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An assessment of the relationship between Global Competitiveness Index scores and national GDP per capita growth rates

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Abstract

An increasing amount of attention is paid by the media, and political and business leaders to national competitiveness indices. As globalisation increases and the difficulties of the financial crisis linger on, leaders look towards global benchmarks such as the World Economic Forum's Global Competitiveness Index to make policy and resource allocation decisions. Despite this emphasis on national competitiveness, how this translates to economic growth prospects is not well understood, and a universally accepted economic growth model continues to elude macroeconomists. The research seeks to understand whether a more detailed assessment of the Global Competitiveness Index's twelve competitiveness pillars can improve its explanatory power for economic growth, by investigating patterns of competitiveness performance from both static and dynamic perspectives.

Data was collated over the period 2007-2013 for 118 countries. A hierarchical cluster analysis was performed to segment countries according to homogeneous competitiveness patterns, followed by stepwise multiple regression modelling on the total sample and the resulting clusters in order to assess impacts on adjusted R-squared values. Regressions were performed on stock and flow values for twelve country competitiveness variables.

The results show that the cluster analysis coupled with the specified multiple regression models significantly improved the explanatory power of the selected competitiveness variables on economic growth, except for the least competitive countries, where further research is needed to uncover their true drivers of competitiveness.

Keywords

Economic growth, cluster analysis, cross-country panel regressions

Declaration

I declare that this research project is my own work. It is submitted in partial fulfillment of the requirements for the degree of Master of Business Administration at the Gordon Institute of Business Science, University of Pretoria. It has not been submitted before for any degree or examination in any other University. I further declare that I have obtained the necessary authorisation and consent to carry out this research.

Lauren Julia Rota
11 November 2013

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I dedicate this thesis to Dalia Rota, who will remain with me in spirit for all my days.

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List of Abbreviations

CAGR	Compound annual growth rate
GCI	Global Competitiveness Index
GDP	Gross Domestic Product
IMF	International Monetary Fund
PPPP-GDP	Purchasing power parity *per capita* Gross Domestic Product
WEF	World Economic Forum

1. Introduction to the research problem

'It is in the interests of the commercial world that wealth should be found everywhere'.

- Edmund Burke

1.1. Research title

An assessment of the relationship between Global Competitiveness Index scores and national GDP per capita growth rates

1.1.1. Research problem

As the world has become increasingly globalised, structural problems in the trade-exposed sectors of developed countries have been unveiled, compelling a growing policy emphasis on structural adjustments to overcome economic stagnation (Colander, 2013).

In the wake of the financial crisis, coupled with these globalisation pressures, policy makers have turned their attention to national competitiveness as a policy objective, in the hope that it will resolve the structural issues and restore sustainable higher growth rates (Berger, 2008; Berger & Bristow, 2009; Huggins, 2003; Lee, 2010). Equally so within the South African business context, national competitiveness is the subject of frequent business and media discourse (for example, Deloitte South Africa, 2013; Maswanganyi, 2013; Pennington, 2012; Smith, 2011).

Perhaps unsurprisingly, the development of complex ranking systems to benchmark national competitiveness via composite indicators has surged, to in excess of 190 global competitiveness related indices (Berger & Bristow, 2009). Prominent economists such as Krugman (1994) bemoan the "dangerous obsession" (p. 28) with national competitiveness, since numerous studies of various of these globally compiled indices demonstrate weak correlations with economic performance measures (for example, Berger & Bristow, 2009).

Despite their scientific shortcomings, the value of these composite indicators of national competitiveness lies in their simplicity of use as communication and political tools. Academics concede that compiling valid and reliable indicators of country performance is important for policymakers in assessing economic policy (Freudenberg, 2003; Lall, 2001). From a private enterprise perspective, investors allocating resources among countries use competitiveness indicators to decide on their investment plans (Ochel & Röhn, 2006; Porter, 1998).

Apparent deficiencies notwithstanding, the focus on national competitiveness performance as a means to achieving national economic policy objectives remains, which prompts the need to better understand the concept of national competitiveness, and how it influences a country's economic growth prospects.

As an example, South Africa has a distinctly dichotomous performance on the World Economic Forum's Global Competitiveness Index (Hazelhurst, 2013). How does South Africa's competitiveness ranking of 53rd place out of 148 countries describe its growth prospects when on the one hand it excels on metrics such as financial market development and strength of institutions, but performs among the worst of nations on health, education and labour market efficiency indicators (WEF, 2012)? Can this be understood by decomposing the composite score to explore competitiveness at the component variable level, to identify an underlying pattern? Could a different pattern of competitiveness realise a different economic growth outcome? If competitiveness is a requirement for high levels of economic growth, why do some countries with low competitiveness scores experience higher levels of economic growth than some countries with higher total competitiveness scores?

The issue is of such interest to this country, that Brand South Africa has launched the South African Competitiveness Forum to identify local and international factors that influence South Africa's competitiveness and its attractiveness as an investment destination. A key outcome is the development of a unique South African competitiveness index to inform policy decisions (Brand South Africa, 2013, July 25). Are such customised competitiveness metrics necessary? Are globally standardised benchmarking tools such as the Global

Competitiveness Index appropriate?

Is the emphasis placed on the results of countries' competitiveness scores by media, policymakers and investors alike justified as an indicator of future performance? Do these indicators present a sound basis from which to inform policy decisions? Can multinational companies place any reliance on these indicators to inform their resource allocation decisions (Maswanganyi, 2013)?

These questions on national competitiveness and its link to economic growth have prompted the formulation of the research aim.

1.2. Research aim

Despite extensive academic critique of the notion of national competitiveness, econometric studies continue to apply new techniques to the investigation of cross-country economic growth regression analyses, seeking a robust empirical basis from which to develop sound theoretical underpinnings for the relationship between national competitiveness and economic performance (Hoover & Perez, 2004).

In light of increasing globalisation pressures on national competitiveness and economic growth prospects, the purpose of this research is to establish whether the explanatory power of economic growth regressions can be improved by assessing patterns of national competitiveness among the world's countries. The literature review informed the development of four research objectives to address the research purpose.

The first objective is an assessment of whether there are meaningful differences in country groupings formed in terms of their differing natures of competitiveness performance versus the traditional national competitiveness analysis approach of groupings countries in terms of GDP per capita thresholds.

The second objective is an assessment of whether segmenting countries into homogeneous sub-groups of differing patterns of national competitiveness, can improve the explanatory power of national competitiveness performance on economic growth performance.

The third objective is an assessment of whether analysing changes in stocks of competitiveness patterns (flows), rather than measures of the stocks of competitiveness patterns themselves, can further improve the explanatory power of national competitiveness performance on economic growth performance.

The fourth objective is an assessment of whether economic growth performance is better explained by analysing sub-groups of countries segmented by patterns of competitiveness or country wealth levels, the latter being the conventional approach.

In light of the increasing emphasis on national competitiveness as a policy development objective (Lall, 2001) and on its global benchmarks as decision-making tools for policymakers and investors alike (Ochel & Röhn, 2006), the research is of importance if it succeeds in improving the explanatory power of a global sample's competitiveness performance on its economic growth performance. Any improvement in explaining this relationship would imply more informed decision making by users of these tools. Given the current lack of a universally accepted model to describe the drivers of economic growth, Hoover and Perez (2004) observe that "Substantial room remains for theory to be informed by empirical investigations" (p. 779), supporting the intent of this research.

1.3. Research scope

The purpose of this research is to establish whether the explanatory power of economic growth regressions can be improved by assessing patterns of national competitiveness among the world's countries. While 'patterns' could encompass a wide range of features for observation, two particular patterns of interest are singled out to address the research purpose. These are the differing natures of competitiveness performance among countries, and changes in competitiveness performance over time.

To address the research objectives, a combination of time-series data from two sources is required, namely a globally comparable competitiveness index as the source of the independent variables, and national economic performance statistics as the dependent variable.

1.3.1. Measure of national competitiveness

The World Economic Forum's Global Competitiveness Index (GCI) published in its annual Global Competitiveness Report is the most prominent of national competitiveness indices. It has aligned its metrics along the premises of Michael Porter's seminal work "The Competitive Advantage of Nations" (1990) (Berger & Bristow, 2009; Lall, 2001). Porter, Ketels and Dalgado (2007) and Sala-i-Martin, Blanke, Hanouz, Geiger and Mia (2009) advocate that public policy's focus should centre on national competitiveness as the underpinning of a country's future sustained economic performance.

Accordingly, policymakers view the GCI as a proxy for economic growth (Berger & Bristow, 2009) and use its findings as a basis for policy analysis and development (Lall, 2001). The dominance of the GCI in the national competitiveness discourse and its widespread scale of implementation (benchmarking 144 countries in the 2012-2013 report) (WEF, 2012), make it a relevant database for business research on national competitiveness, and thus it was selected as the source of the research sample.

