, a significant relationship between malaria and economic growth is revealed. For example, in their cross country growth regression for the period between 1965 and 1990, Gallup and Sachs (2001) find that countries with severe malaria in 1965 had a 1.3 percentage lower annual economic growth rate controlling for the initial income level, overall health, and tropical location. Moreover, they estimate that a 10 percentage reduction in the malaria index will lead to a 0.3 percentage rise in annual economic growth. In these studies, it is argued that geography affects the prevalence of disease. For example, climate and ecology are found to be the main determinants of the location and severity of malaria by a study conducted by Gallup and Sachs (2001). More precisely, malaria and other diseases are endemic in the tropical (and subtropical) zones (see also Gallup et al., 2001, and Sachs and Malaney, 2002). Acemoglu et al. (2001), who study the effect of disease through institutions (instead of a direct effect),[13] argue that Europeans were more likely to install solid institutions in areas where they faced a favorable disease environment (p. 1370). They refine that malaria and yellow fever were the major sources of European mortality in the colonies (p. 1380).[14]

In the following, we will test whether the prevalence of diseases such as malaria and yellow fever also have important implications for the question of whether countries face an MIT. We start with our malaria dummy. In particular, we test whether the proportion of countries with malaria in the MIT-country group is greater than in the non-MIT country group.

Table 8. Malaria dummy.

Sample	**Test**	H_a	n_M	n_{NM}	π_M	π_{NM}	**p-value**	**z**	**OR**
Aiyar et al. (2013)	Two-proportions z-test (one-sided)	g	47	35	.60	.06	< 0.001	5.01	-
World Bank (2013)	Two-proportions z-test (one-sided)	g	60	30	.63	.03	< 0.001	5.41	-
Felipe et al. (2012)	Fisher's exact test (one-sided)	g	46	13	.59	.08	0.001	-	16.36

Table 8 provides a detailed overview of our results. When analyzing the World Bank (2013) sample, we find that the share of countries with malaria is statistically significantly greater in the MIT country group (π_M^{WB} =.63) than in the non-MIT country group (π_{NM}^{WB} = .03), z^{WB} = 5.01, $, p^{WB} < 0.001$. The results for the Aiyar et al. (2013) sample ($\pi_M^A = .60$, $\pi_{NM}^A = .06$, $z^A = 5.41$, $p^A < 0.001$) and the Felipe et al. (2012) sample ($\pi_M^F = .59$ $\pi_{NM}^A = .08$, $, p^A = 0.001$, $OR^F =$ 16.36) support this view.

Next, we test whether the proportion of countries where yellow fewer epidemics occurred before 1900 in the MIT-country group is greater than in the non-MIT country group. When ana-

[13] Easterly and Levine (2003, p. 8) call it 'a 'germs' theory of institutions'.

[14] Note that some researchers (among them Acemoglu et al., 2001) argue that malaria is endogenous because poor countries with weak institutions have not managed to eradicate malaria.

lyzing the Aiyar et al. (2013) sample, we find that the share of countries with yellow fever epidemics before 1900 is statistically significantly greater in the MIT country group (π_M^A =.50) than in the non-MIT country group ($\pi_{NM}^A = .11$), $z^A = 3.81$, $, p^A < 0.001$. The results for the World Bank (2013) sample ($\pi_M^{WB} = .48$, $\pi_{NM}^{WB} = .17$, $z^{WB} = 2.94$, $p^{WB} < 0.001$) and the Felipe et al. (2012) sample ($\pi_M^F = .37$ $\pi_{NM}^A = .08$, $, p^A = 0.037$, $OR^F = 6.77$) confirm our findings. Table 9 summarizes our results in more detail.

Table 9. Yellow fever dummy.

Sample	Test	H_a	n_M	n_{NM}	π_M	π_{NM}	p-value	z	OR
Aiyar et al. (2013)	Two-proportions z-test (one-sided)	g	48	37	.50	.11	< 0.001	3.81	-
World Bank (2013)	Two-proportions z-test (one-sided)	g	62	30	.48	.17	< 0.001	2.94	-
Felipe et al. (2012)	Fisher's exact test (one-sided)	g	63	13	.37	.08	0.037	-	6.77

4.1.5 Oil reserves

In this subsection, we focus on the 'resource curse' and investigate its empirical relationship with growth slowdowns in emerging market economies. The term resource curse was coined by Gelb (1988) and Auty (1993) to describe the phenomenon that resource abundance (for example soil fertility, minerals, fossil fuels and energy resources) leads to economic underperformance.[15] By now, this idea is widely accepted among researchers and international organizations such as the World Bank and the IMF (see Rosser, 2006). Auty (2001) finds that resource-poor countries grow two to three times faster than resource abundant countries. Other examples for (empirical) studies examining the effect of resource abundance on economic performance include Gelb (1988), Sachs and Warner (1995b, 1999, and 2001), Leite and Weidmann (1999), Gylfason et al. (1999), and Engerman and Sokoloff (1997, 2002).[16]

We want to examine the relationship between resource abundance (in particular, the oil reserves of a country) and the MIT dummy. In particular, we want to test whether the average MIT countries' oil reserves are greater than the average non-MIT countries' oil reserves. As our data does not satisfy the normality distribution and variance homogeneity assumptions, we use a log transformation that enables us to at least perform a Wilcoxon test.[17] Our results regarding the World Bank (2013) sample indicate that there is not sufficient evidence to conclude the MIT countries' oil reserves ($\tilde{x}_M^{WB} = 2960$) are less than the non-MIT countries' oil reserves ($\tilde{x}_{NM}^{WB} =$

[15] It is noteworthy that prior to the late 1980s, the conventional wisdom among economists was exactly the opposite saying that resource abundance was conducive for growth. The only exceptions include Prebisch (1950) and Singer (1950).
[16] Note that more recently, some authors have also critized the resource curse concept (see, for example, the survey of Havranek et al., 2016).
[17] We add a constant (1) before taking the logs.

1832.5), $p^F = 0.225$, $z^F = 0.76$. Our findings are confirmed by the Felipe et al. (2012) sample ($\tilde{x}_M^F = 4135$, $\tilde{x}_{NM}^F = 240, z^F = 1.34, p^F = 0.091$) and the Aiyar et al. (2013) sample ($\tilde{x}_M^A = 1100$, $\tilde{x}_{NM}^A = 5580, t^A = -0.19, p^A = 0.576$), the latter even indicates a trend in the opposite direction (see Table 10).

Some countries have an extremely high level of oil resources. Thus, it can be decisive for the results whether one single country belongs to the MIT or non-MIT group.[18] We therefore construct a dummy variable equaling one if the country has oil and zero otherwise.[19]

We test whether the proportion of countries with oil resource is greater in the MIT-country group than in the non-MIT country group. Table 11 provides an overview of our results. When analyzing the World Bank (2013) sample, we do not find significant empirical support that the share of oil rich countries is greater in the MIT country group ($\pi_M^{WB} = .65$) than in the non MIT country group ($\pi_{NM}^{WB} = .57$), $z^{WB} = 0.71$, $p^{WB} = 0.239$). Our results regarding the Felipe et al. (2012) sample ($\pi_M^F = .66$, $\pi_{NM}^A = .50$, $p^A = 0.229$, $OR^F = 1.93$) and the Aiyar et al. (2013) sample ($\pi_M^A =.60$, $\pi_{NM}^A = .61$, $z^A = -0.09, , p^A = 0.54$) confirm these findings.

[18] For example, Libya and Saudi Arabia, which both are oil rich countries, are assigned to the MIT country group in the World Bank (2013) and Felipe et al. (2012) sample, but not in the Aiyar et al. (2013) sample for which they belong to the non-MIT country group. See also the Notes of Table 1.

[19] We also test the robustness when applying minimal threshold levels for the countries' oil reserves (100 and 1000), however, our results does not change significantly.

Table 10. Oil reserves (log).

Sample	Test	H_a	n_M	n_{NM}	μ_M	μ_{NM}	$\tilde{x}_M$	$\tilde{x}_{NM}$	p-value	z
Aiyar et al. (2013)	Two-samples Wilcoxon Test (one-sided)	g	47	33	246176.1 (845615.9)	931037.0 (3064983.3)	1100 (96250)	5580 (95700)	0.576	-0.19
World Bank (2013)	Two-samples Wilcoxon Test (one-sided)	g	60	28	522439.8 (2193424.1)	113242.7 (388678.1)	2960.0 (114000)	1832.5 (54150)	0.225	0.76
Felipe et al. (2012)	Two-samples Wilcoxon Test (one-sided)	g	62	12	679238.6 (2357727.4)	179729.2 (586461.7)	4135 (120000)	240 (7160)	0.091	1.34

Table 11. Oil reserves dummy.

