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THE ROLE OF INFORMAL INSTITUTIONS ON ECONOMIC GROWTH: A PANEL DATA ANALYSIS

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ABSTRACT

Two factors that have become dominant in the search for the non-economic drivers of economic growth and development are culture and informal institutions. This paper uses Rokeach (1976) to unite both factors under the one conceptual framework of informal institutions. Cultural factors such as Limited Good Syndrome, Achievement Motivation and Generalized Trust from Marini's study are interpreted as informal institutions. These informal institutions form the core of our panel data analysis investigating the extent to which they contribute to economic growth. The results show no single pattern in their contribution.

Keywords: Informal institutions, economic growth, economic culture, limited good syndrome, achievement motivation, and generalized trust.

1 INTRODUCTION

Two factors that have become dominant in the search for the non-economic drivers of economic growth and development are culture and informal institutions. In his seminal work *Culture's Consequences*, Hofstede's (1980, p25) defines culture as "the collective programming of the human mind distinguishing the members of one group or category of people from others." This definition is consistent with the ones used by other authors such as Kluckhohn (1951) and Boyd and Richerson (1985). Hofstede (2001, p10) believes that "systems of values are a core element of culture," with value being defined as "a broad tendency to prefer certain states of affairs over others" (Hofstede 2001, p5). This understanding of values is similar to Rockeach's (1976, p124) definition of values as a "person's beliefs about ideal modes of conduct and ideal terminal goals"

North (1990 p36) defines informal institutions – norms, conventions, and internally held codes of conduct – as the "informal ways by which human beings have structured human interactions." He continues that informal institutions are 'part of the heritage we call culture' as it is "the cultural filter [that] provides a continuity so that the informal solution to exchange problems in the past carries over in the present and makes those informal constraints important sources of continuity in long-run societal change" (*Ibid.*, p. 37). North claims that institutions are intrinsically linked to individual belief systems:

> "Belief systems embody the internal representation of the human landscape. Institutions are the structure that humans impose on that landscape in order to produce the desired outcome. Belief systems therefore are the internal representation and institutions the external manifestation of that representation" (North 2005, p49).

North further observes that:

> "The intimate interrelationship of beliefs and institutions, while evident in the formal rules of a society, is most clearly articulated in the informal institutions – norms, conventions, and internally held codes of conduct. These informal institutions not only embody the moral codes of the belief system, which tend to have common characteristics across cultures, but also embody the norms particular to individual societies, which are very diverse across cultures" (North 2005, p50).

The relationship between culture and informal institutions can thus be thought of as the relationship between 'values' and 'belief systems'. Rokeach (1976, p2) examined this relationship by focusing on beliefs, which he defined as "inferences made by an observer about underlying states of expectancy." These beliefs are arranged within a belief system, which contains all "of a person's countless beliefs about physical and social reality" in an organised psychological but not necessarily logical form (*Ibid*.).

Values, on the other hand are "a type of belief, centrally located within one's total belief system, about how one ought or ought not to behave, or about some end-state of existence worth or not worth attaining" (Rokeach 1976, p124).

Values are the core beliefs within the belief system, and thus influence the hierarchical level of individual beliefs. Beliefs that are consistent with an individual's values will become more important than those that are inconsistent. The study of culture (as defined by Hofstede) is therefore an attempt to understand the core of a society's belief systems, or, a society's informal institutions (as defined by North). While culture is the core of informal institutions, it is informal institutions that dictate human interactions in society, and thus economic transactions. Informal institutions thus are the primary instrument through which culture influences economic factors.

This paper therefore proposes that informal institutions and culture be considered under the one banner. This approach seems to be supported by Raiser (2001), whose understanding of informal institutions is broader than North's as it includes Hofstede's understanding of culture. Raiser's definition is as follows:

> "Informal institutions may then be understood as the collection of social norms, conventions, and moral values that constrain individuals and organizations in pursuit of their goals." (Raiser 2001, p218).

This paper builds on Raiser's definition of informal institutions as it clearly brings the two seemingly competing non-economic factors of culture and informal institutions together. This paper thus uses both 'culture' and 'informal institutions' interchangeably. Empirically, this paper builds upon Marini's (2004) study on the relationship between culture and economic growth. Marini examines culture through the lens of human preferences, noting that 'the origin of preferences is social, and is linked to the process of primary socialization.' This socialization is passed on through the cultural filter (as identified by North), and manifests itself in the belief system as the values (core beliefs) which dictate the state of affairs an individual prefers over another. Building on Marini's conceptual model, this paper reworks his methodology to develop a more robust test of whether informal institutions drive economic performance. This paper will use 'culture' and 'informal institutions' interchangeably when discussing Marini.

This paper proceeds as follows: The literature review in Section 2 introduces Marini's (2004) analysis of the relationship between culture and economic growth. Section 3

develops the research methodology to identify informal institutions and estimate their contribution to economic growth. Section 4 presents the results of the panel data analysis. Section 5 outlines the robustness tests of these results. Section 6 concludes the paper.

2 LITERATURE REVIEW

This literature review outlines Marini's study, which itself is an improvement of Granato et al.'s (1996) work. Building on the arguments of McClelland et al. (1953) and McClelland (1961), Granato et al. (1996) develop an achievement motivation index. This index is created by summing the percentage of respondents within each nation who want to teach their children 'thrift, saving money and things' and 'determination and perseverance,' while subtracting those who want to teach 'obedience' or 'religious faith.' Granato et al.'s (1996) justification is that the first two answers reflect an emphasis on autonomy and economic achievement, while the last two emphasise conformity to traditional and social norms. Granato et al. (1996) find that nations with a higher achievement motivation have significantly higher economic growth rates. They also find that economic growth models incorporating both economic and cultural variables outperform models that include just one set.

Marini (2004) builds on the work of Granato et al. (1996) by identifying a further three aspects of culture that are related to economic outcomes. This leads to a total of four "syndromes of economic culture, namely: (i) the limited good syndrome; (ii) the achievement syndrome; (iii) the generalized trust syndrome; and (iv) the post-materialistic syndrome" (Marini 2004, p773).

The Limited Good Syndrome comes from the work of Foster (1973), who developed a 'limited good' model after analysing the work of anthropologists in rural and peasant societies. This syndrome is associated with a belief that "economic stagnation is the norm," and leads to the development of three cultural attitudes: (1) rent seeking; (2) restricted communitarianism; and (3) fatalism (Marini 2004). These attitudes are intertwined, in that if economic stagnation is the norm, economic development is a

zero-sum game, so those who want to become rich will monopolise resources and markets. This forces the poorer members of society to "develop the opposite attitude, based on egalitarian relationships within their families and neighbourhoods," which leads to a sharing of poverty (Marini 2004, p773). Eventually a sense of fatalism arises in society as individuals rationalise their state in life and accept the status quo.