The GCI compiles a composite competitiveness score for each country, which has been operationalised as an aggregate of scores on twelve underlying categories of national competitiveness, namely: institutions, infrastructure, macroeconomic environment, health and primary education, higher education and training, goods market efficiency, labour market efficiency, financial market development, technological readiness, market size, business sophistication and innovation (WEF, 2012). While the report has prepared national competitiveness scores for countries for over three decades, the indicator has evolved over time. Consequently, the scope of the research considers only the seven most recent years of competitiveness scores (2007-2013), during which time the indicator has remained fairly stable.

1.3.2. Measure of economic performance

The International Monetary Fund (IMF) World Economic Outlook maintains a global database of selected macroeconomic indicators for each country, reported since 1980, including medium-term projections for certain indicators to 2017 at the time of this research (IMF, 2012). Within the economic growth literature economic performance as the dependent variable is typically operationalised as some form of GDP per capita measure to allow for cross-country comparisons (for example, Hoover & Perez, 2004; Porter, Ketels & Dalgado, 2007; Sala-i-Martin, Doppelhofer & Miller, 2004). The research employed 'purchasing power parity GDP per capita' (PPPPC-GDP) as the dependent variable, over the corresponding data period for national competitiveness (2007-2013). PPPPC-GDP is appropriate when making national income comparisons, since comparisons based on market exchange rates understate the standard of living in poor countries, and are prone to large swings due to fluctuating currencies (Callen, 2007).

1.3.3. Relationship between national competitiveness and economic growth

The purpose of this research is to establish whether the explanatory power of economic growth regressions can be improved by assessing patterns of national competitiveness among the world's countries. Explanatory power implies a measure of association between variables, but not necessarily causation (Saunders & Lewis, 2012), since a causal relationship requires confidence that no variables have been omitted or that no reverse causation exists among the dependent and independent variable (Acemoglu, Johnson & Robinson, 2005). Testing for causality was not required to meet the research objectives, and hence the relationship test between national competitiveness and economic growth is one of association.

2. Literature review

'There be three things which make a nation great and prosperous: a fertile soil, busy workshops, easy conveyance for men and goods from place to place.'

- Francis Bacon

2.1. Introduction

The research primarily considers two academic fields, being national competitiveness and economic growth.

To ground this research in the context of the current body of knowledge, a literature review proceeds. This begins with a discussion on the importance of economic growth, its theoretical basis in the Neoclassical and new growth theories, and cross-country growth panels as the means by which empirical studies on economic growth are typically conducted. An overview is provided on the evolution of growth regression model specifications in an attempt to capture the diversity of country growth paths.

This is followed by a discussion on the concept of national competitiveness, its measurement, and the selected data set for the research sample, the Global Competitiveness Indicator (GCI), compiled annually by the World Economic Forum (WEF).

The chapter ends with a section describing the literature gap which this research aimed to address, in the assessment of specific patterns of competitiveness and their association with economic growth.

2.2. A brief review of economic growth theory

Growth is considered by many macroeconomists to be the most important economic issue since it is an important driver of living standards (Colander, 2010; Vietor, 2007), and has in recent years become the subject of ever more focus as the structural stagnation of many developed countries becomes exposed in light of increasingly globalised markets (Colander, 2013).

Being of such academic importance, economic growth theory is a large literature, focused mainly on understanding the fundamental drivers of growth, with the ultimate objective of informing macroeconomic policy decisions (Aghion & Durlauf, 2007).

Theories of growth stem from supply-side economics and employ a linear production function to relate a measure of economic output to a function of relevant inputs (Colander, 2010). The production function today includes factors such as capital, labour, national resources and technology (Hämäläinen, 2003).

Over time, three growth theories evolved, namely classical theory (advocated by the likes of Adam Smith, John Stuart Mill and Karl Marx), neoclassical theory (developed by Robert Solow, Simon Kuznets and others) and new or endogenous growth theory (supported by Marvin Frankel, Paul Romer and others) (Hämäläinen, 2003). More recently, institutional theory has also been drawn upon to explain differences in economic development among nations (Acemoglu, 2005).

The original Classical model emphasised the importance of capital accumulation, stressing saving as the means to achieve economic growth through investment. The model predicted diminishing marginal productivity of labour because of the finite availability of land, implying that marginal per capita income would decline as the supply of labour increased (Colander, 2010). The production function therefore defined output, measured in GDP per capita, in terms of diminishing returns to labour, all other inputs held constant.

In the 1950s, Solow and Swan independently realised that Classical theory's predictions were not empirically evident, since labour supply had increased over time (in line with population growth) but stagnating per capita income had not been witnessed (Aghion, Howitt & Peñalosa, 1998). Their contribution to the economic growth literature was a paradigm shift which demonstrated that increases in capital and technology were able to overcome any diminishing returns to labour – and so was spawned the Neoclassical theory. This movement shifted the perspective from labour to capital as the production function input which was subjected to the law of diminishing returns, all other inputs held constant (Aghion et al., 1998). The Solow-Swan model (most often called just the Solow model) assumed technology was exogenous or external to the production function and hence predicted that marginal per capita income would decline as a function of capital accumulation, if no external influences were exerted by technological advances to overcome the diminishing returns to capital (Boianovsky & Hoover, 2009).

In 1957, Solow empirically tested his growth theory as a linear production function summing capital and labour input factors, each weighted by their relative shares in national income. He included a term in his regression model to capture residual effects impacting on the productivity of inputs which were not captured by their own explicit terms in the regression model – the residual term thus included exogenous technology changes and increasing skill levels of workers (Boianovsky & Hoover, 2009). The residual came to be known as "total factor productivity" (TFP), and this yielded an unexpected high contribution to Solow's regression model, which prompted further theoretical development (Boianovsky & Hoover, 2009).

Both the Classical and Neoclassical models assume diminishing returns to some input factor (labour or capital, respectively), implying that per capita incomes of countries must converge. This convergence hypothesis predicted that per capita incomes of different countries with similar institutional structures would, over time, become equal, since production would continue to relocate to countries with lowest factor input costs until one price was established (Colander, 2010). Empirical tests of the convergence hypothesis have been inconclusive (for example, Canarella & Pollard, 2004). Economists have developed alternative explanations for why this might be so, including the quality of human capital in different countries, differences in institutional structure and lack of mobility of certain factors of production, which limits the law of one price (Colander, 2010).

With the emergence of new growth theory, the Neoclassical theory's exogenous changes in technological progress were endogenised into the growth models, which emphasised the important enabling role of policy to influence the rate of technological and other progress (Aghion et al., 1998). Such models predicted that output and capital per person would grow at the rate of technological progress, which would offset diminishing marginal productivity and lead to constant returns to capital (Aghion et al., 1998). This distinct contrast with Neoclassical theory's convergence predictions for per capita income has been the subject of many empirical studies (Eberhardt & Teal, 2011). Much of the new growth theory's emphasis has been on explaining productivity growth through attempting to quantify the impacts of technologies (in the broad sense of the word) which might overcome Solow's predicted diminishing returns to capital, which includes aspects as varied as knowledge accumulation, technological progress, innovation, higher education levels, protection of intellectual property rights and democracy (Aghion & Durlauf, 2007). Eberhardt and Teal (2011) note that as much as the TFP term captured by residuals from growth regressions may represent a country technology efficiency index, unobservables captured in TFP are equally a measure of ignorance of the true set of predictors which drive economic growth.

Empirical data tends to support the Solow model in respect of diminishing returns to physical capital, but new growth theory economists point out that a broader definition of capital is required, encompassing human capital, public infrastructure and knowledge, and that when this is done, diminishing returns to capital is not necessarily evident (Aghion et al., 1998). The findings, then, remain inconclusive.

More recently, arguments in favour of using an institutional theory lens to explain economic growth have gained traction, specifically the economic institutions which influence economic incentives and therefore private enterprise, and how these gains from trade are allocated (Acemoglu et al., 2005). At the empirical level, researchers have attempted to incorporate these various factors identified by the literature as economic growth predictors, endogenously into their regression model specifications (Eberhardt & Teal, 2011).

2.3. Cross-country panel growth regressions

As growth theories developed and evolved, empirical studies had a role to play in testing the models against data, and this emerged as a topical area of study in the 1990s (Boianovsky & Hoover, 2009), starting with Barro's (1991) seminal cross-country panel growth regression to explore variables correlating with economic growth (Sala-i-Martin, 1997; Salimans, 2012).