Sample	Test	H_a	n_M	n_{NM}	π_M	π_{NM}	p-value	z	OR
Aiyar et al. (2013)	Two-proportions z-test (one-sided)	g	47	33	.60	.61	0.537	-0.09	-
World Bank (2013)	Two-proportions z-test (one-sided)	g	60	28	.65	.57	0.239	0.71	-
Felipe et al. (2012)	Fisher's exact test (one-sided)	g	62	12	.66	.50	0.229	-	1.93

4.2 Institutional variables

In this subsection, we examine whether the fact that some countries experience an MIT is related to differences in institutional variables. Due to the endogeneity and reverse causality problems, we use instrumental variables (utilized widely in empirical studies) instead of direct measures of institutional quality (as, for example, the average risk against expropriation, the Worldwide Governance Indicators etc.). The variables discussed in this section are colonial origin, legal origin, euroshare and the settlers' mortality rate. It has to be noted that these variables are, in turn, to some extent influenced by geographical characteristics such as the disease environment (see, for example, Acemoglu et al., 2001).

4.2.1 Colonial heritage and identity of the colonizing power

We want to test whether the proportion of countries with colonial heritage is significantly greater in the MIT-country group than in the non-MIT-country group. A two-proportion z-test is conducted for the Aiyar et al. (2013) and the World Bank (2013) samples. For the Felipe et al. (2012) sample, we perform the Fisher's exact test because the sample size condition is not fulfilled.

When analyzing the World Bank (2013) sample, we find that the share of countries with colonial heritage is statistically significantly greater in the MIT country group (π_M^{WB} =.92) than in the non-MIT country group (π_{NM}^{WB} = .56), $z^{WB} = 4.21$, ,$p^{WB} < 0.001$. We obtain similar results regarding the other two samples ($\pi_M^A = .92$, $\pi_{NM}^A = .65$, $z^A = 3.16$, $p^A = 0.002$ and $\pi_M^F = .84$, $\pi_{NM}^A = .38$, ,$p^A = 0.002$, $OR^F = 8.00$).

Next, we turn to the identity of the colonizer (British, French, and Spanish), which, according to various empirical cross-country studies, might help to explain the different growth performance of former colonies (examples of such studies include Grier, 1999; Englebert, 2000a,b; Bertocchi and Canova, 2002; Price, 2003; Rostowski and Stacescu, 2006, 2008; Klerman et al., 2011). In particular, standard literature implies that in general, countries with a British colonial origin have grown faster than former French and Spanish colonies and that this can be mainly attributed to the fact that British colonizing powers installed better institutions, in particular better protection of property rights (see, for example, Landes, 1998, and North et al., 2000). However, does the identity of the former colonizing power in a country also matter for the question whether a country faces an MIT? In particular, we want to know whether the proportion of former British colonies (former French and Spanish colonies) in the MIT-country group is less (greater) than in the non-MIT-country group.

Former British origin: When analyzing the Aiyar et al. (2013) sample, the results indicate that there is not sufficient evidence to conclude that the proportion of countries with former British origin is less in the MIT group ($\pi_M^A = .38$) than in the non-MIT group ($\pi_{NM}^A = .38$), $z^A < 0.01, p^A = 0.51$. This result is supported by our findings regarding the World Bank (2013) sample ($\pi_M^{WB} = .28, \pi_{NM}^{WB} = .34, z^{WB} = -0.68$, $p^{WB} = 0.250$) and the Felipe et al. (2012) sample

($\pi_M^F = .32, \pi_{NM}^F = .23, p^F = 0.837, OR^F = 1.58$) which even indicate a trend in the not predicted direction. If we exclude countries that do not have a colonial origin, we derive the same conclusion regarding the Aiyar et al. (2013) sample ($\pi_M^A = .41$, $\pi_{NM}^A = .58, z^A = -1.35$, $p^A = 0.088$) and the Felipe et al. (2012) sample ($\pi_M^F = .38$, $\pi_{NM}^F = .60, p^F = 0.317$, $OR^F = 0.42$) (although now, there is a trend in the predicted direction). However, our results with respect to the World Bank (2013) sample indicate that there is a statistically significant less share of former British colony countries in the MIT group compared to the non-MIT group ($\pi_M^{WB} = .30$, $\pi_{NM}^{WB} = .61, OR^{WB} = 0.28$, $p^{WB} = 0.018$). Given the fact that the sample size is sharply reduced when excluding countries with no colonial heritage, our results from this analysis should be treated with considerable caution.

In sum, we find only very little support for the hypothesis that the proportion of former British colonies is less in the MIT group than in the non MIT group. Thus, our findings differ significantly from earlier results reported in the general growth and development literature. More precisely, the positive impact of being a former British colony seems to be important for the initial take-off of stagnation, but it does not seem to apply to the MIT question.

Former French origin: When analyzing the World Bank (2013) sample, the results indicate that the MIT countries have a significantly higher share of countries with French colonial origin ($\pi_M^{WB} = .18$) than in the non-MIT group ($\pi_{NM}^{WB} = .00$), ($p^{WB} = 0.006$, $OR^{WB} = Inf$). This result is supported by our findings regarding the Aiyar et al. (2013) sample ($\pi_M^A = .14$, $\pi_{NM}^A = .00, p^A = 0.017, OR^A = Inf$). Regarding the Felipe et al. (2012) sample, results indicate a non-significant trending in the predicted direction (a higher share of countries with former French colonial origin for MIT countries, $\pi_M^F = .13, \pi_{NM}^F = .00, p^F = 0.200, OR^F = Inf$). If we exclude non-former colonies, our results regarding the Aiyar et al. (2013) and the World Bank (2013) sample are still significant at the 5-percent level and the results regarding the Felipe et al. (2012) sample stay insignificant.

Former Spanish origin: We obtain similar results regarding the share of former Spanish colonies. Using the Aiyar et al. (2013) sample, we find that the share of countries with a Spanish colonial origin is significantly greater in the MIT country group ($\pi_M^A = .28$) than in the non-MIT country group ($\pi_{NM}^F = .00$), $p^A < 0.001$, $OR^A = Inf$. This result is supported by our findings regarding the World Bank (2013) sample ($\pi_M^{WB} = .25$, $\pi_{NM}^{WB} = .06, p^{WB} = 0.023$, $OR^{WB} = 4.83$) and the Felipe et al. (2012) sample ($\pi_M^F = .26, \pi_{NM}^F = .00, p^F = 0.0320, OR^F = Inf$). If we use samples consisting only of former colony countries, our results regarding the World Bank (2013) and the Felipe et al. (2012) sample turn insignificant but indicate a trend in the predicted direction. Note that, again, that the sample size is relatively small when excluding the non-former colonies.

Former French/Spanish origin: As French and Spanish former colonies share some characteristics (for example, an autocratic regime), we construct a new group with a dummy equaling one if the country has been either a French or a Spanish colony. This sample satisfies the sample size conditions for the Aiyar et al. (2013) sample and the World Bank (2013) sample so we can perform a two-proportion z-test. In both samples, we find strong empirical support that the share of countries with French or Spanish colonial origin is greater in the MIT country group ($\pi_M^{WB} = .43$ and $\pi_M^A = .42$, respectively) than in the non-MIT group ($\pi_{NM}^{WB} = .06$ and $\pi_{NM}^A = .00$, respectively), $z^{WB} = 3.69$, $p^{WB} < 0.001$ and $z^A = 4.53$, $p^A < 0.001$. This result is supported by our findings regarding Felipe et al. (2012) sample ($\pi_M^F = .39$, $\pi_{NM}^F = .00, p^F = 0.004$, $OR^F = Inf$). Excluding non-former colonies, the results of the Felipe et al. (2012) sample turn insignificant, however, the results regarding the other two samples stay highly significant. Overall, our results are in line with the previous findings of the general growth literature. The share of countries with a French and/or Spanish colonial origin is significantly greater in the MIT sample.

Our main findings regarding the colonial origin can be summarized as follows: In contrast to results of the standard literature, the positive impact of being a former British colony seems not to apply to the MIT question. In most cases, even at the 10-percent level of significance, the sample data show there is not sufficient evidence to conclude that the proportion of countries with former British origin is less in the MIT group. The only example is the World Bank (2013) study (and only if we exclude countries without a colonial heritage) which indicates that the proportion of countries with former British origin is less in the MIT group at the 5-percent level. In contrast, the proportion of countries with a French or Spanish colonial origin is significantly greater in the MIT-country group (in most cases ranging from the 5-percent to 1-percent level of significance). Especially if we combine the former French and Spanish colonies, we derive very strong empirical evidence. It is striking that the negative influence of the former French and Spanish colonies seems to persist, whereas the positive effect of the former British colonies seems to fade out. However, it is possible that the being a former French or Spanish colony might be correlated with other characteristics (e.g. geographical variables) that enhance the probability of a country to experience an MIT. A look at the correlation matrix in Appendix A2 reveals that the former Spanish colony dummy is positively correlated with being a Latin American country (0.7143) as well as the share of Catholics in the population (0.7837). The former French colony dummy, in turn, is positively correlated with the share of Muslims in the countries' population. Again, Table 12 summarizes our results in detail.