The Achievement Syndrome is developed from the work of McClelland (1961, pvii), who found evidence that "a particular psychological factor – the need for Achievement – is responsible for economic growth and decline." McClelland interprets Weber's (2009) Protestant Work Ethic, and Marx's understanding of the profit motive, as being a manifestation of this need for achievement within society. Marini associates higher levels of the Achievement Syndrome with nations that value competition, as long as the outcomes or results are determined by merit rather than arbitrary decisions. A natural consequence of this is the acceptance of inequality. Marini argues that McClelland's (1961) claims were supported by Granato et al.'s (1996) study.

The Generalized Trust Syndrome can be traced back to the works of Banfield (1958) and Foster (1973), as it re-expresses the Limited Good Syndrome in "positive terms" (Marini 2004, p769). This syndrome is supported by Putnam's (1993) finding that civic traditions explain economic development in the North of Italy, and Fukuyama's (1996) assertion that trust is a key ingredient of economic prosperity. Marini (2004, p774) explains the importance of the Generalized Trust Syndrome using transaction costs: "in a market characterized by lack of trust and opportunism among operators, the transaction costs are so high as to discourage the use of the market itself and, in this way, to hinder economic growth."

The Post-Materialistic Syndrome was developed by Inglehart (1977), who found that economic development leads to individuals placing a greater emphasis on satisfying their non-material needs. The relationship between the Post-Materialistic Syndrome and economic outcomes is left for other researchers.

Having identified these four syndromes, Marini (2004) develops a theoretical model with three stages of economic development: (i) antiquity – the early stage of development, where per capita income growth is flat, and technology is primitive; (ii) modernity – economic take-off, where technology is applied to a specific sector, leading to a dramatic increase in GDP per capita; and (iii) contemporaneity – innovation spreads throughout the economy, and GDP per capita growth is more steady. Marini (2004) hypothesises that the Limited Good Syndrome is present in antiquity, and must be overcome for a society to move into modernity. As that society enters modernity, the Achievement Syndrome and Generalized Trust Syndrome drive the high economic growth that characterises this stage. Once the society reaches contemporaneity, the Post-Materialistic Syndrome becomes dominant, as its members have satisfied their material needs so they focus on satisfying their non-material needs.

Marini (2004) tests his theory by aggregating the Limited Good Syndrome, Achievement Syndrome and Generalized Trust Syndrome into one cultural index. This index is developed by identifying one childhood value for each of the three syndromes: "obedience" for Limited Good Syndrome, "independence" for the Achievement Syndrome and "feeling of responsibility" for the Generalized Trust Syndrome. The percentage of respondents within each society who want their children to learn the values of "independence" and "feeling of responsibility" are added together, while the percentage of respondents who want "obedience" is subtracted. Marini replicates Granato et al.'s (1996) model using this new cultural index, and finds that it is superior in explaining economic growth than Granato et al.'s index.

This paper improves on Marini's (2004) study in three key ways. First, this paper uses principal component factor analysis to develop a more robust measure of each cultural syndrome. Second, this paper analyses each syndrome individually, instead of aggregating them. Finally, this paper uses data from multiple waves of the World Values Survey to test how the syndromes affect economic growth within nations.

3 HYPOTHESIS DEVELOPMENT AND MODEL SPECIFICATION

Hypothesis Development

Marini's (2004) study identified three cultural syndromes hypothesised to drive economic development in society: the *Limited Good Syndrome*, the *Achievement Syndrome*, and the *Generalized Trust Syndrome*. The relationship between each of these cultural syndromes and economic growth, as predicted by Marini, leads to the following hypotheses[1]:

> H1 – Nations with higher levels of the Limited Good Syndrome will tend to experience lower levels of economic growth, *ceteris paribus*.
>
> H2 – Nations with higher levels of the Achievement Syndrome will tend to experience higher levels of economic growth, *ceteris paribus*.
>
> H3 – Nations with higher levels of the Generalizable Trust Syndrome will tend to experience higher levels of economic growth, *ceteris paribus*.

Cultural Variables

This paper applies principal component factor analysis to data collected by the World Values Survey to develop the cultural variables tested by this paper. The factor analysis uses data from all the observations available in the World Values Survey, regardless of whether they are retained or excluded by the sample selection procedure. This is because cultural measures only have meaning when compared to each other. Developing the cultural measures using the full sample, then refining the sample for the univariate and multivariate analyses, ensures that the ensuring cultural measures are as comparable as possible, and helps to identify any unintentional sample selection bias that may arise.

Marini (2004) built his analysis on the following World Values Survey question:

[1] While Marini's (2004) conceptual model links each syndrome to economic development, his empirical testing analyses their relationship to economic growth. The implicit assumption is that higher economic growth leads to higher economic development.

> "Here is a list of qualities that children can be encouraged to learn at home. Which, if any, do you consider to be especially important? Please choose up to five." (European Values Study Group and World Values Survey Association 2006, p20).

Marini (2004) attributes the eleven possible answers to his four cultural syndromes as follows:

- Limited Good Syndrome: obedience, religious faith, tolerance and good manners;
- Achievement Syndrome: independence, thrift, determination and hard work;
- Generalized Trust Syndrome: responsibility;
- Post-materialistic Syndrome: imagination and unselfishness.

Marini does not justify these groupings with reference to a theoretical framework. Instead, he relies upon his univariate analysis showing that the correlation between every response and economic growth is what is expected for each of the cultural syndromes to which they are allocated. This paper prefers to rely on theoretical arguments, and, as a result, changes some of these groupings.

Limited Good Index (LG)

The first variable constructed measures the Limited Good Syndrome. Marini (2004 p776) associates this syndrome with parents wanting to teach their children the values of "obedience, religious faith, tolerance and good manners." This paper maintains the responses of Obedience, Religious Faith, and Tolerance in the construction of the variable. 'Tolerance' is removed, as it is hypothesised to relate to the Generalized Trust Syndrome. Furthermore, 'Independence' is included, as higher levels of Independence are associated with a movement away from the Limited Good Syndrome. This is seen in Marini's (2004, p733) description of the syndrome as 'restricted communitarianism,' where the individual is brought up with a "radical refusal of any form of enrichment and the consequent sharing of poverty". A lower

percentage of parents wishing to teach their children 'independence' is thus a strong indication that a nation has a high level of the Limited Good Syndrome.

The factor analysis identifies one factor underlying Good Manners, Independence, Religious Faith and Obedience. This factor has an Eigenvalue of 2.0828, and explains 52.1% of the total variation in the four variables. Table 1 shows the factor coefficients and uniqueness of each of the four variables used to construct LG.

Table 1: Development of the Limited Good Index (LG)

	LG	Uniqueness
Good Manners	0.5909	0.6509
Independence	-0.5081	0.7418
Religious Faith	0.8516	0.2748
Obedience	0.8662	0.2497

As expected, Table 1 shows that LG is positively correlated with a desire to teach children Good Manners, Religious Faith and Obedience, and is negatively correlated with a desire to teach children Independence. The factor loadings show that LG is most closely related to Obedience, which is the variable Marini (2004) used as a proxy. The uniqueness, which gives the percentage of the variance in each variable that is not explained by the other variables in the factor model, reveals that Good Manners and Independence are quite different from the other variables used to construct LG. This highlights that while Independence is related to the Limited Good Index, it does not explain as much of LG as the other variables.