Following Barro's (1991) article, there had been an explosion of cross-country panel analyses, which have in the main served two main research objectives: first, in identifying the structural and policy variables correlating with growth in real GDP per capita in order to endogenise these to the growth regression model, and second, in testing the theory of convergence of national real GDP per capita levels to validate (or reject) the Neoclassical model (Aghion et al., 1998; Eberhardt & Teal, 2011).

On the former issue, studies have identified positive relationships between real GDP per capita growth rates and factors including level of education, life expectancy, level of investment, financial sector development, political stability, religious variables, openness of the economy and type of economic organisation (Alesina & Rodrik, 1994; Barro & Sala-i-Martin, 1995; Benhabib & Spiegel, 1994; King & Levine, 1992; Sala-i-Martin, 1997). Studies specifically focused on technology progression, which lies at the heart of the endogenous theory of growth, have uncovered parameters such as protection of intellectual property rights, macroeconomic stability, product market competition and managerial delegation as important to explaining growth (Aghion & Durlauf, 2007). Discussed further in Section 2.5, these parameters are all among the Global Competitiveness Index's measures.

On the second matter of testing convergence, results are inconclusive, with academics on either side of the Neoclassical–new growth theory divide highlighting methodological flaws that render definitive answers impossible currently. Examples of studies in support of the convergence theory or adapted versions thereof, include Mankiw, Romer and Weil (1992), King and Levine (1994) and Sala-i-Martin et al. (2004). Studies supporting new growth theory include Durlauf and Johnson (1995), Minier (2007) and Paap, Franses and van Dijk (2005). Some studies have even found evidence of dualistic outcomes; for example Canarella and Pollard (2004) find that convergence is displayed by countries in the top three quartiles of GDP per capita performance, whereas for the bottom quartile, endogenous growth theory was more explanatory of the empirical evidence.

In light of the equivocal findings on growth predictors and the limits to growth, Hoover and Perez (2004) observe that "Substantial room remains for theory to be informed by empirical investigations" (p. 779), supporting the intent of this research.

2.4. Specification of economic growth regression models

The contemporary production function used to model per capita GDP growth rates in cross-country growth regressions is typically an adaptation of the Solow growth model, to accommodate additional parameters, especially variables contemplated within endogenous models. The generalised form is a log-linear growth regression equation (Eberhardt & Teal, 2011; Henderson, Papageorgiou & Parmeter, 2011; Sala-i-Martin et al., 2004; Salimans, 2012)

$$y_i = \alpha + \beta_{i,1}x_{i,1} + \beta_{i,2}x_{i,2} + \beta_{i,3}x_{i,3} + \cdots + \beta_{i,p}x_{i,p} + \varepsilon_i \qquad (1)$$

with y_i representing the i^{th} country's growth rate in real GDP *per capita* (for i = 1... n), α representing an index of the initial level of economic development, such as GDP *per capita* or initial human capital (Barro, 1991), and $\beta_{i,1}$... $\beta_{i,p}$ representing the standardised partial regression coefficients for each independent regression variable $x_{i,1}$... $x_{i,p}$. The error term ε_i represents the Solow residual or TFP, associated with each country's regression equation.

Variables are typically specified as 'stocks', representing the existing levels of the various capitals required to support the existing economic structure (McNamara, Kriesel & Deaton, 1988).

This equation form can also be expressed by categorising different variables together, such as (Aghion & Durlauf, 2007):

$$g_i = X_i\beta + Z_i\gamma + \varepsilon_i \qquad (2)$$

where g_i is equivalent to y_i in equation (1); X_i is a vector of regression variables from the Solow model (population growth, technological change, physical and human capital savings rates) including an indicator of initial level (stock) of development; Z_i represent additional possible regression variables, such as those broad capital and technology variables explored under new growth theory; and ε_i is the remaining unobservables influencing economic growth, termed TFP. β and γ are the respective variables' standardised partial regression coefficients. The distinction in (2) between X_i and Z_i is solely that all economists agree on incorporating the Solow variables in some format, whereas there are divergent views on which additional variables should form part of Z_i (Aghion & Durlauf, 2007).

This research follows in the endogenous theory's path and takes as a starting point, a perspective that any of the set of variables defining the broad concept of capital, as captured in the Global Competitiveness Index, could be of importance (Ghosh & Roy, 2004). Therefore the format of regression equation (1) has been adopted, in the manner of Sala-i-Martin (2004) and Salimans (2012).

2.5. National competitiveness as a driver of economic growth

Evolving separately from the economic growth theory literature, national competitiveness as a concept can be traced back to Adam Smith's 18th Century theories about division of labour and specialisation, which were furthered by Ricardo's theory of comparative advantage (Hassett, Hubbard & Jensen, 2011). These works spawned studies into firm-level competitiveness as the driving force for efficient markets. Economists of this "trade theory" school of thought have traditionally been reluctant to attempt to expand the notions of competitive advantage of firms to a national competitiveness concept, noting differences in the "zero sum game" of competition of firms to the comparative advantages of mutually beneficial trade, engaged in at a national level (Hassett *et al*., 2011; Lee, 2010).

On a divergent track, the business economist school of thought was reinvigorated through Michael Porter's "The Competitive Advantage of Nations", published in 1990 (Lee, 2010). Porter's work linked national growth to competitiveness at the firm and industry level, referring to the importance of enhancing a nation's industrial productivity to attain sustainable growth, especially in an increasingly globalised and interconnected world where factors of production are mobile (Berger, 2008). In this paradigm, the enabling role of government is to create an environment conducive to firm success, by fostering rising levels of productivity of a nation's firms (Porter, 1998). Porter's paper spurred an interest in national competitiveness benchmarking (Hassett *et al*., 2011).

Perhaps as a result of the business economist school of thought, the pursuit of national competitiveness has become an overarching policy goal of many nations, with policy increasingly analysed and guided in its design by the rating and ranking results of much publicised global composite indicators such as the World Economic Forum's GCI (Berger & Bristow, 2009; Lall, 2001).

2.5.1. The concept and measurement of competitiveness at the national level

Krugman's much-cited critique of national competitiveness (1994) raises numerous concerns about the theoretical underpinnings of the concept. There is no integrated theory providing a framework for understanding national competitiveness, and consequently no unanimous definition of the terminology (Lall, 2001). Various metrics are thus used by academics to assess national competitiveness, which contributes to the predisposition of analysts, institutions and other bodies to compiling composite national competitiveness indicators comprising large numbers of wide-ranging variables.

Berger (2008) identifies four different theoretical constructs for national competitiveness, which illustrates the divergence on the subject. The first frames competitiveness as the ability of a nation to sell its goods to other nations. Here the measure of a country's ability to sell is reflected in price-based terms such as its relative costs and prices, and the real exchange rate (Berger & Bristow, 2009). Ability to sell can also be conceived in non price-based terms such as a shift in exported goods towards higher value-added products and services, the running of a current account surplus, or constant and increasing world market shares (Berger, 2008). Economists do note the limitations in these measures, since a surplus in one area must necessarily be balanced by a deficit in another area, and a strengthening (or weakening) currency is simultaneously beneficial and harmful to exporting and importing activities respectively (Berger, 2008).

The second notion of national competitiveness is phrased as the ability of a nation to earn, that is, the macroeconomic indicators of its outputs (Berger, 2008). The business economics school of thought is aligned with this approach, since the model by which the process is thought to enact, is that higher degrees of national competitiveness confer greater possibilities of productivity gains for firms, which in turn yields higher GDP gains or income (Berger & Bristow, 2009; WEF, 2012). The limitation is that measures such as GDP *per capita* can only account for economic success, since social aspects such as income inequality are overlooked, however economists generally agree that on this basis, GDP measures could comprise adequate proxy measures as the output of national competitiveness (Berger, 2008).

Berger (2008) lists the third view as the ability to adjust to changes in the external environment, conceptualised as having flexible open markets which enable economic adjustments as change happens, and innovative capacity to drive new product markets and productivity improvements. Entrepreneurship is seen as an important vehicle for competitiveness in this paradigm, following Schumpeter's theory of economic development through creative destruction (Eberhardt & Teal, 2011). Proxy measures of competitiveness would reflect Research and Development-related expenditures.

Finally, in a globalised market, competitiveness is increasingly also being framed in terms of a nation's ability to attract mobile resources, including scarce skills and capital, such as is measured by foreign direct investment (Berger & Bristow, 2009; Porter, 1998).

Beyond these four theoretical frameworks, Porter in 1990 attempted to construct an empirical model for national competitiveness on the back of research conducted in ten industrialised economies (Berger, 2008). Porter viewed the ultimate economic goal of nations to be the creation of high and rising standards of living, which he measured through national *per capita* income – synonymous with the view of national competitiveness through the 'ability to earn' lens described above, and the economic growth literature discussed in Section 2.2.