Table 12. Colonial heritage and origin.

a) Sample A (all countries)

Variable	Sample	Test	H_a	n_M	n_{NM}	π_M	π_{NM}	p-value	z	OR
Former colony	Aiyar et al. (2013)	Two-proportions z-test (one-sided,)	g	50	37	.92	.65	< 0.001	3.16	-
	World Bank (2013)	Two-proportions z-test (one-sided)	g	65	32	.92	.56	< 0.001	4.21	-
	Felipe et al. (2012)	Fisher's exact test (one-sided)	g	62	13	.84	.38	0.002	-	8.00
British colony	Aiyar et al. (2013)	Two-proportions z-test (one-sided)	l	50	37	.38	.38	0.506	0.02	-
	World Bank (2013)	Two-proportions z-test (one-sided)	l	65	32	.28	.34	0.250	-0.68	-
	Felipe et al. (2012)	Fisher's exact test (one-sided)	l	62	13	.32	.23	0.837	-	1.58
French colony	Aiyar et al. (2013)	Fisher's exact test (one-sided)	g	50	37	.14	.00	0.017	-	Inf
	World Bank (2013)	Fisher's exact test (one-sided)	g	65	32	.18	.00	0.006	-	Inf
	Felipe et al. (2012)	Fisher's exact test (one-sided)	g	62	13	.13	.00	0.200	-	Inf
Spanish colony	Aiyar et al. (2013)	Fisher's exact test (one-sided)	g	50	37	.28	.00	< 0.001	-	Inf
	World Bank (2013)	Fisher's exact test (one-sided)	g	65	32	.25	.06	0.023	-	4.83
	Felipe et al. (2012)	Fisher's exact test (one-sided)	g	62	13	.26	.00	0.032	-	Inf
FRA/ESP colony	Aiyar et al. (2013)	Two-proportions z-test (one-sided)	g	50	37	.42	.00	< 0.001	4.53	-
	World Bank (2013)	Two-proportions z-test (one-sided)	g	65	32	.43	.06	< 0.001	3.69	-
	Felipe et al. (2012)	Fisher's exact test (one-sided)	g	62	13	.39	.00	0.004	-	Inf

b) Sample B (only colonies)

Variable	Sample	Test	H_a	n_M	n_{NM}	π_M	π_{NM}	p-value	z	OR
British colony	Aiyar et al. (2013)	Two-proportions z-test (one-sided)	l	46	24	.41	.58	0.088	-1.35	-
	World Bank (2013)	Fisher's exact test (one-sided)	l	60	18	.30	.61	0.018	-	0.28
	Felipe et al. (2012)	Fisher's exact test (one-sided)	l	52	5	.38	.60	0.317	-	0.42
French colony	Aiyar et al. (2013)	Fisher's exact test (one-sided)	g	46	24	.15	.00	0.045	-	Inf
	World Bank (2013)	Fisher's exact test (one-sided)	g	60	18	.20	.00	0.032	-	Inf
	Felipe et al. (2012)	Fisher's exact test (one-sided)	g	52	5	.15	.00	0.455	-	Inf
Spanish colony	Aiyar et al. (2013)	Fisher's exact test (one-sided)	g	46	24	.30	.00	0.001	-	Inf
	World Bank (2013)	Fisher's exact test (one-sided)	g	60	18	.27	.11	0.145	-	2.88
	Felipe et al. (2012)	Fisher's exact test (one-sided)	g	52	5	.31	.00	0.179	-	Inf
FRA/ESP colony	Aiyar et al. (2013)	Two-proportions z-test (one-sided)	g	46	24	.46	.00	< 0.001	3.96	-
	World Bank (2013)	Fisher's exact test (one-sided)	g	60	18	.47	.11	0.005	-	6.85
	Felipe et al. (2012)	Fisher's exact test (one-sided)	g	52	5	.46	.00	0.057	-	Inf

Table 13. Legal origin.

Variable	Sample	Test	H_a	n_M	n_{NM}	π_M	π_{NM}	p-value	z	OR
British legal origin	Aiyar et al. (2013)	Two-proportions z-test (one-sided)	l	51	38	.29	.37	0.230	-0.74	-
	World Bank (2013)	Two-proportions z-test (one-sided)	l	66	32	.21	.34	0.081	-1.40	-
	Felipe et al. (2012)	Fisher's exact test (one-sided)	l	64	13	.25	.23	0.679	-	1.11
French legal origin	Aiyar et al. (2013)	Two-proportions z-test (one-sided)	g	51	38	.63	.24	<0.001	3.66	-
	World Bank (2013)	Two-proportions z-test (one-sided)	g	66	32	.58	.31	0.007	2.44	-
	Felipe et al. (2012)	Fisher's exact test (one-sided)	g	64	13	.64	.15	0.002	-	9.52

4.2.2 Legal Origin

La Porta et al. (1999) argue that the differences between legal systems implemented by the colonial powers, in particular between the (British) common law and the (French) civil law, were important for the development of institutions (especially the protection of investor rights) and thus, on the long-term development. In particular, they find that countries with a French legal origin are more interventionist, have a less efficient government as well as less political freedom and a worse public good provision than the common law countries (p. 261).

We want to know whether the proportion of countries with a British common law origin (French civil law origin) in the MIT-country group is less (greater) than in the non-MIT-country group. Due to the fact that the sample size conditions are only fulfilled for our Aiyar et al. (2013) and World Bank (2013) sample but not for the Felipe et al. (2012) sample, we use the two-proportions z-test for the two former and the Fisher's exact test for the latter.

British legal origin: When analyzing the World Bank (2013) sample, the results indicate that there is not sufficient evidence to conclude that the proportion of countries with former British origin is less in the MIT group ($\pi_M^{WB} = .21$) than in the non-MIT group ($\pi_{NM}^{WB} = .34$), $z^{WB} = -1.40, p^{WB} = 0.081$. This result is supported by our findings regarding the World Bank (2013) sample ($\pi_M^A = .29$, $\pi_{NM}^A = .37, z^A = -0.74, p^A = 0.230$) and the Felipe et al. (2012) sample ($\pi_M^F = .25$, $\pi_{NM}^F = .23, p^F = 0.679$, $OR^F = 1.11$) which even indicates a slight trend in the not predicted direction.

French legal origin: When analyzing the Aiyar et al. (2013) sample, we find strong empirical support that the share of countries with a French legal origin is greater in the MIT country group ($\pi_M^A = .63$) than in the non-MIT country group ($\pi_{NM}^A = .24$), $z^A = 3.66$, $p^A < 0.001$. Our results regarding the World Bank (2013) sample ($\pi_M^{WB} = .58$, $\pi_{NM}^{WB} = .31, z^{WB} = 2.44, p^{WB} = 0.007$) and the Felipe et al. (2012) sample ($\pi_M^F = .64$, $\pi_{NM}^F = .15, p^F = 0.002$, $OR^F = 9.52$) confirm this finding.

Our main findings can be summarized as follows: In contrast to results of La Porta et al. (1999), the positive impact of having a British common law tradition does not seem to apply to the MIT question. In all three samples, even at the 10-percent level of significance, the sample data show there is not sufficient evidence to conclude that the proportion of countries with common law tradition is less in the MIT group. In contrast, our results regarding the share of countries with a civil law origin are in line with the standard literature: In all three samples the proportion of countries with a French civil law origin is significantly greater in the MIT-country group than in the non-MIT group (for the Aiyar et al., 2013, and Felipe et al., 2012, sample at the 1-perent level and for the World Bank, 2013, sample on the 5-percent level). Table 13 summarizes our results in detail.

4.2.3 Settler mortality

In contrast to various other studies, Acemoglu et al. (2001) focus on the conditions faced in the colonies, in particular the disease environment (rather than on the identity of the colonizer) to examine the effect of colonization on the long-term development trajectory of the former colonies. Acemoglu et al.'s (2001, p. 1370) argumentation is the following: Europeans were more inclined to implement growth-promoting institutions (with a strong emphasis on private property) in areas with a disease environment favorable for settlement. In areas with a relatively unfavorable disease environment, European powers set up extractive colonies and did not provide much legal protection for private property. Acemoglu et al. (2001) argue that these institutions installed by the Europeans persisted to the present. They use the differences in European mortality rates as an instrument for current institutions to estimate the effects on the GDP per capita.[20]

In this subsection, we will examine whether argumentation of Acemoglu et al. (2001) also applies to the MIT phenomenon. In particular, we test whether the average MIT country's settler's mortality rate is greater than the average non-MIT country settlers' mortality rate. Due to the fact that the assumption of normality is not valid for any of the three samples, we apply the non-parametric Wilcoxon test. Table 14 provides detailed information on the test results. For example, regarding the World Bank (2013) sample, the results of the Wilcoxon test indicate that the settler mortality of the MIT country group ($\tilde{x}_M^{WB} = 4.38$) is significantly greater than the settler mortality of the non-MIT country group ($\tilde{x}_{NM}^{WB} = 2.71$), $z^{WB} = 3.86, p^{WB} < 0.001$. This is consistent regarding our findings of the Aiyar et al. (2013) sample ($\tilde{x}_M^A = 4.36, \tilde{x}_{NM}^A = 2.70, z^A = 3.83, p^A < 0.001$) and the Felipe et al. (2012) sample ($\tilde{x}_M^F = 4.26, \tilde{x}_{NM}^F = 2.70, z^F = 1.68, p^F = 0.047$).

[20] See Nunn (2009) for a more detailed summary of Acemoglu et al.'s (2001) study.

Table 14. Settler mortality (logarithm).