Achievement Index (AC)

The second constructed variable measures the Achievement Syndrome. Marini (2004 p776) associates this syndrome with parents wanting to teach their children the values of "independence, thrift, determination and hard work." This paper maintains the responses of Thrift, Determination and Hard Work. Independence is removed, as unlike the other three responses, it is not closely related to a desire for achievement.

Granato et al. (1996) agree, as they also exclude 'independence' from their achievement motivation index.

The factor analysis identifies one factor underlying Hard Work, Thrift and Determination. This factor has an Eigenvalue of 1.6102, and explains 53.7% of the total variation in these three variables. Table 2 shows the development of AC:

Table 2: Development of the Achievement Index (AC)

	AC	Uniqueness
Hard Work	0.6115	0.6260
Thrift	0.8308	0.3098
Determination	0.7389	0.4540

Table 2 shows that AC is positively correlated with a desire to teach children Hard Work, Thrift and Determination.

Generalized Trust Index (GT)

The third constructed variable measures the Generalized Trust Syndrome. Marini (2004) associates this with parents wanting to teach their children a Feeling of Responsibility. This paper adds another two variables to the construction of the Generalized Trust Index. The first is the percentage of parents wanting to teach their children Tolerance. Tolerance implicitly demands that individuals trust others to judge for themselves, and accept the decisions that others make. The second comes from a different part of the World Values Survey which asks: "Generally speaking, would you say that most people can be trusted or that you need to be very careful in dealing with people?" (European Values Study Group and World Values Survey Association 2006). While this question does not relate to childhood values, it captures the level of trust in each nation. This paper takes the percentage of people who respond: "Most people can be trusted" as a measure of Trust within society (European Values Study Group and World Values Survey Association 2006, p114). Responsibility, Tolerance, and Trust are all expected to be positively correlated with each other and with the Generalized Trust Syndrome.

The factor analysis identifies one factor underlying Responsibility, Tolerance and Trust. This factor has an Eigenvalue of 1.5087, and explains 50.3% of the total variation in the three variables. Table 3 shows the development of GT:

Table 3: Development of the Generalized Trust Index (GT)

	GT	Uniqueness
Responsibility	0.7822	0.3724
Trust	0.4833	0.7664
Tolerance	0.8047	0.3525

Table 3 shows that each variable is positively associated with higher levels of GT. The uniqueness scores show that over half the variance in Responsibility and Tolerance can be explained by the three variables used to construct GT.

Governance

This paper creates one more variable to account for the formal institutional environment in each nation. This variable is called GOV, and is developed from the World Governance Indicators (Kaufmann et al. 2011). The World Governance Indicators identify six measures of governance quality across nations, taken every year or second year from 1996. The six indicators are: Voice and Accountability (VAA); Political Stability and Absence of Violence/Terrorism (PSNV); Government Effectiveness (GE); Regulatory Quality (RQ); Rule of Law (RoL); and Control of Corruption (CoC).

The factor analysis identifies one factor underlying each of the six World Governance Indicators. This factor has an Eigenvalue of 5.3604, and explains 89.3% of the total variation in the six variables. Table 4 shows the development of GOV:

Table 4: Development of Governance (GOV)

	GT	Unique
VAA	0.9141	0.1644
PSNV	0.8880	0.2115
GE	0.9702	0.0587

RQ	0.9523	0.0932
RoL	0.9774	0.0447
CoC	0.9659	0.0671

Table 4 shows that each of the six World Governance Indicators is positively associated with GOV. The uniqueness scores show that there is only a small proportion of each variable that is not explained by one of the other variables or by GOV.

Model Specification

The hypotheses stated above are tested using the following model:

$$GROWTH_{i,t} = \beta_0 + \beta_1 LG_{i,t} + \beta_2 AC_{i,t} + \beta_3 GT_{i,t} + \beta_4 GOV_{i,t} + \beta_5 LNGDP_{i,t} + \beta_6 CAP_{i,t} + \beta_7 EDU_{i,t} + \beta_8 TEC_{i,t} + \beta_9 LAB_{i,t} + \epsilon$$

$\mathrm{GROWTH}_{i,t}$ is the compound annual growth rate in real GDP per capita for each nation in the years t+1 to t+10. The values of this variable are calculated using the Penn World Tables version 1 (Heston et al. 2012).

$\mathrm{LG}_{i,t}$ is the Limited Good Index for nation i at time t, which tests H1, and is expected to have a negative coefficient. $\mathrm{AC}_{i,t}$ is the Achievement Index for nation i at time t, which tests H2, and is expected to have a positive coefficient. $\mathrm{GT}_{i,t}$ is the Generalized Trust Index for nation i at time t, which tests H3, and is expected to have a positive coefficient. $\mathrm{GOV}_{i,t}$ is the quality of governance for nation i at time t. $\mathrm{LNGDP}_{i,t}$ is the natural logarithm of real GDP per capita in nation i at time t, taken from the Penn World Tables version 7.1. This is included as a control variable to account for the level of economic development in the nation. The inclusion of this variable also acts as a proxy to control for all other time invariant factors that drive economic growth. $\mathrm{CAP}_{i,t}$, $\mathrm{EDU}_{i,t}$, $\mathrm{TEC}_{i,t}$ and $\mathrm{LAB}_{i,t}$ are derived from the Solow-Swan framework as controls for capital, education (or technical knowledge), technology and labour respectively (Solow 1956; Swan 1956). $\mathrm{CAP}_{i,t}$ is Gross Capital Formation as a percentage of GDP,

measured by the World Bank for nation i at time t. Formally, $\mathrm{CAP}_{i,t}$ is the "outlays on additions to the fixed assets of the economy plus net changes in the level of inventories" (World Bank 2014a). $\mathrm{EDU}_{i,t}$ is "the total enrolment in tertiary education, regardless of age, expressed as a percentage of the total population of the five-year age group following on from secondary school leaving" in nation i at time t, as reported by the World Bank (2014b). Tertiary enrolments are used to control for human capital instead of primary or secondary enrolments, as they better reflects the spread of the higher-level technical knowledge across the population. Furthermore, given the ten-year timeframe under analysis, there is insufficient time for primary or secondary school enrolments to have any meaningful impact on economic growth.

$\mathrm{TEC}_{i,t}$ reports the high-technology exports, which are "products with high R&D intensity" as a percentage of manufactured exports, reported by the World Bank (2014c) for nation i at time t.

$\mathrm{LAB}_{i,t}$ is the employment to population ratio, which "is the proportion of a country's population that is employed" as reported by the World Bank (2014d) for nation i in time t.