Porter's approach sees macroeconomic performance as an output resulting from various competitiveness components. His 'diamond' model arising from his research combines a number of different theories and has become the pre-eminent framework for the global discourse on national competitiveness. One reason for its widespread adoption include its explanatory power for the observed tendency of interconnected firms to geographically co-locate, such as the Silicon Valley phenomenon, which he terms 'clustering' (Berger, 2008). His combination of numerous different theories into the competitiveness framework mirrors the multitude of different factors identified as correlating to GDP growth *per capita*, discussed in Section 2.2.

Given the alignment between the "growth in GDP *per capita*" objective of the economic growth theorists and Porter's diamond model, this research adopts GDP growth *per capita* as the appropriate indicator of economic success as the outcome of competitiveness (Berger, 2008), for the dependent variable for the research. As explained in Section 1.4.2, this is operationalised on a purchasing power parity basis, abbreviated as PPPPC-GDP.

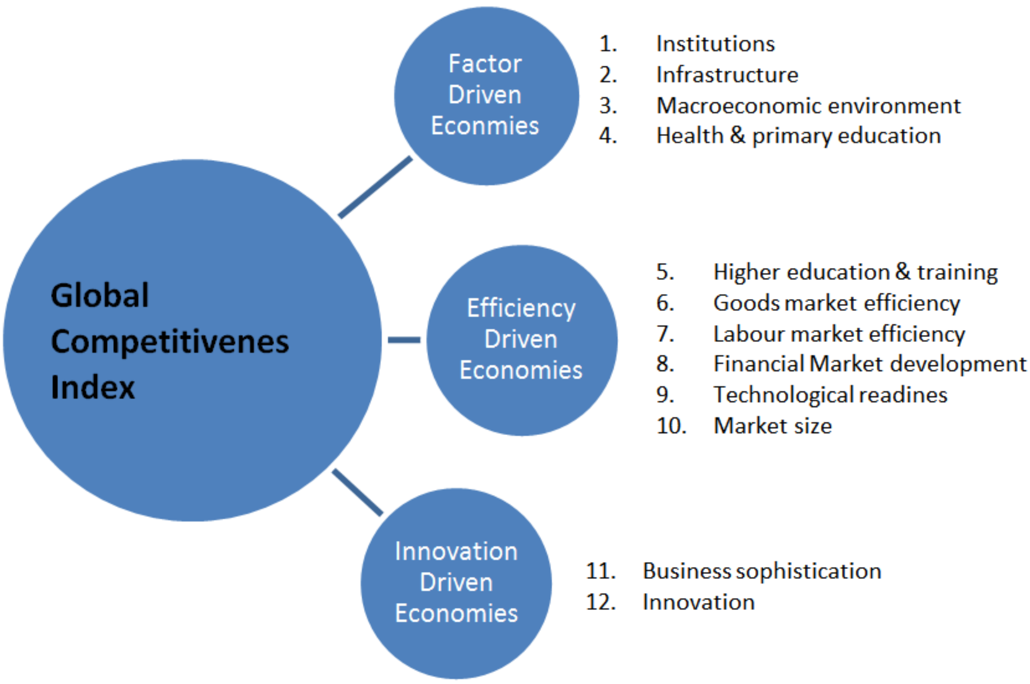
2.5.2. The global competitiveness index as a composite indicator of national competitiveness

Being a prominent national competitiveness index used as an indicator of future economic growth and to inform policy (Berger & Bristow, 2009; Lall, 2001), the GCI is the subject of academic scrutiny and criticism for the apparent lack of theoretical rigour of definitions and component measures of national competitiveness employed (Berger, 2008; Bergsteiner & Avery, 2012; Hassett *et al*., 2011; Krugman, 1994; Lee, 2010). A number of studies have been conducted to retrospectively demonstrate its predictive power for economic outcomes, employing indicators such as historic Gross Domestic Product (GDP) growth, GDP growth *per capita* and change in total employment. The GCI (along with many numerous other globally compiled national competitiveness indices) has typically shown weak correlations with any economic performance measure (Berger & Bristow, 2009).

The World Economic Forum (WEF) defines competitiveness as "the set of institutions, policies, and factors that determine the level of productivity of a country" (WEF, 2012, p. 4). The definition is closely aligned with Porter's diamond model, which considers competitiveness to be the output of microeconomic determinants (including firm strategy, structure and rivalry, and related and supporting industries), macroeconomic determinants (demand conditions and factor conditions), as well as the external roles of government and chance, which affect the four determinants (Berger, 2008). The WEF contends that the factors driving competitiveness and productivity are numerous, and not mutually exclusive, and hence an open-ended approach incorporating a weighted average of many different variables is appropriate (WEF, 2012). Variables are collated into twelve different pillars, as shown in Figure 1, being: institutions, infrastructure, macroeconomic environment, health and primary education, higher education and training, goods market efficiency, labour market efficiency, financial market development, technological readiness, market size, business sophistication and innovation. The sub-component parameters of each pillar are informed by economic growth literature, notably that of Sala-i-Martin *et al*. (2004), the Chief Advisor on the GCI panel (WEF, 2012).

The GCI subscribes to the economic theory of 'Stages of development' (WEF, 2012), and hence distinguishes among different competitiveness pillars as being more important to factor-driven economies, efficiency-driven economies and innovation-driven economies. Figure 1 illustrates the pillars of greatest importance to each type of economy, depending on its stage of development.

Figure 1: Framework of GCI competitiveness pillars key to each developmental stage of an economy



Source: WEF (2012)

Figure 2 illustrates the GCI's approach to reflecting the relative importance of different competitiveness pillars to economies at different stages of development, in the compilation of a composite competitiveness score for each country. Countries are classified into five different stages of development (factor-driven, efficiency-driven and innovation-driven, along with two intermediate transition stages) on the basis of their performance against two criteria: GDP *per capita* in US dollars, and an adjustment in classifying any country with in excess of 70% of exports being mineral products as a factor-driven economy, regardless of GDP *per capita* performance (WEF, 2012). The WEF categorisation of countries into these segments is thus pre-defined by characteristics external to the GCI data set.

Weightings are applied to each component variable within each pillar. In the aggregation of a country's pillar scores to a total composite score, different weightings are applied to each subindex, depending on a country's stage of development.

Figure 2: GCI Sub-index weights and development stage classification

		GDP per Capita (US$) thresholds	Weight for basic requirements subindex	Weight for efficiency enhancers subindex	Weight for innovation and sophistication factors subindex
WEF Stages of Development	Stage 1: Factor Driven	< 2,000	60%	35%	5%
	Transition from stage 1 to stage 2	2,000-2,999	40-60%	35-50%	5-10%
	Stage 2: Efficiency Driven	3,000-8,999	40%	50%	10%
	Transition from stage 2 to stage 3	9,000-17,000	20-40%	50%	10-30%
	Stage 1: Innovation Driven	>17,000	20%	50%	30%

Source: WEF (2012)

It is clear from the discussion in Section 2.5. that the framework for competitiveness employed by the WEF's GCI subscribes to the new growth theory in that its index incorporates a variety of variables that classify within the broader new growth theory definition of 'capital', which WEF argues are demonstrated to influence economic growth, and should be endogenised within economic growth models (Eberhardt & Teal, 2011).

2.5.3. Critique of the GCI as a composite indicator of national competitiveness

Freudenberg (2003) states that composite indicators in general cannot be subjected to empirical tests to test a predictive ability, since they are subject to considerable methodological errors and can be manipulated to achieve desired results. He adds that composite indicators are prone to ad hoc computation methods, and rankings show significant sensitivity to the weightings applied to the component variables.

This generic critique of composite indicators is reflected in the GCI-specific assessments conducted by academics. Among the many concerns noted, is a contested leap from business strategy concepts to the national level without a solid theoretical framework to explain the merit of this transition (Lall, 2001).

Furthermore, researchers have noted a high degree of correlation among many of the twelve pillars (de CarvalhoI, Di SerioII & de Vasconcellos, 2012) and little solid theoretical basis from which to select optimal variables for inclusion in the composite index (Berger & Bristow, 2009).

Lall (2001) and Lee (2010) report data inconsistencies, high reliance on subjective indicators, and the use of arbitrary weightings of variables in the composite index, which skews country rankings.

Cammack (2006) claims the entire GCI construct is an example of the imposition of western capitalist hegemony on other nations, which seeks to force the rest of the world to play by the west's preferred economic terms.

It is important to note that, which numerous aspects of the GCI (and indeed other global benchmarks of competitiveness) have been criticised, economic growth theorists do not dispute the usefulness of the WEF's attempts to find a simple indicator to convey information to policymakers and investors.