Sample	Test	H_a	n_M	n_{NM}	μ_M	μ_{NM}	$\tilde{x}_M$	$\tilde{x}_{NM}$	p-value	z
Aiyar et al. (2013)	Two-samples Wilcoxon test (one-sided)	g	34	9	4.39 (0.699)	2.42 (1.049)	4.36 (0.627)	2.70 (0.633)	< 0.001	3.83
World Bank (2013)	Two-samples Wilcoxon test (one-sided)	g	40	11	4.63 (0.885)	2.73 (0.195)	4.38 (0.717)	2.71 (1.000)	< 0.001	3.86
Felipe et al. (2012)	Two-samples Wilcoxon test (one-sided)	g	35	4	4.10 (1.055)	2.81 (1.521)	4.26 (0.179)	2.70 (0.933)	0.047	1.68

Table 15. Euroshare (logarithm).

Sample	Test	H_a	n_M	n_{NM}	μ_M	μ_{NM}	$\tilde{x}_M$	$\tilde{x}_{NM}$	p-value	t	z
Aiyar et al. (2013)	Unpaired two sample t-test (one-sided)	l	30	5	1.701 (0.792)	4.11 (0.459)	1.76 (0.951)	4.19 (0.264)	< 0.001	-6.56	-
World Bank (2013)	Two-samples Wilcoxon test (one-sided)	l	31	7	1.38 (1.379)	3.59 (1.103)	1.66 (1.473)	4.13 (1.167)	< 0.001	-	-3.22

Table 16. Ethnolinguistic fragmentation (logarithm).

Sample	Test	H_a	n_M	n_{NM}	μ_M	μ_{NM}	$\tilde{x}_M$	$\tilde{x}_{NM}$	p-value	z
World Bank (2013)	Two-samples Wilcoxon test (one-sided)	g	50	26	-1.65 (1.271)	-2.27 (1.243)	-1.31 (2.215)	-2.21 (1.422)	0.014	2.19
Felipe et al. (2012)	Two-samples Wilcoxon test (one-sided)	g	55	10	-2.05 (1.271)	-2.37 (1.149)	-2.11 (1.843)	-2.29 (1.558)	0.187	0.89

4.2.4 Euroshare

Easterly and Levine (2016) find a strong positive relationship between current GDP per capita and the proportion of Europeans during colonization (henceforth: *euroshare*). Their findings are in line with the standard literature (see, for example, Engerman and Sokoloff, 1997, as well as Acemoglu et al., 2001), however, they are the first who present direct evidence for the positive influence of colonial European settlement by constructing a comprehensive database. Easterly and Levine (2016) estimate that once European settlement is above 4.8 percent, there is a positive effect on current economic development compared to no colonial European settlement (Easterly and Levine, 2016, p. 253). We use their data to examine the relationship between the MIT dummy and the logarithm of the euroshare. (We use the logarithm of the proportion of Europeans during colonization to fulfill the normality assumptions.)

We test whether the average MIT country's euroshare is less than the average non-MIT countries' euroshare. We cannot use the Felipe et al. (2012) sample as there is only one non-MIT country we have data for, so we focus on the Aiyar et al. (2013) and World Bank (2013) sample (see Table 15).

Our results regarding the Aiyar et al. (2013) sample indicate that the mean euroshare is significantly smaller in the MIT country group ($\mu_M^A = 1.70$) than in the non-MIT country group ($\mu_{NM}^A = 4.11$), $t^A = -6.56,\ p^A > 0.001$. Using a Wilcoxon test (due to the violation of the normality assumption) our results regarding the World Bank (2013) sample confirm these findings ($\tilde{x}_{NM}^{WB} = 1.66, \tilde{x}_{NM}^{WB} = 4.13, z^{WB} = 3.22, p^{WB} < 0.001$).

4.3 Culture

This subsection is an extension of Subsection 4.2 as culture can be regarded as "informal institutions" (North, 1990). In the following, we investigate the relationship between growth slowdowns at the middle-income range and cultural variables such as ethnolinguistic fragmentation, language, religious affiliation, and the Hofstede measure of individualism.

4.3.1 Ethnolinguistic fragmentation

Since the seminal empirical studies of Mauro (1995) and Easterly and Levine (1997), there has been an increasing body of literature analyzing the relationship between ethnic diversity and economic growth. The ethnolinguistic fragmentation index is the standard measure of ethnic diversity. In particular, it measures the probability that two randomly chosen persons in a country belong to different ethnic groups (Easterly and Levine, 1997).[21] The ethnolinguistic fragmentation index ranges from 0 to 1, where 0 indicates perfect homogeneity and 1 indicates perfect heterogeneity.

[21] It is defined as $\square\square\square = 1 - \sum_{\square}\square_{\square}$, where $\square\square\square$ is the ethnolinguistic fragmentation index and $\square_{\square}$ denotes the share of group i in the population.

Especially the early contributions find a direct negative effect of ethnic diversity on economic growth. For example, Easterly and Levine (1997) argue that Africa's high ethnic fragmentation is an important factor in explaining the country's poor economic performance. Various other studies focus on the indirect effects of ethnic heterogeneity. For example, La Porta et al. (1999) show that ethnolinguistic fragmentation is (together with other factors such as the legal origin), an important factor regarding the government performance, which, in turn may affect per capita income. Some studies, however, emphasize that the adverse effect of ethnolinguistic fragmentation on economic growth is only conditional. For instance, Collier et al. (2000) points out that ethnic diversity only adversely affects economic performance in nondemocratic regimes. Easterly (2001) adds that ethnic diversity has more negative effects on economic growth in countries with poor institutions.

We want to test whether there is a significant relationship between the ethnolinguistic fragmentation and the MIT phenomenon. As our data does not satisfy the normality or variance homogeneity assumption, we take the logarithm so we can perform a Wilcoxon test.[22] Using the World Bank (2013) sample, we find that the ethnolinguistic fragmentation is greater in the MIT country group ($\tilde{x}_M^{WB} = -1.31$) than in the non MIT country group ($\tilde{x}_{NM}^{WB} = -2.21$), $p^{WB} = 0.014$, $z^{WB} = 2.19$. However, our results regarding the Felipe et al. (2012) sample do not confirm these findings ($\tilde{x}_{NM}^{F} = -2.05$, $\tilde{x}_M^{F} = -2.37$, $p^F = 0.187$, $z^F = 0.89$). It is worth noting that the non MIT country group is relatively small (it consists of only 10 countries) in the Felipe et al. (2012) sample. Table 16 summarizes our results in detail.

4.3.2 Language

Language variables actually present a borderline case regarding the question whether they should be presented in Section 4.2 or 4.3. Stulz and Williamson (2003) use language (and religion) as proxies for culture (however, they also find that culture is important for investor rights). Hall and Jones (1999) argue that the fraction of the population speaking English or other major Western European languages (as a correlate for Western influences) is partially related to the adoption of different social infrastructures, which affect capital accumulation and productivity and thus, may cause large income differences. Kaufmann et al. (1999) argue that the language variables (as an instrument for institutions) have a strong effect on per capita income (especially according to this interpretation, the language variable could also belong to Section 4.2.).

We want to test whether the fraction of the population speaking English (EngFrac) and, alternatively, speaking one of the five main European languages (EurFrac; namely English, French, German, Spanish, and Portuguese) is related to the MIT dummy. We use data compiled by Hall and Jones (1999).

Regarding the *EngFrac* indicator, the normality and variance homogeneity assumptions are not satisfied for the Aiyar et al. (2013) and the World Bank (2013) sample. Using a Wilcoxon test for the Felipe et al. (2012) sample, our results indicate that the EngFrac is not significantly less in the MIT country sample than in the non-MIT country sample.

[22] Note that for the Aiyar et al. (2013) sample, the necessary assumptions are still not satisfied.

Regarding the *EurFrac* indicator, our results regarding the World Bank (2013) sample reveal that the EurFrac is significantly less in the MIT country group ($\tilde{x}_M^{WB} = 0.003$) than in the non-MIT country group ($\tilde{x}_{NM}^{WB} = 0.456$), $p^{WB} = 0.017$, $z^{WB} = -2.13$. In contrast, our results regarding the other two samples do not confirm these findings, indeed, they even indicate a trend in the opposite direction (Felipe et al (2012) sample: $\tilde{x}_M^F = 0.036$, $\tilde{x}_{NM}^F = 0.004$, $p^F = 0.465$, $z^F = -0.088$; Aiyar et al. (2013) sample: $\tilde{x}_M^A = 0.068$, $\tilde{x}_{NM}^A = 0.005$, $p^A = 0.702$, $z^A = 0.53$). More detailed information is provided in Table 17.

We also construct dummy variables indicating whether the share of the country's population speaking English (or the five main European languages) as mother tongue is greater than 0, 1, 10, 20, or 25 percent. We obtain the following results:

Regarding the *EngFrac* dummy variable, our results are insignificant regarding all combinations (greater than 0, 1, 10, 20, or 25 percent) with respect to the Aiyar et al. (2013) and Felipe et al. (2012) sample, the latter even indicates a trend in the opposite direction. In contrast, our results regarding the World Bank (2013) sample indicate that the share of English speaking persons is significantly less in the MIT group than in the non-MIT group for all dummies. The significance increases with increasing threshold percentage. Our results are significant at the 5-percentage level for the >0 and >1 percent dummies and significant at the 1-percent level regarding the >10, >20, and >25 percent dummies. For example, regarding the >20 percent dummy, we obtain the following results: $\pi_M^{WB} = .02$, $\pi_{NM}^{WB} = .23$, $p^{WB} = 0.002$, $z^{WB} = 0.06$.