The model is estimated in three ways. The first is as a fixed effects panel data model. Wooldridge (2009, p493) argues that when each observation samples a "large geographical unit," as is the case in this paper, then the fixed effects model "is much more convincing … for policy analysis using aggregate data" than the random effects model. This is because the fixed effects model controls for individual (or national) specific time invariant effects, allowing it to estimate how each variable changes for each nation over time. The limitation of this approach is that it assumes that the size of the given effect, or the slope coefficient, is constant between nations. This paper therefore also estimates the model as a random effects model, which allows the slope to vary between observations, but does not control for time invariant factors. Thus, while the results of the random effects model are presented, they may suffer from omitted variable bias. Finally, this paper estimates the model using the ordinary least squares regression model.

This paper estimates each model with robust standard errors to account for the clustering in the data. As a result, the Hausman (1978) test cannot be used to evaluate the random effects model. Instead, this paper uses the 'xtoverid' test of overidentifying restrictions developed by Schaffer and Stillman (2011) from the procedure outlined by Wooldridge (2002).

Sample Selection

Table 5 summarises the sample selection procedure

Table 5: Sample Selection

	Less	Remaining
Observations in the World Values Survey		297
Less observations:		
for which the cultural indices cannot be calculated	-139	
not in the Penn World Tables	-15	
not in the World Governance Indicators	-59	
for which the $\mathrm{CAP}_{i,t}$, $\mathrm{EDU}_{i,t}$, $\mathrm{TEC}_{i,t}$ or $\mathrm{LAB}_{i,t}$ cannot be obtained	-15	-228
Total		69

The sample selection begins with the 297 observations taken over six waves from the World Values Survey (2014). Each observation for which any of the cultural indices ($\mathrm{LG}_{i,t}$, $\mathrm{AC}_{i,t}$ or $\mathrm{GT}_{i,t}$) can not be calculated is removed. Many of these excluded observations are nations where 'Good Manners' is not a possible response for the childhood values question. This response is necessary to construct $\mathrm{LG}_{i,t}$, and was removed from the fifth and sixth waves of the World Values Survey[2]. There were 15 observations for which the Penn World Tables do not provide GDP data, so these observations are excluded. A further 59 observations are removed as they are not covered by the World Governance Indicators (Kaufmann et al. 2011). Many of these observations are taken from the first and second waves of the World Values Survey,

[2] The variable $\mathrm{GROWTH}_{i,t}$ cannot be calculated for any observations in waves 5 and 6, so changing the construction of $\mathrm{LG}_{i,t}$ will not bring these observations into the sample.

as the World Governance Indicators do not extend that far back. Finally, 15 observations are excluded, as data for one of the remaining control variables ($CAP_{i,t}$, $EDU_{i,t}$, $TEC_{i,t}$ or $LAB_{i,t}$) is not provided by the World Bank. This leads to a total sample of 69 observations across 55 nations from waves 3 and 4 of the World Values Survey.

Table 6 replicates the sample selection procedure, but begins by using only observations from waves 3 and 4. This is followed by Table 7, which shows the nations and years covered by the sample.

Table 6: Sample Selection (Adjusted)

	Less	Remaining
Observations in the World Values Survey		123
Less observations:		
for which the cultural indices cannot be calculated	-29	
not in the Penn World Tables	-8	
not in the World Governance Indicators	-1	
for which the $CAP_{i,t}$, $EDU_{i,t}$, $TEC_{i,t}$ or $LAB_{i,t}$ cannot be obtained	-16	-54
Total		69

Table 7: Final Sample

	COUNTRY	WAVE 3	WAVE 4
1	Albania	1998	-
2	Argentina	-	1999
3	Armenia	1997	-
4	Australia	1995	-
5	Austria	-	1999
6	Azerbaijan	1997	-
7	Belarus	-	2000
8	Belgium	-	1999
9	Bulgaria	1997	1997
10	Chile	1996	-
11	China	1995	-
12	Colombia	1997	-
13	Croatia	1996	-
14	Czech Republic	1998	1998
15	Denmark	-	1999
16	El Salvador	1999	-

	COUNTRY	WAVE 3	WAVE 4
30	Italy	-	1999
31	Japan	1995	-
32	Latvia	1996	1996
33	Lithuania	1997	1997
34	Luxembourg	-	1999
35	Macedonia	1998	-
36	Malta	-	1999
37	Mexico	1996	-
38	Moldova	1996	-
39	Netherlands	-	1999
40	New Zealand	1998	-
41	Norway	1996	-
42	Peru	1996	-
43	Philippines	1996	-
44	Poland	-	1999
45	Portugal	-	1999

17	Estonia	1996	1996	46	Romania	1998	1998
18	Finland	1996	2000	47	Russia	1998	1998
20	France	-	1999	48	Slovakia	1998	1998
21	Georgia	1996	-	49	Slovenia	1995	1995
22	Germany	1997	-	50	South Korea	1996	-
23	Great Britain	-	1999	51	Spain	1995	1995
24	Greece	-	1999	52	Sweden	1996	1996
25	Hungary	1998	1998	53	Switzerland	1996	-
26	Iceland	-	1999	54	Ukraine	1996	1996
27	India	1995	-	55	United States	1995	-
28	Iran	-	2000	56	Uruguay	1996	-
29	Ireland	-	1999		TOTAL	38	31

Note: Table 7 presents the nations included in the sample used by this paper, and the year for which the observations were taken.

A key issue arising from Table 7 is the lack of observations from African nations. South Africa (1996), Egypt (2000), and Nigeria (2000) were all removed from the sample, as the World Bank did not report $\mathrm{EDU}_{i,t}$, while Nigeria (1995) is missing both $\mathrm{EDU}_{i,t}$ and $\mathrm{TEC}_{i,t}$. Morocco (2001) was also removed as the Penn World Tables do not report GDP per capita in 2011, which is needed to calculate $\mathrm{GROWTH}_{i,t}$. Table 11 also highlights the highly unbalanced nature of the World Values Survey, as only 14 of the 56 nations examined by this paper have observations in both waves.

4 ANALYSIS AND RESULTS

Table 8 presents the results of the multivariate analysis, examining the relationship between Marini's cultural concepts and economic growth.

Table 8: Multivariate Analysis

		Model 1	**Model 2**	**Model 3**
		Fixed Effects	Random Effects	OLS
		GROWTH	GROWTH	GROWTH
Constant		73.8524 (2.85)***	26.0040 (3.01)***	24.2066 (3.08)***
$\mathrm{LG}_{i,t}$	H1–	1.2242 (4.47)***	-1.0556 (-2.18)**	-0.6789 (-1.93)*
$\mathrm{AC}_{i,t}$	H2+	0.4047 (1.64)	0.6013 (2.77)***	1.0814 (3.86)***
$\mathrm{GT}_{i,t}$	H3+	0.5459 (1.22)	-0.1795 (-0.49)	0.4168 (0.96)