2.6. Patterns of competitiveness influencing economic growth

The purpose of this research is to establish whether the explanatory power of economic growth regressions can be improved by assessing patterns of national competitiveness among the world's countries. Two patterns of interest that were singled out for study are the differing natures of competitiveness performance among countries, and changes in competitiveness performance over time.

The contributions of these two patterns to advancing the body of knowledge on economic growth modelling using competitiveness indicators are described below

2.6.1. Accounting for heterogeneity in competitiveness for countries on divergent growth paths

Freudenberg (2003) notes that composite indicators are generally incapable of reflecting the complexity of performance or of capturing the relationships between variables, since at the unit of measure, nations are treated as equals. He thus observes that the more comprehensive a composite indicator, the weaker it may be in adequately reflecting actual country performance. Lall (2001) concurs with this sentiment. Freudenberg (2003) accordingly calls for any analysis of composite indicators to decompose the aggregate indicators in order to understand the contribution of each component to the composite result.

Heeding Freudenberg's (2003) observations, the research of Zanakis and Becerra-Fernandez (2005) employs multivariate statistical techniques to explore the underlying components of competitiveness performance of nations, coupled with knowledge discovery techniques in order to test whether competitiveness performance could be predicted one year into the future. Önsel, Ülengin, Ulusoy, Aktaş, Kabak and Topcu (2008) conduct a cluster analysis, followed by a computational technique to objectively determine the regression coefficients to be applied to each competitiveness component variable, in order to build up a more transparent, objective composite competitiveness score. Both of these studies excluded the longitudinal dynamics of competitiveness scores, using just one year of competitiveness data, and both stopped short of examining the relationship between competitiveness scores and GDP performance.

Correspondence with authors of both of these studies confirmed their perspective that research to link a cluster-based approach to economic growth regressions would form a contribution to knowledge in this subject area (E. Aktaş & F. Ülengin, personal communication, June 2, 2013; S. Zanakis & I. Becerra-Fernandez, personal communication, June 19, 2013).

Porter *et al*. (2007) who founded the construct for the GCI, acknowledge that "there are multiple paths to prosperity, and that individual countries succeed when they build on their unique strengths rather than emulating the economic choices of others" (p. 52). The GCI's approach is to account for such differences by clustering countries according to their stages of development, based on a subjective GDP *per capita* partitioning (WEF, 2012) as a means to apply different sub-index weights to each of the 12 competitiveness pillars in calculating country composite competitiveness scores, as illustrated in Figure 2 and described in Section 2.4.2.

Within the academic literature, Durlauf and Johnson's article "Multiple Regimes and Cross-Country Behaviour" (1995) spearheaded a new effort in growth economics research, to capture cross-country differences in economic models, which had up till then been specified in the same manner, with the same variables x_i and β_i coefficients, for all countries modelled. Durlauf and Johnson (1995) prepared linear aggregate production functions to model the growth path of each of a pre-identified sub-set of countries, rather than use a single linear production function for the entire country set. Their claim was that these prior studies had implicitly assumed a common linear growth specification for all countries, which may have invalidly reinforced the Solow model with its convergence prediction. Durlauf and Johnson (1995) felt that by pre-specifying country sub-sets, different linear regressions (of a Solow-type specification) could be obtained, indicating different paths of development. Consequently, this would make a case for the endogenous theory of growth, since the sub-sets might converge to different GDP *per capita* levels rather than the same value, as the Solow model predicts. The mechanism employed by Durlauf and Johnson (1995) to split countries into sub-sets was by applying threshold values for initial GDP *per capita* and literacy rates. Their research identified different regression equations for each sub-set of countries, consequently with each variable in each of the equations having different levels of significance to the regression model, with different regression coefficients, an artefact which subsequently came to be known among growth economists as "parameter heterogeneity" (Eberhardt & Teal, 2011).

Numerous other studies have followed in the same vein, for example Canarella and Pollard's (2004) and Galvao's (2011) approaches using quantile regression methods, by splitting nations into quantiles using GDP *per capita*. Other methods reported to capture heterogeneity in country samples by mechanically pre-specifying their sub-groups include geographical location (Easterly & Levine, 1997) and prior status as colonies (Barro, 1999).

Baştürk, Paap and van Dijk (2012) describe current modes of segmenting countries into sub-groups as *ad hoc*, based on setting an arbitrary threshold value for some *a priori* observable characteristic such as GDP *per capita*, level of education or openness of the economy. This accords with Onsel *et al*. (2008) who viewed these approaches as “arbitrary” and “subjective” (p. 226). To resolve this challenge, Baştürk *et al*. (2012) recently turned to cluster analysis, employing the principles highlighted by Zanakis and Becerra-Fernandez (2005) and Onsel *et al*. (2008) to objectively sort countries into sub-sets by using their inherent heterogeneity in competitiveness characteristics. Baştürk *et al*. (2012) then prepared regression equations for each of their two resulting clusters of countries, and found that the regression coefficients were distinct for each cluster, implying different growth paths. The Baştürk *et al*. (2012) study did not seek to conclude whether such formed clusters improved the explanatory power of regression models as compared with the heterogeneous country sample, but rather to observe differences in cluster composition versus *a priori* segmentation approaches, and parameter heterogeneity.

Brock and Durlauf (2001) in Eberhardt and Teal (2011) note that, given these innovations in cross-country panel modelling, specifying economic growth regressions for parameter homogeneity is inappropriate.

Baştürk *et al*. (2012) presents a notable departure from the previous methodologies employed in parameter heterogeneity studies, through using a data-driven approach to segment nations into homogeneous groupings for regression modelling. The GCI approach, ascribing to a ‘Stages of development’ model, contrasts with this in being an example of the old order approach of using external variables such as GDP per capita to segment countries into groupings of a purportedly homogeneous nature.

2.6.2. Accounting for competitiveness stock and flow in regressions performed upon countries in homogeneous clusters

The specification of competitiveness predictor variables in growth regression models as stocks (representing the existing levels of the various capitals required to support the existing economic structure) (McNamara *et al.*, 1988) in comparison with flows (representing changes to the stocks of the included capitals) is not extensively discussed in the literature.

McNamara *et al.* (1988) review the treatment of human capital measures in growth regressions, and conclude that little differentiation between stocks and flows has taken place, and that marginal changes in human capital levels over time (representing the rate at which capital is being added to current capital stocks, namely flows of capital) are important to understanding economic growth consequences, including company location decisions.

A more recent example to account for stocks and flows in economic growth models, is found in Ghosh and Roy's (2004) incorporation of variables for public capital (a stock) and public services (these expenditures constitute a flow to public capital), for the purposes of investigating the public sector's short-term and long-term trade-offs. Their findings demonstrate the relevance of considering both stock and flow variables in regression model specifications.

WEF (2009) notes that competitiveness involves both static (stock) and dynamic (flow) components, since the former is linked to a country's ability to sustain current GDP *per capita* levels, while the latter is key to explaining an economy's growth potential.

The Solow model considers capital accumulation, and hence investments represent the flows in net capital accumulation (Ruby, n.d.), thus a growth rate in the stocks of different types of capital represents the net investment in these. In light of the sparse literature on flows to net capital accumulation and particular consideration of these concepts in the national competitiveness-economic growth body of knowledge, this literature gap was considered worthy of further study.

2.7. Implications

Hoover and Perez (2004) observe that "Substantial room remains for theory to be informed by empirical investigations" (p. 779) in economic growth regressions.

The integration of national competitiveness research, and particularly the multitude of highly publicised and influential global competitiveness indicators such as the GCI, with economic growth theory, into a theoretically solid model, has some way to go. Whereas new growth theory calls for exploration into a much broader set of variables which are potentially part of a set of 'true' indicators of future economic growth, cross-country panel growth regressions do not explicitly look at composite competitiveness indicators as a source of such variables - this despite their significance to politics and business.

It is only recently that an appreciation for country growth path heterogeneity has been contemplated in cross-country panel growth regression studies, and even more recently that clustering techniques have been applied as a means to objectively segment countries into homogeneous competitiveness groupings. Limited information is available about the extent to which flows in capital stocks explain economic growth.

This situation creates an opportunity to investigate the value of the GCI as a source of broader variables to explain economic growth along the lines of new growth theory.

The research therefore starts from the Baştürk *et al*. (2012) departure point, employing clusters on competitiveness variables inherent to the data set, with a number of expansions. Baştürk *et al*. (2012) considers 59 developing countries from Africa, Asia and Latin America for a time period up until 2000, and seven possible explanatory variables. As Salimans (2012) notes, this ignored uncertainty in the regression variable selection process, and focused, without explanation, on a small set of possible predictors for economic growth.