We obtain very similar results regarding the *EurFrac* dummy. Again, only the World Bank (2013) sample reveals significant results (at the 5-percent level), however, only for the >10, >20, and >25 percent dummies: $\pi_M^{WB} = .29$, $\pi_{NM}^{WB} = .53$, $p^{WB} = 0.012$, $z^{WB} = -2.26$. The other two samples do not indicate a significant less share of people speaking one of the five major European languages as mother tongue in the MIT country group, the Aiyar et al. (2013) sample even indicates a trend in the opposite direction. For more detailed results, see Table 18.

In sum, the language variables seem to be less important for the MIT phenomenon than in the general growth regressions. Only one sample supports this hypothesis, other samples even show a trend in the opposite direction. Thus, the effect of the language as a proxy for Western influence seems not to apply to the MIT question.

Table 17. Language variables.

Variable	Sample	Test	H_a	n_M	n_{NM}	μ_M	μ_{NM}	$\tilde{x}_M$	$\tilde{x}_{NM}$	p-value	z
EngFrac	Aiyar et al. (2013)	Normality and variance homogeneity assumptions not satisfied.	1	50	32	0.073 (0.229)	0.192 (0.368)	0.000 (0.000)	0.000 (0.025)	-	-
	World Bank (2013)	Normality and variance homogeneity assumptions not satisfied.	1	56	30	0.023 (0.127)	0.204 (0.371)	0.000 (0.000)	0.000 (0.076)	-	-
	Felipe et al. (2012)	Two-samples Wilcoxon test (one-sided)	1	61	13	0.091 (0.258)	0.068 (0.246)	0.000 (0.000)	0.000 (0.000)	0.771	0.74
EurFrac	Aiyar et al. (2013)	Two-samples Wilcoxon test (one-sided)	1	50	32	0.367 (0.417)	0.332 (0.442)	0.068 (0.832)	0.005 (0.868)	0.702	0.53
	World Bank (2013)	Two-samples Wilcoxon test (one-sided)	1	56	30	0.239 (0.378)	0.463 (0.453)	0.0025 (0.570)	0.4560 (0.950)	0.017	-2.13
	Felipe et al. (2012)	Two-samples Wilcoxon test (one-sided)	1	61	13	0.346 (0.418)	0.392 (0.469)	0.036 (0.836)	0.004 (0.949)	0.465	-0.09

Table 18. Language dummy variables.

Variable	Sample	Test	H_a	n_M	n_{NM}	π_M	π_{NM}	p-value	z	OR
EngFrac0	Aiyar et al. (2013)	Two-proportions z-test (one-sided)	1	50	32	.24	.28	0.338	-0.42	-
	World Bank (2013)	Two-proportions z-test (one-sided)	1	56	30	.18	.37	0.027	-1.94	-
	Felipe et al. (2012)	Fisher's exact test (one-sided)	1	61	13	.25	.15	0.862	-	1.78
EurFrac0	Aiyar et al. (2013)	Two-proportions z-test (one-sided)	1	50	32	.64	.53	0.836	0.98	-
	World Bank (2013)	Two-proportions z-test (one-sided)	1	56	30	.50	.67	0.069	-1.48	-
	Felipe et al. (2012)	Fisher's exact test (one-sided)	1	61	13	.62	.53	0.811	-	1.41
EngFrac1	Aiyar et al. (2013)	Two-proportions z-test (one-sided)	1	50	32	.16	.25	0.158	-1.00	-
	World Bank (2013)	Fisher's exact test (one-sided)	1	56	30	.11	.30	0.026	-	0.28
	Felipe et al. (2012)	Fisher's exact test (one-sided)	1	61	13	.18	.08	0.921	-	2.61
EurFrac1	Aiyar et al. (2013)	Two-proportions z-test (one-sided)	1	50	32	.60	.41	0.957	1.71	-
	World Bank (2013)	Two-proportions z-test (one-sided)	1	56	30	.43	.57	0.111	-1.22	-
	Felipe et al. (2012)	Fisher's exact test (one-sided)	1	61	13	.52	.46	0.764	-	1.28
EngFrac10	Aiyar et al. (2013)	Fisher's exact test (one-sided)	1	50	32	.10	.22	0.123	-	0.40
	World Bank (2013)	Fisher's exact test (one-sided)	1	56	30	.04	.23	0.008	-	0.13
	Felipe et al. (2012)	Fisher's exact test (one-sided)	1	61	13	.11	.08	0.805	-	1.55
EurFrac10	Aiyar et al. (2013)	Two-proportions z-test (one-sided)	1	50	32	.44	.38	0.720	0.58	-
	World Bank (2013)	Two-proportions z-test (one-sided)	1	56	30	.29	.53	0.012	-2.26	-
	Felipe et al. (2012)	Fisher's exact test (one-sided)	1	61	13	.41	.46	0.482	-	0.81
EngFrac20	Aiyar et al. (2013)	Fisher's exact test (one-sided)	1	50	32	.08	.22	0.073	-	0.36
	World Bank (2013)	Fisher's exact test (one-sided)	1	56	30	.02	.23	0.002	-	0.06
	Felipe et al. (2012)	Fisher's exact test (one-sided)	1	61	13	.10	.08	0.758	-	1.30
EurFrac20	Aiyar et al. (2013)	Two-proportions z-test (one-sided)	1	50	32	.44	.38	0.720	0.58	-
	World Bank (2013)	Two-proportions z-test (one-sided)	1	56	30	.29	.53	0.012	-2.26	-
	Felipe et al. (2012)	Fisher's exact test (one-sided)	1	61	13	.41	.46	0.482	-	0.81
EngFrac25	Aiyar et al. (2013)	Fisher's exact test (one-sided)	1	50	32	.08	.22	0.073	-	0.36
	World Bank (2013)	Fisher's exact test (one-sided)	1	56	30	.02	.23	0.002	-	0.06
	Felipe et al. (2012)	Fisher's exact test (one-sided)	1	61	13	.10	.08	0.758	-	1.30
EurFrac25	Aiyar et al. (2013)	Two-proportions z-test (one-sided)	1	50	32	.44	.38	0.720	0.58	-
	World Bank (2013)	Two-proportions z-test (one-sided)	1	56	30	.29	.53	0.012	-2.26	-
	Felipe et al. (2012)	Fisher's exact test (one-sided)	1	61	13	.41	.46	0.482	-	0.81

4.3.3 Religion

There is a considerable body of literature studying the effects of religion (as a proxy for culture) on economic development. An early contribution is provided by Weber's seminal work *The Protestant Ethic and the Spirit of Capitalism*. He points out that the Protestant (particularly the Calvinist) work ethic was decisive for the rise of capitalist institutions.

The more recent contributions of Landes (1998) and Grier (1997) confirm this view. For example, Landes (1998) argues that Catholic and Muslim countries have adopted a culture of intolerance, xenophobia, and narrow-mindedness that has delayed their economic development in comparison to Protestant countries. Grier (1997) finds that there exists a positive correlation between the level of Protestantism and real GDP per capita levels. La Porta et al. (1999), among others, examine the effects of religious affiliation on government performance. They find that countries with a Protestant majority have better governments than countries with a predominantly Catholic or Muslim population (the Muslim effect is even stronger). However, they add that the legal origin is "a more robust predictor of poor government performance" (p. 264). In contrast, studies of Sala-i-Martin et al. (2004) and Noland (2005) show that the Islam is rather positively related to economic growth. Focusing on the financial channel, Stulz and Williamson (2003) suggest that the predominant religion as a proxy for culture (along with the predominant language) matter for investor protection. In particular, they find that Catholic countries have less protection of creditor rights than other countries (however, they admit that this effect is tempered when including the country's openness to international trade).

In the following, we will examine whether the religious affiliation of the population is a decisive factor regarding the MIT phenomenon. We use two different kinds of indicators. First, we examine the relationship between the fraction of the population with Catholic, Muslim, Protestant, and "Other" religious affiliation (as taken out by La Porta et al., 1999) and the MIT dummy. Following Stulz and Williamson (2003), we then construct dummy variables for the country's predominant religion (Catholic, Muslim, Protestant, and Other). Our findings are summarized by Tables 19 and 20, respectively.

We start with the *religious affiliation (fraction of the population with a certain religious affiliation)* variable. Regarding all indicators in all three samples, the normality assumption is not satisfied. Therefore, we can only use the Wilcoxon test. Moreover, regarding the Protestant variable, the variance homogeneity assumption is not fulfilled either. (Thus, we can only refer to descriptive analysis there.)