$GOV_{i,t}$		-4.0237 (-3.26)***	0.1825 (0.29)	0.0268 (0.05)
$LNGDP_{i,t}$		-7.4254 (-2.41)**	-1.9710 (-2.16)**	-2.0615 (-2.29)**
$CAP_{i,t}$		0.0967 (2.52)**	0.0177 (0.32)	0.0406 (0.59)
$EDU_{i,t}$		-0.0286 (-0.64)	-0.0363 (-2.12)**	0.0002 (0.01)
$LAB_{i,t}$		-0.0181 (-0.50)	-0.0264 (-0.63)	-0.0087 (-0.26)
$TEC_{i,t}$		0.1007 (4.19)***	-0.0107 (-0.41)	-0.0322 (-1.48)
$WAVE_t$		-	-	0.0124 (0.03)
n (obs)		69	69	69
n (groups)		55	55	-
R^2 within		0.9316	0.6241	-
R^2 between		0.3877	0.5610	-
R^2 overall		0.4069	0.5901	0.6485
Test Statistic		$F_{9,54}$=140.01	χ^2_9=66.29	$F_{10,58}$=13.89
Prob>Statistic		0.0000	0.0000	0.0000
AIC		-79.76056	-	302.5939
		xtoverid p=0.0000		

Note: Table 8 presents the results of the regressions examining the extent to which Marini's cultural concepts explain economic growth. Models 1, 2 and 3 present the output of the estimated fixed effects panel data model, random effects panel data model and pooled cross-sectional linear regression model, respectively. The dependent variable in each model is $GROWTH_{i,t}$, which is the compounded annual growth in real GDP per capita for each nation from time t+1 to t+10, calculated using data from the Penn World Tables version 7.1. The table presents the coefficient for each variable, along with the t-ratio, calculated using robust standard errors to account for clustering in the sample. *, ** and *** are used to indicate significance at the less than 10%, 5% and 1% levels respectively for the one-tailed test. The independent variables are defined as follows:

$GROWTH_{i,t}$	The growth in real GDP per capita for nation i from time t+1 to t+10. Obtained from the Penn World Tables version 7.1.
$LG_{i,t}$	The Limited Good Index
$AC_{i,t}$	The Achievement Index
$GT_{i,t}$	The Generalized Trust Index
$GOV_{i,t}$	The Governance Index.
$LNGDP_{i,t}$	The natural logarithm of the real GDP per capita for nation i in time t. Obtained from the Penn World Tables version 7.1.
$CAP_{i,t}$	Capital Formation as a percentage of GDP. Obtained from the World Bank.
$EDU_{i,t}$	Percentage of Tertiary Enrolments. Obtained from the World Bank.
$LAB_{i,t}$	Employment to population ratio. Obtained from the World Bank.
$TEC_{i,t}$	High Technology Exports as a percentage of Manufactured Exports. Obtained from the World Bank.

Model 1 employs the fixed effects panel data estimator, and therefore examines the variations within each nation over time. The model finds evidence against H1, as $LG_{i,t}$ is positive and significant at the less than 1% level. There is no evidence, however to support H2 or H3, as while the coefficients for $AC_{i,t}$ and $GT_{i,t}$ are positive, they are not statistically significant at any of the standard levels. Model 1 therefore suggests that

an increase in a nation's Limited Good Syndrome will lead to an increase in economic growth within that nation.

Model 2 employs the random effects panel data estimator. Unlike Model 1, Model 2 finds support for H1, as $\mathrm{LG}_{\mathrm{i,t}}$ is found to be negative and statistically significant at the less than 5% confidence level. H2 is also supported, as the coefficient for $\mathrm{AC}_{\mathrm{i,t}}$ is both positive and significant at the less than 1% level. Once again, the model finds no support for H3. These results, however, are meaningless as the xtoverid test finds that the random effects model is inconsistent. Model 1 therefore provides a better estimation of the true model.

Model 3 presents the pooled cross-sectional ordinary least squares estimation of the model developed in Subsection 3.5. This model's findings are similar to those of Model 2, which was found to be inconsistent. The usefulness of these findings, however, is questionable as the model was estimated using panel data.

Each of the three models was estimated using robust standard errors to account for clustering in the data. This controls for any heteroskedasticity and non-normal distributions of the error term.

5 ROBUSTNESS ANALYSIS

Section 4 did not find strong evidence to support any of the three hypotheses tested by this paper. Section 5 examines the robustness of these findings by relaxing two key assumptions. The first is that the cultural indices have a linear relationship with economic growth. The second is that the relationship between the cultural indices and economic growth is the same across all three development groups.

Non-Linearities

Thus far, this paper has assumed that the cultural indices have a linear relationship to future economic growth. This robustness test examines that assumption by including first squared, then logarithmic terms into the model developed in Section 3.

Table 9 presents the re-estimation of the models from Table 8, with the inclusion of three additional independent variables: $\mathrm{LG}_{\mathrm{i,t}}^{2}$, $\mathrm{AC}_{\mathrm{i,t}}^{2}$ and $\mathrm{GT}_{\mathrm{i,t}}^{2}$, which are the squares of $\mathrm{LG}_{\mathrm{i,t}}$, $\mathrm{AC}_{\mathrm{i,t}}$ and $\mathrm{GT}_{\mathrm{i,t}}$ respectively.

Table 9: Robustness Test – Squares

		Model 1S	**Model 2S**	**Model 3S**
		Fixed Effects	Random Effects	OLS
		GROWTH	GROWTH	GROWTH
Constant		95.8941 (3.29)***	23.8804 (2.65)***	23.2837 (2.67)**
$\mathrm{LG}_{\mathrm{i,t}}$	H1–	-0.0612 (-0.15)	-1.2541 (-2.42)**	-0.7590 (-1.98)*
$\mathrm{AC}_{\mathrm{i,t}}$	H2+	-0.4701 (-2.02)**	0.2073 (0.61)	0.8369 (2.34)**
$\mathrm{GT}_{\mathrm{i,t}}$	H3+	1.4547 (2.68)***	-0.3993 (-0.76)	-0.1874 (-0.32)
$\mathrm{GOV}_{\mathrm{i,t}}$		-5.1546 (-4.84)***	0.0281 (-0.05)	0.5118 (1.04)
$\mathrm{LNGDP}_{\mathrm{i,t}}$		-9.7969 (-3.06)***	-1.7640 (-1.78)*	-1.8671 (-1.89)*
$\mathrm{CAP}_{\mathrm{i,t}}$		0.1518 (4.77)***	0.0296 (0.51)	0.0561 (0.75)
$\mathrm{EDU}_{\mathrm{i,t}}$		-0.0241 (-0.65)	-0.0382 (-2.15)**	0.0005 (0.03)
$\mathrm{LAB}_{\mathrm{i,t}}$		-0.0337 (-0.60)	-0.0242 (-0.60)	-0.0456 (-1.23)
$\mathrm{TEC}_{\mathrm{i,t}}$		0.0974 (4.92)***	-0.0120 (-0.44)	-0.0303 (-1.35)
WAVE_{t}		-	-	-0.0208 (-0.04)
$\mathrm{LG}_{i,t}^{2}$		-2.0363 (-3.49)***	-0.4655 (-1.02)	-0.0273 (-0.07)
$\mathrm{AC}_{i,t}^{2}$		0.1881 (0.94)	0.4065 (1.59)	1.1440 (2.79)***
$\mathrm{GT}_{i,t}^{2}$		0.4294 (2.07)**	0.0093 (0.03)	-0.0758 (-0.27)
n (obs)		69	69	69
n (groups)		55	55	-
R^2 within		0.9769	0.6096	-
R^2 between		0.4322	0.5944	-
R^2 overall		0.4470	0.6204	0.7166
Test Statistic		$\mathrm{F}_{12,54}$=556.59	χ_{12}^{2}=82.37	$\mathrm{F}_{13,55}$=12.40