Consequently, this research expanded upon Baştürk *et al*. (2012) by considering 118 countries for which data was available over the specified time period, using the 12 competitiveness pillars of the GCI to incorporate other possible variables that impact upon growth (such as policy variables including corruption levels, impartiality of courts and enforcement of property rights, and innovation variables such as patent numbers, higher education etc). It furthermore considered flows of competitiveness variables, and not just the stocks contemplated by Baştürk *et al*. (2012).

3. Research hypotheses

'Surely one of the most important tasks before developing countries is to achieve higher rates of economic growth.'

\- *Raghbendra Jha*

In the era of globalisation, national competitiveness is increasingly emphasised as an important objective and is used to drive economic policy (Berger, 2008; Berger & Bristow, 2009; Huggins, 2003; Lee, 2010).

The overarching purpose of this research is to establish whether the explanatory power of economic growth regressions can be improved by assessing patterns of national competitiveness among countries. The particular patterns of interest include differing natures of competitiveness performance, and changes in competitiveness performance over time. The literature review informed the development of four research objectives to address the research purpose, which have in turn been translated into four hypotheses.

The first objective is an assessment of whether there are meaningful differences in country groupings formed in terms of their differing natures of competitiveness performance versus the traditional national competitiveness analysis approach of groupings countries in terms of GDP *per capita* thresholds;

The second objective is an assessment of whether segmenting countries into homogeneous sub-groups of differing patterns of national competitiveness, can improve the explanatory power of national competitiveness performance on economic growth performance;

The third objective is an assessment of whether analysing changes in stocks of competitiveness patterns (flows), rather than measures of the stocks of competitiveness patterns themselves, can further improve the explanatory power of national competitiveness performance on economic growth performance; and

The fourth objective is an assessment of whether economic growth performance is better explained by analysing sub-groups of countries segmented by patterns of competitiveness or country wealth levels, the latter being the conventional approach.

Four hypotheses have been developed to address the research objectives. Normally a decision between the null and alternative hypotheses involves the comparison of a test statistic with some critical value(s) (Weiers, 2011). This research borrows from the philosophy of hypothesis testing to state the results formally, while not using critical values.

3.1. Hypothesis 1

To the extent that economic growth regression studies acknowledge and attempt to account for heterogeneity among nations, these typically employ exogenous means of segmenting countries into homogeneous sub-sets such as national income bands, before developing separate regression models for each sub-set (for example, Canarella & Pollard, 2004; Durlauf & Johnson, 1995) . Following in the footsteps of Bastürk *et al*. (2012), this research will use a data-based, endogenous clustering methodology to establish separate country groupings, based on the 12 competitiveness pillars of the GCI.

The first hypothesis assesses whether countries clustered according to their competitiveness patterns, as determined by their scores on the twelve GCI pillars, are meaningfully different than the traditional GDP *per capita* segmentation that is employed.

H_0: Countries group similarly according to the twelve pillars of competitiveness when compared with grouping according to GDP *per capita*

H_a: Countries group dissimilarly according to the twelve pillars of competitiveness when compared with grouping according to GDP *per capita*

3.2. Hypothesis 2

Recent research in the new growth theory emphasises heterogeneity among countries, and hence in their growth parameters, in growth regressions. Such regressions attempt to endogenise various technologies or broad forms of capital into the growth models. They thereby allow for different growth impacts for different country groupings, through the identification of distinct regression equations for the different country groupings, whose growth paths are not considered homogeneous.

The second hypothesis uses as its starting point, the homogeneous country clusters formed from country scores on the twelve GCI pillars. Following on from the first hypothesis, the intent is to demonstrate that regressions performed on clusters of countries with homogeneous competitiveness patterns have better explanatory power than regressions performed on the total country set.

H_0: Regressions based on clusters formed by the twelve GCI pillars do not improve explanatory power for purchasing power *per capita* GDP growth rate as compared to the equivalent regression for the heterogeneous total set of countries

H_a: Regressions based on clusters formed by the twelve GCI pillars improve explanatory power for purchasing power *per capita* GDP growth rate as compared to the equivalent regression for the heterogeneous total set of countries

3.3. Hypothesis 3

National stocks of competitiveness are the customary independent variables upon which growth regressions are performed. The third hypothesis evaluates how cluster regressions using national *changes* in competitiveness pillar stocks (i.e. flows) alter the explanatory power of growth regressions. The regression results obtained from hypothesis two serve as the baseline for this assessment.

H_0: Regressions using the flows in twelve competitiveness pillar scores for clusters do not improve upon regressions for clusters on the stocks of the twelve competitiveness pillars

H_a: Cluster regressions using the flows in twelve competitiveness pillar scores do improve upon cluster regression on the stocks of the twelve competitiveness pillars.

3.4. Hypothesis 4

Porter *et al*. (2007) and the subsequent WEF Global Competitiveness Report GCI compilations use purchasing power parity GDP *per capita* as a method to segment countries into five 'Stages of development' categories, and thereby to distinguish between the different marginal effects of the competitiveness pillars in the calculation of a country's total GCI score, as illustrated in Figure 2.

If the more objective endogenous clustering approach to segmenting countries into homogeneous sub-groups is to be considered an improvement upon the WEF's 'theory of economic development' approach of segmenting based on purchasing power parity GDP *per capita* thresholds, then it must increase the explanatory power of growth regressions.

H_0: Regressions based on clusters formed endogenously by the twelve GCI pillars do not improve explanatory power for purchasing power parity GDP *per capita* growth rate as compared with regressions based on the WEF's exogenously formed purchasing power parity GDP *per capita* segments

H_a: Regressions based on clusters formed by the twelve GCI pillars do improve explanatory power for purchasing power parity GDP *per capita* growth rate as compared with regressions based on the WEF's purchasing power parity GDP *per capita* segments

4. Research methodology

4.1. Research design

This research set out to establish whether purchasing power parity GDP *per capita* growth of nations can be explained in terms of their patterns of national competitiveness performance, in particular by analysing whether clustering nations into homogeneous competitiveness segments improves cross-country growth regressions' explanatory power on PPPPC-GDP growth.

This research combines two types of studies, the first step being a descriptive one, which systematically looks at national competitiveness pillar scores over a time period to extract a competitiveness pattern from this multivariate data (Waltenburg & McLauchlan, 2012). The second step involves association research since it relates the impact of a set of variables, namely national competitiveness pillar scores collected over a period of time, on another variable, purchasing power parity GDP *per capita* growth of nations (Saunders & Lewis, 2012). Econometric research typically employs such cross-country panel regressions in studies of economic growth (for example, Aghion & Durlauf, 2007; Eberhardt & Teal, 2011; Galvao, 2011). The second phase is described as "association" and not "causal" research since, while relationships may be identified between national competitiveness and PPPPC-GDP growth, this indicates that changes in their values are associated, but does not provide proof that changes in national competitiveness cause PPPPC-GDP growth, or that some other variable is causing both to vary (Weiers, 2011).

The methodology employed is quantitative in nature, using available secondary data. This is appropriate since the research questions can be answered by combining two freely available data sets systematically compiled on an annual basis by two international organisations, as described in Section 4.3.

The databases selected are suitable for the study, in that they match the research's requirements, and have been compiled at a global scale, by the same body in each instance over the time period of the study. Furthermore, as described in Chapter 1, the databases are frequently used by policymakers and the business press alike, making them pertinent business references for competitiveness research. The data is deemed to be relevant to the research purpose, as well as comparatively free from bias towards any particular member nation (Saunders & Lewis, 2012).

To answer the research questions, the methodology proceeds with three analyses, described in detail in Section 4.6. The first step comprises a process to objectively segment countries into groups that are relatively homogeneous in terms of their patterns of competitiveness, which is then followed by multiple regression analysis on each homogeneous segment to investigate the association or relationship between twelve competitiveness variables (as the independent variables) on purchasing power parity GDP *per capita* (PPPPC-GDP) (as the dependent variable). The third step repeats the multiple regression analysis, but using the five 'Stages of development' country segments in the WEF's Global Competitiveness Reports (for example, refer to WEF, 2012).

The time period over which comparable data is available for both data sets is constrained by the GCI, which only shares detailed country scores on a consistent basis for the period 2007-2013. This has therefore been selected as the timeframe for the research.

4.2. Unit of analysis

The unit of analysis is a country's compound annual growth rate in PPPPC-GDP over the period 2007-2013.

Naturally, studies investigating national competitiveness aggregate competitiveness metrics to the nation level (for example, Canarella & Pollard, 2004; Sala-i-Martin *et al*., 2004; Zanakis & Becerra-Fernandez, 2005). This study will follow a similar course since the intent is to explore the relationship between patterns in national competitiveness performance and PPPPC-GDP growth rates.