We test whether the fraction of population with a Catholic and Muslim (Protestant) population is greater (less) in the MIT country group than in the no MIT country group. Our estimates regarding for the Catholic and Muslim religions variables are not significant at all. The only exception is the Catholic variable in the Aiyar et al. (2013), for which our results indicate that MIT countries have a greater share of Catholics than the non MIT countries ($\tilde{x}_M^A = 32.80$, $\tilde{x}_{NM}^A = 6.90$, $p^A = 0.016$, $z^A = 2.14$). However, using the World Bank (2013) sample, we find a trend in the opposite direction ($\tilde{x}_M^{WB} = 32.80$, $\tilde{x}_{NM}^{WB} = 6.90$, $p^{WB} = 0.812$, $z^{WB} = -0.89$). We also find a wrong sign for the Muslim fraction variable in the Aiyar et al. (2013) sample ($\tilde{x}_M^A = 0.10$, $\tilde{x}_{NM}^A = 0.50$ $p^A = 0.805$, $z^A = 0.62$). Although we cannot perform hypothesis tests regarding the Protestant fraction variable (due to the violation of the necessary assumptions), the fraction of Protestants is much higher in the non-MIT group for all three samples (for the World Bank (2013) sample we have, for example, $\mu_M^{WB} = 5.98$, $\mu_{NM}^{WB} = 21.88$; see Table 19)

We then turn to the *predominant religion dummies*.

Catholic dummy: When analyzing the World Bank (2013) sample, the results indicate that there is not sufficient evidence to conclude that the proportion of countries with a predominantly Catholic population is greater in the MIT group ($\pi_M^{WB} = .40$) than in the non-MIT group ($\pi_{NM}^{WB} = .41$), $z^{WB} = -0.09, p^{WB} = 0.535$. Indeed, we find a slight trend in the opposite direction. Our findings regarding the Aiyar et al. (2013) sample ($\pi_M^A = .47$, $\pi_{NM}^A = .32$, $z^A = 1.47, p^A = 0.071$) and Felipe et al. (2012) sample ($\pi_M^F = .44$, $\pi_{NM}^F = .31, p^F = 0.292$, $OR^F = 1.74$) also do not reveal a significant greater share of Catholic countries in the MIT group than in the non-MIT group.

Muslim dummy: We obtain mixed results regarding our Muslim dummy: Regarding the Aiyar et al. (2013) sample ($\pi_M^A = .20$, $\pi_{NM}^A = .18$, $p^A = 0.444$, $z^A = 0.14$) and the Felipe et al. (2012) sample ($\pi_M^F = .27$, $\pi_{NM}^F = .08, p^F = 0.132$, $OR^F = 4.28$), we do not find significant empirical support that the share of countries with a predominantly Muslim religious affiliation is greater in the MIT country group than in the non MIT country group. In contrast, our findings regarding the World Bank (2013) sample reveal there is a significantly (at the 1-percent level) greater share of Muslim countries in the MIT group ($\pi_M^{WB} = .29$) than in the non-MIT group ($\pi_{\square M}^{WB} = .03$), $p^{WB} = 0.001$, $z^{WB} = 3.01$.

Protestant dummy: When analyzing the World Bank (2013) sample, we find significant empirical support that the share of countries with a predominantly Protestant population is less in the MIT country group ($\pi_M^{WB} = .03$) than in the non-MIT country group ($\pi_{NM}^{WB} = .19$), $p^{WB} = 0.012$, $OR^{WB} = 0.13$. Our results regarding the Felipe et al. (2012) sample confirm these findings ($\pi_M^F = .06$, $\pi_{NM}^F = .31, p^F = 0.024$, $OR^F = 0.16$). The sole exception is the Aiyar et al. (2012) sample, which shows the predicted direction, but not significantly so ($\pi_M^A = .08$, $\pi_{NM}^A = .21$, $p^A = 0.069$, $OR^A = 0.32$).

Table 19. Religious affiliation (in %).

Variable	Sample	Test	H_a	n_M	n_{NM}	μ_M	μ_{NM}	$\tilde{x}_M$	$\tilde{x}_{NM}$	p-value	t	z
Catholic	Aiyar et al. (2013)	Two-samples Wilcoxon test (one-sided)	g	51	38	45.77 (41.140)	28.12 (33.643)	32.80 (90.500)	6.90 (50.400)	0.016	-	2.14
	World Bank (2013)	Two-samples Wilcoxon test (one-sided)	g	68	32	34.66 (40.027)	38.03 (36.363)	10.00 (28.100)	30.60 (71.175)	0.812	-	-0.89
	Felipe et al. (2012)	Two-samples Wilcoxon test (one-sided)	g	64	13	40.01 (40.943)	29.92 (35.564)	18.90 (87.575)	7.90 (51.400)	0.268	-	0.62
Muslim	Aiyar et al. (2013)	Two-samples Wilcoxon test (one-sided)	g	51	38	20.05 (36.444)	17.83 (35.801)	0.10 (13.500)	0.50 (2.6125)	0.805	-	-0.86
	World Bank (2013)	Normality and variance homogeneity assumptions not satisfied.	g	68	32	28.81 (40.085)	4.91 (16.974)	2.40 (55.300)	0.50 (1.410)	-	-	-
	Felipe et al. (2012)	Two-samples Wilcoxon test (one-sided)	g	64	13	25.42 (40.230)	7.84 (26.171)	0.70 (40.400)	0.50 (0.700)	0.276	-	0.59
Protestant	Aiyar et al. (2013)	Normality and variance homogeneity assumptions not satisfied.	l	51	38	10.66 (17.441)	23.62 (31.665)	2.30 (12.550)	5.55 (40.375)	-	-	-
	World Bank (2013)	Normality and variance homogeneity assumptions not satisfied.	l	68	32	5.98 (12.524)	21.88 (30.052)	1.10 (4.000)	5.80 (38.125)	-	-	-
	Felipe et al. (2012)	Normality and variance homogeneity assumptions not satisfied.	l	64	13	10.79 (20.876)	25.58 (31.514)	1.40 (5.600)	7.50 (41.200)	-	-	-
Other	Aiyar et al. (2013)	Two-samples Wilcoxon test (two-sided)	?	51	38	23.52 (28.009)	30.43 (31.644)	8.80 (40.850)	18.39 (41.700)	0.135	-	-1.49
	World Bank (2013)	Two-samples Wilcoxon test (two-sided)	?	68	32	27.60 (33.039)	35.17 (33.120)	10.40 (45.000)	23.25 (51.275)	0.060	-	-1.88
	Felipe et al. (2012)	Two-samples Wilcoxon test (two-sided)	?	64	13	23.77 (29.898)	36.65 (38.447)	7.30 (37.525)	18.58 (79.500)	0.116	-	-1.57

Table 20. Predominant religion dummy.

Variable	Sample	Test	H_a	n_M	n_{NM}	π_M	π_{NM}	p-value	z	OR
Catholic	Aiyar et al. (2013)	Two-proportions z-test (one-sided)	g	51	38	.47	.32	0.071	1.47	-
	World Bank (2013)	Two-proportions z-test (one-sided)	g	68	32	.40	.41	0.535	-0.09	-
	Felipe et al. (2012)	Fisher's exact test (one-sided)	g	64	13	.44	.31	0.292	-	1.74
Muslim	Aiyar et al. (2013)	Two-proportions z-test (one-sided)	g	51	38	.20	.18	0.444	0.14	-
	World Bank (2013)	Two-proportions z-test (one-sided)	g	68	32	.29	.03	0.001	3.01	
	Felipe et al. (2012)	Fisher's exact test (one-sided)	g	64	13	.27	.08	0.132	-	4.28
Protestant	Aiyar et al. (2013)	Fisher's exact test (one-sided)	l	51	38	.08	.21	0.069	-	0.32
	World Bank (2013)	Fisher's exact test (one-sided)	l	68	32	.03	.19	0.012	-	0.13
	Felipe et al. (2012)	Fisher's exact test (one-sided)	l	64	13	.06	.31	0.024	-	0.16
Other	Aiyar et al. (2013)	Two-proportions z-test (two-sided)	?	51	38	.25	.29	0.716	-0.36	-
	World Bank (2013)	Fisher's exact test (two-sided)	?	68	32	.28	.38	1.000	-	0.97
	Felipe et al. (2012)	Fisher's exact test (two-sided)	?	64	13	.23	.31	0.466	-	0.57

4.3.4 Individualism versus collectivism

Several studies conducted by economists (Greif, 1994, 2006; Gorodnichenko and Roland, 2010; 2012, 2015) and psychologists (Heine, 2007) consider the distinction between individualism and collectivism as the most important cultural dimension. A widely used measure of individualism is provided by Hofstede (2001).[23] It describes the prevailing relationship between the individual and the collectivity in a given society, in particular, whether the individual prefers a *loosely-knit social framework* in which individuals are expected to take care of themselves and only their immediate families (individualism) or a *tightly-knit framework* with individuals expecting their relatives and other in-group members to support each other with unquestioning loyalty (collectivism). That is, individualistic societies value personal freedom and status; collectivist societies, on the other hand, value harmony and conformity. According to Gorodnichenko and Roland (2010), these character traits have important implications for the individual incentive to innovate on the one hand, and the practicability of collective action on the other: The authors argue that in individualistic societies, personal accomplishments are rewarded with social status and thus, there is a culturally motivated incentive for innovation. At the same time, due to the emphasis on personal freedom and status, collective action can be difficult. In contrast, collectivistic societies facilitate collective action because conformity is encouraged, however, this discourages innovation. In their endogenous growth model – including a cultural variable along the dimension of individualism-collectivism – Gorodnichenko and Roland (2010) find a strong causal effect on economic development (in favor of individualist countries).