Prob>Statistic		0.0000	0.0000	0.0000
AIC		-148.5371	-	293.7254
		xtoverid p=0.0000		

Note: Table 9 presents the re-estimated results from Table 16 with the inclusion of squared terms for $LG_{i,t}$, $AC_{i,t}$ and $GT_{i,t}$. Models 1S, 2S and 3S present the output of the estimated fixed effects panel data model, random effects panel data model and pooled cross-sectional linear regression model, respectively. The dependent variable in each model is $GROWTH_{i,t}$, which is the compounded annual growth in real GDP per capita for each nation from time t+1 to t+10, calculated using data from the Penn World Tables version 7.1. The table presents the coefficient for each variable, along with the t-ratio, calculated using robust standard errors to account for clustering in the sample. *, ** and *** are used to indicate significance at the less than 10%, 5% and 1% levels respectively for the one tailed test. The independent variables are defined as follows:

$GROWTH_{i,t}$	The growth in real GDP per capita for nation i from time t+1 to t+10. Obtained from the Penn World Tables version 7.1.
$LG_{i,t}$	The Limited Good Index
$AC_{i,t}$	The Achievement Index
$GT_{i,t}$	The Generalized Trust Index
$GOV_{i,t}$	The Governance Index.
$LNGDP_{i,t}$	The natural logarithm of the real GDP per capita for nation i in time t. Obtained from the Penn World Tables version 7.1.
$CAP_{i,t}$	Capital Formation as a percentage of GDP. Obtained from the World Bank.
$EDU_{i,t}$	Percentage of Tertiary Enrolments. Obtained from the World Bank.
$LAB_{i,t}$	Employment to population ratio. Obtained from the World Bank.
$TEC_{i,t}$	High Technology Exports as a percentage of Manufactured Exports. Obtained from the World Bank.

Model 1S finds strong evidence that the non-linearities should be included in the model as $LG_{i,t}^2$, $AC_{i,t}^2$ and $GT_{i,t}^2$ are jointly significant at the less than 1% level. Furthermore, the three cultural indices are important in explaining future economic growth as: $LG_{i,t}$ and $LG_{i,t}^2$; $AC_{i,t}$ and $AC_{i,t}^2$; and $GT_{i,t}$ and $GT_{i,t}^2$ are all jointly significant at the less than 1% level. However, not all of these variables are individually significant.

Examining each group of variables in turn, Model 1S finds that the coefficient of $LG_{i,t}$ is negative but insignificant, while the coefficient of $LG_{i,t}^2$ is negative and significant at the less than 1% level. This suggests that more extreme values of $LG_{i,t}$ are associated with lower levels of economic growth. $AC_{i,t}$ is found to be negative and significant at the less than 5% level, while $AC_{i,t}^2$ is not significant at any of the standard levels. This is evidence against H2, as it suggests lower Achievement Index scores will lead to higher levels of economic growth. $GT_{i,t}$ and $GT_{i,t}^2$ are both positive and significant at the less than 1% and 5% levels respectively. These findings suggest that if a nation has a Generalized Trust Index score above (below) -1.69, then an increase in the Generalized Trust Index will increase (decrease) future economic growth. The lowest GT score in the sample is -1.68, which suggest that an increase in GT will lead to an

improvement in economic growth for all nations in the sample. Model 1S outperforms Model 1, as it has a dramatically lower Akaike Criterion score.

Model 2S finds no evidence of a non-linear relationship between any of the cultural indices and economic growth. These findings, however, are not robust, as Model 2S is found to be inconsistent under the xtoverid test. Model 1S is therefore superior, and statistical inferences should not be drawn from Model 2S.

Model 3S finds evidence of a non-linear relationship between the Achievement Syndrome and future economic growth. However, as was the case with Model 3, the appropriateness of this model is questionable at best.

Table 10 presents the second re-estimation of the models from Table 16, this time including three additional variables to account for logarithms. To generate the logarithms of the cultural indices, each of $LG_{i,t}$, $AC_{i,t}$ and $GT_{i,t}$ is increased by 3 for each observation to ensure that all values are positive. Taking the natural logarithm of each creates three new variables: ln($LG_{i,t}$+3), ln($AC_{i,t}$+3) and ln($GT_{i,t}$+3).

Table 10: Robustness Test – Logarithms

		Model 1L	**Model 2L**	**Model 3L**
		Fixed Effects	Random Effects	OLS
		GROWTH	GROWTH	GROWTH
Constant		86.4605 (3.81)***	20.1057 (2.05)**	35.2177 (3.47)***
$LG_{i,t}$	H1–	-6.0708 (-3.50)***	4.2881 (-1.85)*	-0.8528 (-0.44)
$AC_{i,t}$	H2+	1.1273 (0.95)	2.6414 (1.99)**	5.8357 (2.54)**
$GT_{i,t}$	H3+	3.7567 (3.13)***	-0.7873 (-0.46)	-1.1593 (-0.73)
$GOV_{i,t}$		-4.5519 (-4.28)***	-0.0731 (-0.11)	0.4863 (0.87)
$LNGDP_{i,t}$		-9.8618 (-2.92)***	-1.7358 (-1.72)*	-2.0938 (-1.81)*
$CAP_{i,t}$		0.1311 (3.78)***	0.0270 (0.48)	0.0520 (0.70)
$EDU_{i,t}$		-0.0128 (-0.31)	-0.0434 (-2.42)**	0.0005 (0.03)

$LAB_{i,t}$		-0.0156 (-0.30)	-0.0140 (-0.34)	-0.0270 (-0.73)
$TEC_{i,t}$		0.0911 (5.54)***	-0.0040 (-0.14)	-0.0267 (-1.10)
$WAVE_t$		-	-	-0.0006 (-0.00)
$\ln(LG_{i,t}+3)$		18.8744 (3.94)***	8.7271 (1.45)	0.5600 (0.11)
$\ln(AC_{i,t}+3)$		-4.1422 (-1.18)	-7.0070 (-1.91)*	-13.7685 (-2.11)**
$\ln(GT_{i,t}+3)$		-7.0148 (-2.06)**	1.2170 (0.23)	3.5897 (0.60)
n (obs)		69	69	69
n (groups)		55	55	-
R^2 within		0.9815	0.6683	-
R^2 between		0.4157	0.5736	-
R^2 overall		0.4909	0.5977	0.6963
Test Statistic		$F_{12,54}$=1151.06	χ^2_{12}=73.66	$F_{13,55}$=16.42
Prob>Statistic		0.0000	0.0000	0.0000
AIC		-163.9999	-	298.4917
		xtoverid p=0.0000		