4.3. Independent and dependent variables

The research data set comprises a longitudinal collection of parameters for 118 countries, from two data sources. Table 1 presents a summary of the data sources for the variables. Appendix 1 lists the dependent and independent variables, transformed from raw data in line with the analytical requirements informed by the literature and research questions.

Table 1: Summary description of the research data set compiled from two data sources

	Variable type	***Description***	***Format of data***	***Data source***
1	Dependent	Compound annual growth rate in purchasing power parity GDP *per capita* (US dollars) for 118 countries over 2007-2013	Real country growth rates expressed in percentage. Calculated from absolute values reported for 2007-2013, in US dollars	IMF World Economic Outlook database, October 2012. Data set available at: http://www.imf.org/external/pubs/ft/weo/2012/02/weodata/download.aspx
2	Independent	For each country: arithmetic means of competitiveness scores for twelve pillar variables, over the time period 2007-2013	Arithmetic mean values. Values for each country's twelve pillar scores are recorded in the GCI dataset in a consistent format over the time period, making such averaging possible. Scores are standardised on an ordinal scale of 1-7 (7 is best)	WEF Global Competitiveness Index (GCI) as reported in the Global Competitiveness Report for each year. Data set available at: http://www.weforum.org/issues/competitiveness-0/gci2012-data-platform
3	Independent	For each country: compound annual growth rates of competitiveness scores for twelve pillar variables, over the time period 2007-2013	Compound annual growth rates expressed in percentages. Values for each country's twelve pillar scores are recorded in the GCI dataset in a consistent format over the time period, making calculation of a growth rate possible. Scores standardised on an ordinal scale of 1-7 (7 is best)	WEF Global Competitiveness Index (GCI) as reported in the Global Competitiveness Report for each year. Data set available at: http://www.weforum.org/issues/competitiveness-0/gci2012-data-platform
4	Independent	Initial purchasing power parity GDP *per capita* for each of 118 countries (2007)	Absolute country values, reported in US dollars. Values were divided by 10,000 to place them in the same order as the other independent variables.	IMF World Economic Outlook database, October 2012. Data set available at: http://www.imf.org/external/pubs/ft/weo/2012/02/weodata/download.aspx

Since the two data sets providing dependent and independent variables are linked in this research, only countries for which all required competitiveness and GDP data are available over the full time period were included, thereby avoiding the need to impute any missing values.

Whereas economic statistics for countries in the IMF data set are reported from 1980, the twelve competitiveness pillar scores for each nation could only be gathered in a readily usable and comparable format for the time-series 2007-2013. Hence this was selected as the timeframe for the research, which presents a limitation in that this is a short time period more reflective of a business cycle than a structural economic cycle. Of the 144 countries included in the GCI 2012-2013 report, complete GCI time-series values were available for 119 countries. The 25 countries that had to be omitted from the data set are all emerging and developing nations as classified by the IMF (2012), which results in under-representation of developing nations in the total data set.

The IMF PPPPC-GDP data set was available for 118 of the 119 countries over the 2007-2013 time-series.

4.3.1. Dependent variable

The compound annual growth rate in PPPPC-GDP for each country over the period 2007-2013 is the dependent variable for this research, as described in Section 1.4. The annual PPPPC-GDP values for each country, reported in US dollars, were obtained from the IMF's World Economic Outlook Database (2013).

4.3.2. Independent variables

Two sources of inputs constitute the independent variables for this research.

First, the Global Competitiveness Report's GCI is the source of country data on twelve component competitiveness pillars, as described in Section 2.5.2 and listed in Figure 1. While other sources of competitiveness indicators exist, the GCI is a frequently cited data source reported on by the business press and used by policymakers, making it apt to employ this database to investigate its implications for economic growth.

A country's GCI score is calculated from 113 component variables summed on a weighted basis. Before weighting and summation, variables are transformed on a scale of 1 to 7, while ensuring the order and relative distances between country scores are preserved (WEF, 2012). The GCI score for each of twelve competitiveness pillars is compiled from the successive aggregation of the arithmetic means of its sub-component indicators (WEF, 2012). The percentages reported in Figure 3 reflect the respective weightings applied to the sub-pillar categories that aggregate to each of the twelve pillar scores, and in turn the applicable weightings applied to these twelve pillar scores in calculating a country's scores in terms of the WEF's 'Stages of development' sub-categories, namely Basic Requirements (pillars 1-4), Efficiency Enhancers (pillars 5-10) and Innovation and Sophistication Enhancers (pillars 11 and 12). Figures 1 and 2 illustrate that in terms of the WEF's theory of 'Stages of development', the three sub-categories are of differing importance to nations in different categories of GDP *per capita*. Hence, each nation's scores for Basic Requirements, Efficiency Enhancers and Innovation and Sophistication Enhancers are weighted according to the nation's applicable 'Stages of development' category shown in Figure 2, and then summed to a single composite GCI score for each country, on a scale of 1 to 7.

Figure 3: Weights applied to variables of the twelve component pillars of the GCI

BASIC REQUIREMENTS

1st Pillar: Institutions 25%	A: Public Institutions 75%
	B: Private Institutions 25%
2nd Pillar: Infrastructure 25%	A: Transport Infrastructure 50%
	B: Electricity & Telephony Infrastructure 50%
3rd Pillar: Macroeconomic environment 25%	
4th Pillar: Health & Primary Education 25%	A: Health 50%
	B: Primary Education 50%

EFFICIENCY ENHANCERS

5th Pillar: Higher education & training 17%	A: Quantity of Education 33%
	B: Quality of Education 33%
	C: On the job training 33%
6th Pillar: Goods market efficiency 17%	A: Competition 67%
	B: Quality of demand conditions 33%
7th Pillar: Labour market efficiency 17%	A: Flexibility 50%
	B: Efficient use of talent 50%
8th Pillar: Financial market development 17%	A: Efficieny 50%
	B: Trustworthiness & confidence 50%
9th Pillar: Technological Readiness 17%	A: Technological adoption 50%
	B: ICT use 50%
10th Pillar: Market size 17%	A: Domestic market size 75%
	B: Foreign market size 25%

INNOVATION & SOPHISTICATION FACTORS

11th Pillar: Business sophistication 50%	
12th Pillar: R&D Innovation 50%	

Source: WEF (2012)

The independent competitiveness variables used in this research consist of the twelve pillar scores for each country, since they have been calculated on a consistent basis for every country, and have not been manipulated with different weightings applied in terms of the WEF-deemed stage of development. Country performance against each of the twelve pillar variables can therefore be compared on a like-for-like basis.

In line with the literature-reported approach and the identified gap discussed in Section 2.6, the twelve independent competitiveness pillar variables are considered in the regression models on both an arithmetic mean basis (representing ‘stock’ of competitiveness) as well as on a compound annual growth rate (CAGR) basis (representing the seldom explored ‘change’ in competitiveness perspective). These independent variables are reflected in rows 2 and 3 of Table 1 respectively.

Row 4 of Table 1 reflects the second type of independent variable included in the regression model. Initial PPPPC-GDP for each country at the start of the time-series (i.e. 2007) is incorporated as an indicator of the initial level of economic development, aligned with the regression model explained in Section 2.4. Country values for this variable were divided by 10,000 to place them in the same order of magnitude as the other independent variables, for the purposes of obtaining regression coefficients of a similar order. Other means employed to transform this variable to a similar order include the use of its logarithm (for example, Baştürk *et. al*, 2012).

4.4. Research universe and sampling

4.4.1. Research universe

The research universe comprises the entire set of nations assessed within the GCI composite index compiled by the World Economic Forum in its 2012-2013 Global Competitiveness Report.

This universe is deemed to be the most suitable for this study, since the GCI is the competitiveness index that is most widely reported on, most influential on policy development and has the largest set of participating nations and survey participants (for example, as reported in Lall, 2001, and Wang *et al*., 2007).

4.4.2. Sampling methodology

As a starting point, the entire sampling frame of the 2013 data set of 144 nations included in the GCI was targeted for analysis (WEF, 2012). Thus three quarters of 193 recognised nations were potentially eligible members for the research data set (United Nations, n.d.). The census approach rather than the sampling approach was preferable, since information was readily accessible for all participant nations, and the population of interest, at 144 potential members, is relatively small (Curwin & Slater, 2004).

Within this set of 144 countries included in the 2012-2013 GCI, two steps were taken to ensure eligibility of countries in the final sample, to ensure research needs were met.