Using the Hofstede dataset (the most recent version of the data can be obtained from the website https://geert-hofstede.com/countries.html), we test whether MIT countries are less individualistic than non-MIT countries. The normality and variance homogeneity assumptions are not fulfilled for the Aiyar et al. (2013) and the World Bank (2013) sample. Performing a Wilcoxon test, our results regarding the Felipe et al. (2012) sample indicate that the individualistic score is significantly less in the MIT-country group ($\tilde{x}_M^F$=35.0) than in the non-MIT country group ($\tilde{x}_{NM}^F = 67.5$), $p^F = 0.028$, $z^F = -1.91$. Our data regarding the other two samples show a tendency in the same direction (see Table 21).

We also test the logarithm of the individualism measure, because then, our variance homogeneity assumption is also fulfilled for the remaining two samples (see Table 22). Our results indicate strong empirical evidence that the individualism score is significantly less in the MIT country group than in the non-MIT group (at the 1-percent level regarding the World Bank (2013) sample ($\tilde{x}_M^{WB}$=3.40, $\tilde{x}_{NM}^{WB} = 4.17$, $p^{WB} < 0.001$, $z^{WB} = -4.14$) as well as the Aiyar et al. (2013) sample ($\tilde{x}_M^A$=3.40, $\tilde{x}_{NM}^A = 4.12$, $p^A < 0.001$, $z^A = -4.65$) and at the 5-percent level regarding the Felipe et al. (2012) sample ($\tilde{x}_M^F$=3.56, $\tilde{x}_{NM}^F = 4.21$, $p^F = 0.028$, $z^F = -1.91$)).

[23] Other measures of individualism include data established by Schwartz (1994) and the World Value Survey data.

Table 21. Individualism measure.

Sample	Test	H_a	n_M	n_{NM}	μ_M	μ_{NM}	$\tilde{x}_M$	$\tilde{x}_{NM}$	p-value	z
Aiyar et al. (2013)	Normality and variance homogeneity assumptions not satisfied.	1	32	34	29.56 (14.990)	58.09 (22.179)	30.0 (17.75)	61.5 (34.75)	-	-
World Bank (2013)	Normality and variance homogeneity assumptions not satisfied.	1	47	30	28.85 (14.554)	55.20 (25.067)	30 (16.00)	65 (47.75)	-	-
Felipe et al. (2012)	Two-samples Wilcoxon test (one-sided)	1	50	12	40.00 (23.033)	56.75 (23.219)	35.0 (28.25)	67.5 (30.25)	0.028	-1.91

Table 22. Individualism measure (logarithm).

Sample	Test	H_a	n_M	n_{NM}	μ_M	μ_{NM}	$\tilde{x}_M$	$\tilde{x}_{NM}$	p-value	z
Aiyar et al. (2013)	Two-samples Wilcoxon test (one-sided)	1	32	34	3.25 (0.569)	3.97 (0.482)	3.40 (0.666)	4.12 (0.629)	<0.001	-4.65
World Bank (2013)	Two-samples Wilcoxon test (one-sided)	1	47	30	3.24 (0.517)	3.88 (0.570)	3.40 (0.600)	4.17 (1.018)	<0.001	-4.14
Felipe et al. (2012)	Two-samples Wilcoxon test (one-sided)	1	50	12	3.51 (0.636)	3.93 (0.528)	3.56 (0.756)	4.21 (0.586)	0.028	-1.91

4.4 Summary

We have examined the relationship between various geographical, institutional, and cultural variables and the MIT. Our main results can be summarized as follows:

Regarding the *geographical variables*, our results indicate that MIT countries have on average a lower latitude measure than the non-MIT countries, meaning that they are on average located in more tropical areas. In addition, the share of countries with malaria or yellow fever epidemics is significantly greater in the MIT group (which is intuitive because malaria and yellow fever are determined by geographical variables as climate). Moreover, a significantly greater (less) share of MIT countries is located in Latin America and Africa (Europe) than of the non-MIT countries. Interestingly, our Asian continent dummy is not significant at all (probably due to the fact that various success countries as Hong Kong, Taiwan, South Korea etc. are located in Asia). Our findings with respect to the coastal variables (that could be also interpreted as proxies for *trade integration*) are mixed. Some of them appear to be of minor importance regarding the question whether a country experiences an MIT. In particular, we find no significant evidence with respect to the landlockedness dummy and the coastal length variable. However, our findings regarding the coastal-area ratio variable indicate that MIT countries in general have a lower coastal-area ratio. Finally, we also do not find empirical support that the share of countries with oil reserves (as a natural reserve indicator) is greater in the MIT group. In sum, our findings regarding the geographical variables do not differ significantly from those of the general literature.

With respect to our *institutional variables*, we find that the MIT countries have on average a higher settler mortality and a less euroshare than the non-MIT group. Our findings regarding the identity of the colonizing power partly differ from the results of the standard literature. In particular, we find very little support for the hypothesis that the proportion of former British colonies is less in the MIT group compared to the non-MIT group. It could therefore be concluded that the positive impact of being a former British colony seems to be important for the initial growth phase (take-off of stagnation), but not at later stages of development. In contrast, our findings regarding the French and Spanish colonies are more in line with the standard literature. In particular, we find that the share of French and Spanish colonies is significantly greater in the MIT country group than in the non-MIT group. Regarding the legal system implemented by the colonial powers, we obtain analogous results: The positive impact of having a British common law tradition seems not to apply to the MIT phenomenon, in particular, we find no evidence that the share of countries with a British legal origin is significantly less in the MIT group (one sample even indicates a trend in the opposite direction). In contrast, our results regarding the share of countries with a French legal origin are in line with the standard literature as the share of countries with a former French legal origin is significantly greater in the MIT group. Interestingly, the negative effects of colonization (identity of the colonizer and thus, the quality of institutions installed by them as well as the legal system implemented by the colonizers) seems to persist at later stages of development (at the middle-income range), however, the positive effects appear to fade away.

Regarding our *cultural variables*, we derive very mixed result for various variables (for example regarding the ethnolinguistic fragmentation indicator as well as the language variables). With respect to the religious variables, we find evidence that the share of Protestant countries is significantly less in the MIT group. However, in contrast to the standard literature, we do not find negative effects of being a predominantly Catholic country (we even find some evidence for a trend in the opposite direction). Our results regarding the share of Muslim countries are mixed. Regarding our Hofstede individualistic measure, we find strong empirical support that MIT countries are less individualistic than non MIT countries.

Geographical, institutional, and cultural variables are often neglected when analyzing the question why countries experience a growth slowdown at the middle-income range. Our results indicate, however, that many factors actually play an important/decisive role for the economic success of these countries.

5 Conclusion

The deep determinants of growth, including geographical, integrational, institutional and cultural variables, are widely analyzed in the general growth literature. Many of these studies have revealed that factors such as latitude, colonial and legal origin and religion have a – partly – significant impact on the growth performance of countries. However, so far very little has been done to explore the effects of these fundamental/underlying factors at more subtle stages of development, in particular at the middle-income range. Actually, (besides integration/trade openness) these factors are not considered in the majority of MIT studies. This paper aimed to sensitize for the potential importance of the deep determinants of growth for the MIT phenomenon and to provide a first general overview on the relationship between these determinants and growth slowdowns at the middle-income range. In particular, we focused on geographical and institutional (exogenous) variables (including culture). Our analysis revealed that many of these variables matter for MIT countries, however, some differences compared to the standard literature have become apparent. For example, our findings regarding the colonial and legal origin imply that the negative effects seem to persist up to the middle-income range, whereas the positive effects fade away and are less important for the performance of MICs. Thus, our paper has shown that not all findings of the deep determinants literature can be easily transferred to the problems of MICs. This may raise the question whether we need *new* deep determinants of growth for the MICs or at least a modified version that takes into account the specific circumstances, characteristics, and needs of MICs in a globalized world. Future research should more intensively investigate these determinants, not only regarding MICs, but also with respect to phenomena as high-income traps or even more subtle MIT classification (e.g., the distinction between an upper and a lower MIT).

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http://geocompendium.grid.unep.ch/data_sets/coastal/data/coastline_length.htm

Appendix A1. Data description

Table A1. Description of the variables and data sources.