Note: Table 10 presents the re-estimated results from Table 16 with the inclusion of logarithms for $LG_{i,t}$, $AC_{i,t}$ and $GT_{i,t}$. Models 1L, 2L and 3L present the output of the estimated fixed effects panel data model, random effects panel data model and pooled cross-sectional linear regression model, respectively. The dependent variable in each model is $GROWTH_{i,t}$, which is the compounded annual growth in real GDP per capita for each nation from time t+1 to t+10, calculated using data from the Penn World Tables version 7.1. The table presents the coefficient for each variable, along with the t-ratio, calculated using robust standard errors to account for clustering in the sample. *, ** and *** are used to indicate significance at the less than 10%, 5% and 1% levels respectively for the one tailed test. The independent variables are defined as follows:

$GROWTH_{i,t}$	The growth in real GDP per capita for nation i from time t+1 to t+10. Obtained from the Penn World Tables version 7.1.
$LG_{i,t}$	The Limited Good Index
$AC_{i,t}$	The Achievement Index
$GT_{i,t}$	The Generalized Trust Index
$GOV_{i,t}$	The Governance Index.
$LNGDP_{i,t}$	The natural logarithm of the real GDP per capita for nation i in time t. Obtained from the Penn World Tables version 7.1.
$CAP_{i,t}$	Capital Formation as a percentage of GDP. Obtained from the World Bank.
$EDU_{i,t}$	Percentage of Tertiary Enrolments. Obtained from the World Bank.
$LAB_{i,t}$	Employment to population ratio. Obtained from the World Bank.
$TEC_{i,t}$	High Technology Exports as a percentage of Manufactured Exports. Obtained from the World Bank.

The findings of Table 10 are similar to those of Table 9. Once again, the fixed effects model is preferred, as the xtoverid test finds that the random effects model is inefficient. The three logarithmic terms are also jointly significant. While the findings for the Limited Good Index and Generalizable Trust Index are the same as Model 1S, Model 1L finds no evidence of a relationship between the Achievement Index and future economic growth. Interestingly, like Model 3S, Model 3L finds evidence of a

non-linear relationship between the Achievement Index and future economic growth. Table 19 compares the findings of Model 1S and Model 1L.

Table 11: Summary of Results

	Model 1S (Squares)	**Model 1L (Logarithms)**
Limited Good Index	maximum: ~0	maximum: 0.11
Achievement Index	'-'ve relationship	No relationship
Generalized Trust Index	minimum: -1.69	minimum: -1.13
R^2 within	09769	0.9815
R^2 between	0.4322	0.4157
R^2 overall	0.4470	0.4909
Akaike Criterion	-148.5371	-163.9999

Table 11 shows that the direction of the non-linear relationships predicted by both models is the same. What differs between the models is the estimated turning points of $LG_{i,t}$, and $GT_{i,t}$. The models propose a similar minimum turning point for $LG_{i,t}$, 0 for Model 1S, and 0.11 for Model 1L. The difference between the estimated minimum turning points is larger for $GT_{i,t}$: -1.69 for Model 1S, and -1.13 for Model 1L. There are however, only two observations between these values: Bulgaria (-1.17) and India (-1.31), both measured in wave 3. The models also disagree on the importance of $AC_{i,t}$ in explaining economic growth, as Model 1S suggests that $AC_{i,t}$ has a negative linear relationship with future economic growth, while Model 1L finds no evidence of a relationship. The model fit statistics indicate that Model 1L outperforms Model 1S, as Model 1L explains a higher proportion of the total variance, and has a lower Akaike Criterion score. This suggests that the Achievement Index may not be important in explaining changes in economic growth within nations.

Emerging Markets and Developing Economies

A major assumption of the Fixed Effects model is that the estimated effects are the same across all nations. This assumes that the effect of informal institutions on economic growth is the same in both Advanced and Developing Economies. He we test this assumption by regressing two additional models. First, Model 1 is re-estimated using only observations from Emerging Markets and Developing

Economies. Secondly, Model 1 is re-estimated using the full sample, but with interaction terms between each of the cultural indices and an Advanced Economies indicator variable to test for different slope effects between AEs and EMDEs. Table 12 presents Model 1, along with both re-estimations[3].

Table 12: Robustness Test – EMDEs

		Model 1	**Model 1E**	**Model 1F**
		Fixed Effects	Fixed Effects	Fixed Effects
		GROWTH	GROWTH	GROWTH
Constant		73.8524 (2.85)***	-56.2018 (-2.18)**	-53.4433 (-2.16)**
$LG_{i,t}$	H1–	1.2242 (4.47)***	1.6290 (4.72)***	1.5398 (5.69)***
$AC_{i,t}$	H2+	0.4047 (1.64)	1.3567 (7.60)***	1.3916 (7.51)***
$GT_{i,t}$	H3+	0.5459 (1.22)	-1.1633 (-3.46)***	-1.2304 (-3.40)***
$GOV_{i,t}$		-4.0237 (-3.26)***	-5.3177 (-5.82)***	-5.2431 (-6.10)***
$LNGDP_{i,t}$		-7.4254 (-2.41)**	7.2830 (2.48)**	6.7501 (2.51)**
$CAP_{i,t}$		0.0967 (2.52)**	0.1515 (7.74)***	0.1566 (7.21)***
$EDU_{i,t}$		-0.0286 (-0.64)	-0.1717 (-5.13)***	-0.1638 (5.45)***
$LAB_{i,t}$		-0.0181 (-0.50)	-0.0342 (-0.74)	-0.0362 (-0.77)
$TEC_{i,t}$		0.1007 (4.19)***	0.2770 (4.82)***	0.2601 (5.28)***
$LG_{i,t} \times AE_i$		-	-	-11.5139 (-4.27)***
$AC_{i,t} \times AE_i$		-	-	-0.5461 (-0.62)
$GT_{i,t} \times AE_i$		-	-	-2.2282 (-1.75)*
n (obs)		69	41	69
n (groups)		55	31	55
R^2 within		0.9316	0.9846	0.9910
R^2 between		0.3877	0.0572	0.0242
R^2 overall		0.4069	0.0651	0.0146
Test Statistic		$F_{9,54}$=140.01	$F_{9,30}$=37659.47	$F_{12,54}$=2887.51
Prob>Statistic		0.0000	0.0000	0.0000
AIC		-79.76056	-103.9157	-213.9839

Note: Table 12 presents three fixed effects models testing whether informal institutions have different effects on economic growth across development groups. The dependent variable in each model is $GROWTH_{i,t}$, which is the compounded annual

[3] Models 1E and 1F do not include non-linearities due to insufficient observations.

growth in real GDP per capita for each nation from time t+1 to t+10, calculated using data from the Penn World Tables version 7.1. The table presents the coefficient for each variable, along with the t-ratio, calculated using robust standard errors to account for clustering in the sample. *, ** and *** are used to indicate significance at the less than 10%, 5% and 1% levels respectively for the one tailed test. The independent variables are defined as follows:

$GROWTH_{i,t}$	The growth in real GDP per capita for nation i from time t+1 to t+10. Obtained from the Penn World Tables version 7.1.
$LG_{i,t}$	The Limited Good Index
$AC_{i,t}$	The Achievement Index
$GT_{i,t}$	The Generalized Trust Index
$GOV_{i,t}$	The Governance Index.
$LNGDP_{i,t}$	The natural logarithm of the real GDP per capita for nation i in time t. Obtained from the Penn World Tables version 7.1.
$CAP_{i,t}$	Capital Formation as a percentage of GDP. Obtained from the World Bank.
$EDU_{i,t}$	Percentage of Tertiary Enrolments. Obtained from the World Bank.
$LAB_{i,t}$	Employment to population ratio. Obtained from the World Bank.
$TEC_{i,t}$	High Technology Exports as a percentage of Manufactured Exports. Obtained from the World Bank.
AE_i	Indicator variable equal to 1 if nation i is an Advanced Economy. Obtained from the International Monetary Fund.