Variable Name	Description	Source
Latitude	A measure of distance from the equator, in particular the absolute value of the latitude of a country scaled to take values between 0 and 1.	La Porta et al. (1999)
Continent	Continent dummy indicating whether a country is located in Africa, Asia, Europe, or Latin America.	World Bank (2017), Mayer and Zignago (2011)
Landlocked	Dummy equal to 1 if the country is landlocked and 0 otherwise.	Mayer and Zignago (2011)
Coastal length	Coastal length in kilometers.	World Vector Shoreline, United States Defense Mapping Agency (1989).
Coastal-area ratio	The coastal-area ratio is defined as coastal length divided by the land area.	See Coastal Length. Data on country ares/size taken from the World Bank (2017)
Malaria dummy	Dummy equal to 1 if the percentage of the population living where falciparum malaria is endemic is greater than *zero.*	Gallup and Sachs (2001), own calculations.
Yellow fever	Dummy equal to 1 if yellow fever epidemics before 1900 and 0 otherwise.	Acemoglu et al. (2001) using data from Oldstone (1998: 69) and Curtin (1989, 1998)
Oil reserves	Oil resources of the country in thousands of barrels per capita.	Parker (1997)
Oil dummy	Dummy equal to 1 if the percentage of the world's oil reserves is greater than zero.	Parker (1997), own calculation.
Colonial origin	Colonial dummy indicating whether a country was a British, French, Spanish, or Other colony.	La Porta et al. (1999), Klerman et al. (2011), Price (2003), Treisman et al. (2014), Mayer and Zignago (2011)
Legal origin	Legal dummy indicating whether a country has a English Common Law origin or a French Commercial Code legal origin.	La Porta et al. (1999)
Log European settler mortality	Logarithm of the baseline settler mortality measured in terms of deaths per annum per 1,000 "mean strength".	Acemoglu et al. (2001)
Euroshare	Proportion of Europeans during colonization.	Easterly and Levine (2016)
Ethnolinguistic fragmentation	Average of five different indices of ethnolinguistic fragmentation ranging from 1 to 0.	Easterly and Levine (1997) as used in La Porta et al. (1999)

Table A1 continued.

Variable Name	Description	Source
Religion variables (fraction)	Percentage of the population that belonged to the three most widely spread religions in the world (in 1980 and in 1990-95 for more recently formed countries), namely Roman Catholic, Protestant, Muslim. The group "other religions" is the residual.	La Porta et al. (1999)
Primary Religion dummy variables (largest fraction)	The primary religion is defined as the one practiced by the largest fraction of the population of a country.	La Porta et al. (1999)
EngFrac	the fraction of a country's population speaking English as a mother tongue	Hunter (1992) and Gunnemark (1991) as used in Hall and Jones (1999).
EurFrac	the fraction of a country's population speaking one of the five primary Western European languages (including English)	Hunter (1992) and Gunnemark (1991) as used in Hall and Jones (1999).
EngFrac0 - EngFrac25	Dummy equal to 1 if the fraction of a country's population speaking English as a mother tongue is greater than 0, 1, 10, 20, 25 percent, respectively.	Hunter (1992) and Gunnemark (1991) as used in Hall and Jones (1999).
EurFrac0 - EurFrac25	Dummy equal to 1 if the fraction of a country's population speaking one of the five primary Western European languages is greater than 0, 1, 10, 20, 25 percent, respectively.	Hunter (1992) and Gunnemark (1991) as used in Hall and Jones (1999).
Individualism	Measure of individualism describing the prevailing relationship between the individual and the collectivity in a given society ranging from 0 (tightly-knit social framework) to 100 (loosely-knit social framework).	Hofstede (2001)

Appendix A2. Correlation

Table A2. Correlation matrix.

	MIT	Africa	Asia	LatinAmerica	latitude	clength	cratio	malfal94	yellow	oilres
MIT	1									
Africa	0.2962	1								
Asia	-0.5878	-0.1741	1							
LatinAmerica	0.3989	-0.6831	-0.3568	1						
latitude	-0.5992	0.0199	0.3203	-0.568	1					
clength	-0.6034	-0.245	0.0733	-0.3205	0.7587	1				
cratio	-0.2992	-0.4074	0.0595	0.3617	0.0509	0.0261	1			
malfal94	0.2318	0.6588	-0.1362	-0.4259	-0.2954	-0.1948	-0.2941	1		
yellow	0.0725	-0.2041	-0.1066	0.2988	-0.4776	-0.2412	0.0143	0.2555	1	
oilres	-0.3649	-0.1239	0.001	0.0282	0.1817	0.1906	0.2377	-0.1007	0.1267	1
f_brit	-0.6623	0.1491	0.3892	-0.5674	0.5185	0.361	0.193	-0.0564	-0.1826	0.1956
f_french	0.1939	0.3637	-0.114	-0.1917	0.0496	-0.167	-0.1556	0.2164	0	-0.1954
f_esp	0.4336	-0.488	-0.2548	0.7143	-0.4304	-0.2144	0.0405	-0.2829	0.0598	-0.0723
f_other	0.1547	0.1741	-0.0909	-0.051	-0.1998	-0.0502	-0.2241	0.3446	0.2132	0.0201
f_fresp	0.5577	-0.2414	-0.3278	0.5795	-0.393	-0.3229	-0.0632	-0.1363	0.0591	-0.2012
legor_uk	-0.7255	0	0.4264	-0.4781	0.4853	0.4034	0.2565	-0.018	-0.0625	0.1773
legor_fr	0.7255	0	-0.4264	0.4781	-0.4853	-0.4034	-0.2565	0.018	0.0625	-0.1773
logem4	0.6768	0.3248	-0.6046	0.2934	-0.6703	-0.5047	0.0072	0.5817	0.3906	-0.0949
euroshare	-0.829	-0.3384	0.5221	-0.427	0.7406	0.7771	0.0457	-0.2819	-0.1328	0.0832
avelf	0.1112	0.6764	-0.1641	-0.5156	-0.0303	-0.0541	-0.3837	0.7189	-0.122	-0.0478
EngFrac	-0.8555	-0.3264	0.5582	-0.2606	0.4632	0.3988	0.4619	-0.2661	0.0514	0.2703
EurFrac	-0.3682	-0.96	0.2134	0.6085	0.04	0.2843	0.4701	-0.6457	0.2695	0.1683
catho80	0.3481	-0.6192	-0.2685	0.7814	-0.4518	-0.0982	-0.0225	-0.2392	0.2626	-0.0071
muslim80	0.1887	0.6891	-0.1263	-0.467	0.1046	-0.1714	-0.2362	0.2696	-0.244	-0.0984
protmg80	-0.5064	0.0243	0.3187	-0.4399	0.4552	0.3321	0.1604	0.0275	-0.0298	-0.0044
no_cpm80	-0.6141	0.139	0.5087	-0.4881	0.3795	0.199	0.3091	0.0305	-0.1247	0.1917
Individualism	-0.727	-0.0386	0.5804	-0.6233	0.8033	0.6209	-0.0835	-0.2418	-0.234	0.0834

Table A2 continued.

	f_brit	f_french	f_esp	f_other	f_fresp	legor_uk	legor_fr	logem4	euroshare	avelf
f_brit	1									
f_french	-0.2928	1								
f_esp	-0.6547	-0.3194	1							
f_other	-0.2335	-0.114	-0.2548	1						
f_fresp	-0.8421	0.3477	0.7774	-0.3278	1					
legor_uk	0.9129	-0.2673	-0.5976	-0.2132	-0.7687	1				
legor_fr	-0.9129	0.2673	0.5976	0.2132	0.7687	-1	1			
logem4	-0.4341	0.2189	0.153	0.2255	0.2967	-0.4484	0.4484	1		
euroshare	0.524	-0.116	-0.3436	-0.1663	-0.4169	0.5949	-0.5949	-0.7273	1	
avelf	0.0673	0.1561	-0.2633	0.1651	-0.157	0.1536	-0.1536	0.2133	-0.1591	1
EngFrac	0.7447	-0.2284	-0.4758	-0.1825	-0.6224	0.8183	-0.8183	-0.5516	0.6856	-0.213
EurFrac	-0.0461	-0.3574	0.353	-0.1212	0.112	0.1031	-0.1031	-0.3718	0.3882	-0.7418
catho80	-0.7304	-0.2365	0.7837	0.1644	0.6185	-0.6152	0.6152	0.1928	-0.2209	-0.3154
muslim80	-0.0184	0.6446	-0.3433	-0.1268	0.0882	-0.2239	0.2239	0.1932	-0.243	0.2156
protmg80	0.7766	-0.3005	-0.5449	-0.0289	-0.7386	0.8695	-0.8695	-0.3752	0.5401	0.1652
no_cpm80	0.902	-0.3173	-0.6091	-0.1137	-0.8133	0.9182	-0.9182	-0.4045	0.3959	0.1615
Individualism	0.635	-0.006	-0.5803	-0.07	-0.5782	0.6828	-0.6828	-0.8037	0.8394	-0.0298

Table A2 continued.

	EngFrac	EurFrac	catho80	muslim80	protmg80	no_cpm80	Individualism
EngFrac	1						
EurFrac	0.4168	1					
catho80	-0.4655	0.5126	1				
muslim80	-0.2253	-0.6751	-0.5887	1			
protmg80	0.7355	0.0669	-0.5499	-0.2926	1		
no_cpm80	0.7183	-0.0155	-0.6528	-0.1686	0.7695	1	
Individualism	0.6725	0.153	-0.515	-0.0419	0.6545	0.5844	1

Note: If possible, we apply identical abbreviations to those used in the studies of the general deep determinants literature. *f_brit*, *f_french*, and *f_esp* stand for a former British; French, and Spanish origin, respectively. *legor_uk* and *legor_fr* indicate a British or French legal origin, respectively. *logem4* denotes the logarithm of the settler mortality rate. *avelf* stands for ethnolinguistic fragmentation. *catho80*, *muslim80*, *protmg80*, and *no_cpm80* indicate the 1980 share of Catholics, Muslims, Protestants, or Other religious groups in the country's population. The other abbreviations are already described in the Notes of Table A1.