The results of Model 1 were discussed in Section 4. Model 1E re-estimates Model 1 using only observations from Emerging Markets and Developing Economies. Removing Advanced Economies from the sample has no effect on the findings for H1, as the coefficient of $LG_{i,t}$ remains positive and significant at the less than 1% level. Fresh evidence is found to support H2, as the coefficient of $AC_{i,t}$ is positive and significant at the less than 1% level. This suggests that higher Achievement Index Scores lead to higher levels of future economic growth in Emerging Markets and Developing Economies. Evidence is found against H3, as the coefficient of $GT_{i,t}$ is negative and significant at the less than 1% level. This suggests that higher levels of Generalizable Trust within EMDEs lead to lower levels of economic growth. The model fit statistics show that the model explains a very small proportion of the variation across nations. This is a direct consequence of using the Fixed Effects Estimator. The Random Effects Estimator was regressed, but found to fail the xtoverid test, so the results are not reported.

Model 1F re-estimates Model 1 with three interaction terms to test whether the slopes of the cultural indices are different across development groups. Each of the cultural indices is interacted with AE_i, an indicator variable that equals 1 if an observation is taken from an Advanced Economy, and 0 otherwise.

Model 1F finds evidence that the relationship between $\mathrm{LG}_{\mathrm{i,t}}$ and $\mathrm{GROWTH}_{\mathrm{i,t}}$ is different across development groups, as $\mathrm{LG}_{\mathrm{i,t}} \times \mathrm{AE}_{\mathrm{i}}$ is significant at the less than 1% level. The model estimates that the coefficient of $\mathrm{LG}_{\mathrm{i,t}}$ is positive while the coefficient of $\mathrm{LG}_{\mathrm{i,t}} \times \mathrm{AE}_{\mathrm{i}}$ is negative. Since $|\mathrm{LG}_{\mathrm{i,t}} \times \mathrm{AE}_{\mathrm{i}}|>|\mathrm{LG}_{\mathrm{i,t}}|$, this finding suggests that higher levels of the Limited Good Index boost future economic growth in EMDEs, but impede future economic growth in AEs. The model finds no evidence that the relationship between $\mathrm{AC}_{\mathrm{i,t}}$ and $\mathrm{GROWTH}_{\mathrm{i,t}}$ is different across development groups, as while the coefficient $\mathrm{AC}_{\mathrm{i,t}} \times \mathrm{AE}_{\mathrm{i}}$ is negative, it is not statistically significant at any of the standard testing levels. Model 1F finds weak evidence that the relationship between $\mathrm{GT}_{\mathrm{i,t}}$ and $\mathrm{GROWTH}_{\mathrm{i,t}}$ is different across development groups, as $\mathrm{GT}_{\mathrm{i,t}} \times \mathrm{AE}_{\mathrm{i}}$ is significant, but only at the 10% level. Since the coefficients of both $\mathrm{GT}_{\mathrm{i,t}}$ and $\mathrm{GT}_{\mathrm{i,t}} \times \mathrm{AE}_{\mathrm{i}}$ are negative this finding suggests that higher levels of Generalized Trust impede future economic growth for all nations, and the magnitude of this effect is larger in Advanced Economies. The usefulness of these results, however, is questionable, as while Model 1F has a lower Akaike Criterion score than Model 1 (and both 1S and 1L), the R^2 statistic shows that Model 1F explains less than 1.5% of the total variation in $\mathrm{GROWTH}_{\mathrm{i,t}}$.

6 CONCLUSION

There are two competing non-economic factors hypothesised to drive economic growth, namely culture and informal institutions. Building on Hofstede's value driven definition of culture, and North's conception of institutions as a representation of belief systems, this paper uses Rokeach (1976) to reconcile both factors under the banner of informal institutions. Reinterpreting Marini's cultural factors of Limited Good Syndrome, Achievement Orientation, and Generalized Trust as informal institutions, we developed three hypotheses. These hypotheses predicted that economic growth is driven by low levels of the Limited Good Syndrome and high levels of both the Achievement Syndrome and the Generalized Trust Syndrome. We also improved upon Marini's (2004) measurement of these informal institutions by using principal component factor analysis to develop a set of indices. The results derived from the panel data analysis within a multivariate empirical framework show a

positive relationship between the Limited Good Index within a nation and that nation's economic growth.

The robustness of the results is tested by relaxing two assumptions. The first assumption is that the relationship between each of the cultural indices and economic growth is linear. Evidence is found to suggest that the Limited Good Index has an 'inverted u-shape' relationship with economic growth, where more extreme values lead to lower levels of economic growth within nations. The optimal level of this index is around the midpoint of the scale. The Generalized Trust Index is found to have a 'u-shape' relationship with economic growth. The minimum turning point, however, is amongst the lowest measures, suggesting that with a few exceptions, higher levels of Generalized Trust within a nation will lead to higher levels of economic growth.

The second assumption used is that the effect of informal institutions on economic growth is the same across nations, regardless of each nation's level of economic development. The results of the robustness test suggest that in Emerging Markets and Developing Economies, higher levels of the Limited Good Index and Achievement Index are associated with higher levels of economic growth, while higher levels of the Generalizable Trust Index are associated with lower levels of economic growth. Furthermore, higher levels of the Limited Good Syndrome and Generalizable Trust Syndrome lead to significantly lower levels of economic growth in Advanced Economies than in Emerging Markets and Developing Economies. The usefulness of these findings, however, is questionable, as the models only explain a small proportion of the variation in future economic growth, and may suffer from insufficient observations.

The major limitation of this paper is a lack of data. While the World Values Survey contains data collected over six waves, observations from the first two waves were excluded, as the World Governance Indices only go back to 1996. Waves 5 and 6 were also removed, as they are too close to the present to calculate future economic growth. This limitation can only be solved by more data becoming available over

time[4]. An expanded dataset will allow for the testing of the non-linear relationships in each development group, and therefore a better analysis of how changes in informal institutions within each nation affect economic growth.

[4] The construction of LG will need to exclude 'Good Manners' if additional data is used to extend the sample size in the future.

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