As a first step, only those countries for which time-series data is available for the twelve competitiveness pillar variables over the research time frame of 2007-2013, were included. This excluded 25 nations for which GCI data has only been gathered in more recent years. The list was thus rationalised down to 119 countries.

Secondly, the data set could only include countries for which corresponding purchasing power parity GDP *per capita* statistics are available within IMF records. Of the eligible list of 119 countries, Puerto Rico (an unincorporated territory of the United States) was further excluded since the IMF does not collect separate data on this territory.

Since the sample is not based on random selection from the universe of GCI members, but rather is purposively compiled on the basis of members being eligible if complete country data is available over the time period, the approach is non-probabilistic, and hence is not representative of the entire universe (Saunders & Lewis, 2012). This places a limitation on the generalisation of findings to the entire GCI data set, and indeed, to all countries.

4.5. Data collection

Data were obtained from the WEF and IMF websites. These were then prepared for the analysis phase by exporting all data to a combined Excel file and transcribing the data into a convenient table format for analytical purposes.

Appendix 1 contains a number of data tables, among which is included a table listing twelve values for arithmetic means of country scores on the twelve GCI competitiveness pillars over the period 2007-2013 (independent variables). These were used for the cluster analysis, which was performed to test Hypothesis 1.

Appendix 3 contains the data used to conduct analysis for Hypothesis 2. This includes the values of twelve arithmetic means for country scores on twelve competitiveness pillars over the period 2007-2013, along with initial PPPPC-GDP (2007) (independent variables) and the PPPPC-GDP, expressed as a CAGR, over the period 2007-2013 (dependent variable).

Appendix 4 contains the data used to conduct analysis for Hypothesis 3. This includes the values of twelve CAGRs for country scores on twelve competitiveness pillars over the period 2007-2013, along with initial PPPPC-GDP (2007) (independent variables) and the PPPPC-GDP, expressed as a CAGR, over the period 2007-2013 (dependent variable).

Appendix 8 contains country data arranged for the five WEF segments, necessary to test Hypothesis 4. This includes the values of twelveCAGRsfor country scores on twelve competitiveness pillars over the period 2007-2013, along with initial PPPPC-GDP (2007) (independent variables) and the PPPPC-GDP, expressed as a CAGR, over the period 2007-2013 (dependent variable).

Section 2.5 discusses the absence of a universally accepted construct and definition of national competitiveness, which makes a validity test of the accuracy of the GCI's instrument in measuring a country's competitiveness impossible (Saunders & Lewis, 2012). The validity of the instrument is therefore assumed, much as it is by many stakeholders, as discussed in Chapter 1.

Since the GCI instrument compiles competitiveness scores from 113 component variables, including secondary data from international and national databases of statistics, and the WEF's annual Executive Opinion Survey (WEF, 2012), there is potential for inconsistency in year-on-year pillar scores for any given country. This poses a question about the reliability of the independent variables (Saunders & Lewis, 2012) - substantial annual fluctuations in country rankings would raise the concern that the GCI instrument is unreliable. To assure the reliability of its data, the WEF (2012) performs an 'inter-year robustness test', hence it was deemed unnecessary to perform further tests of this nature on the data set.

4.6. Data analysis

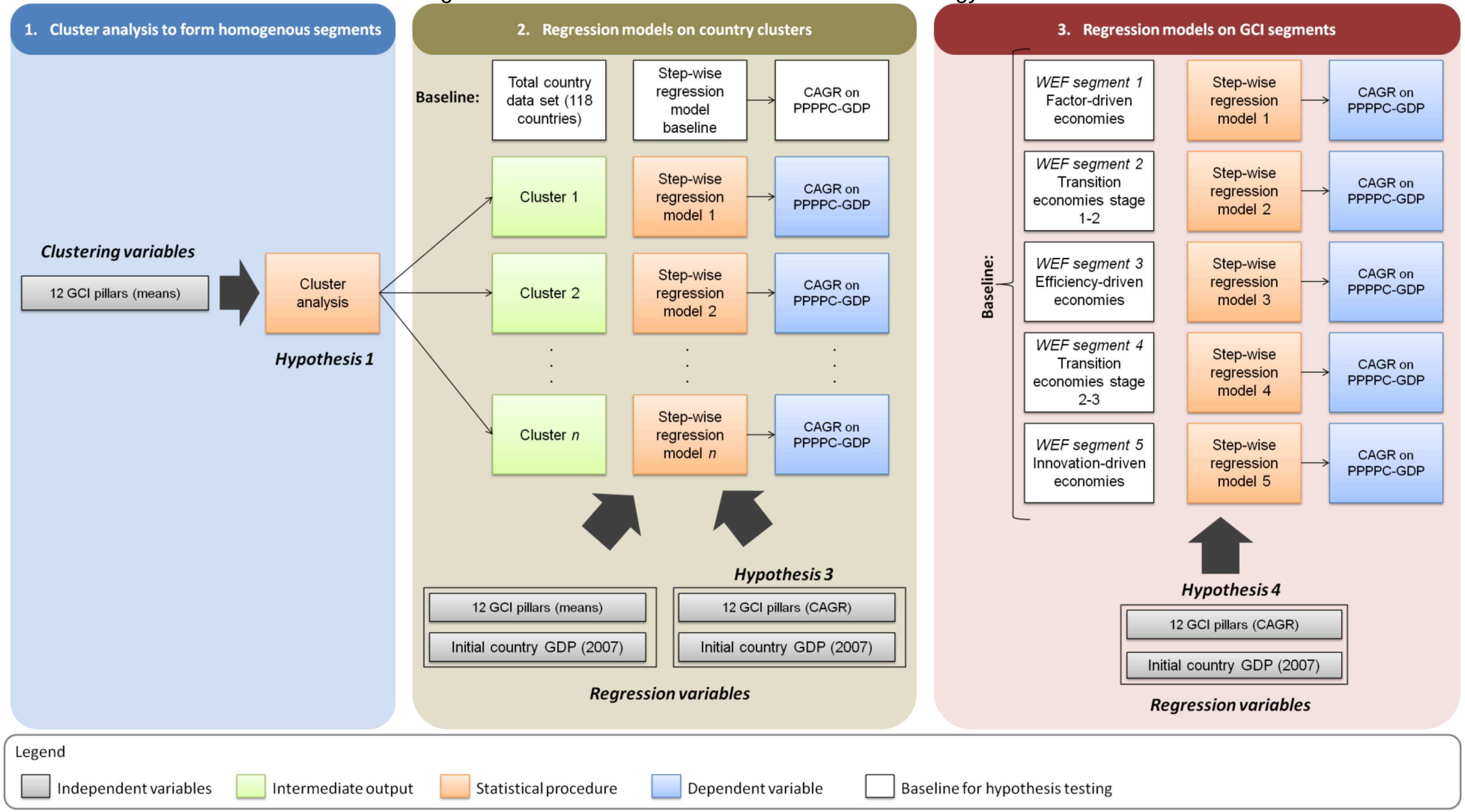
4.6.1. High level overview of analytical steps

Figure 4 is a schematic portrayal of the analytical steps required to answer the three hypotheses. Shown on the left hand side of the schematic, the first step involved the endogenous clustering of countries in terms of their performance on the twelve competitiveness pillars, which addressed hypothesis 1. This procedure is discussed further in Section 4.6.2.

Once country clusters were formed, the next step was to compile multiple regression models for the whole data set as a baseline, and each cluster in turn. Arithmetic means of competitiveness scores were used to address hypothesis 2, and compound annual growth rates in competitiveness scores were used to address hypotheses 3. This is discussed further in Section 4.6.3.

The right hand side of the schematic portrays the analytical process required to address the fourth hypothesis. The five WEF 'Stages of development'segments reflect the traditional way of separating countries into groupings on a *per capita* income basis. Multiple regressions were performed for these five segments, which represented a baseline for comparison with the multiple regressions obtained in the previous step, for testing of hypothesis 4. This is discussed further in Section 4.6.4.

Figure 4: Schematic overview of research methodology



4.6.2. Segmenting countries into clusters with homogeneous competitiveness patterns

The first step of the research methodology, portrayed in Figure 4, is descriptive in nature, in that is sought to identify – and hence, describe – distinct patterns in national competitiveness performance among the world's nations (Saunders & Lewis, 2012). This was done by employing cluster algorithms to compartmentalise countries into homogeneous segments (Hill & Lewicki, 2006). Informed by the approach of Baştürk *et al*. (2012), the variables employed were country mean scores for twelve competitiveness variables over the period 2007-2013, along with initial GDP *per capita*. The SAS® 9.2 package was used to form the clusters, employing the "Proc Cluster" procedure.

Cluster analysis is an exploratory data analysis tool for grouping objects into natural sub-groups or taxonomies, based on multivariate measurements of each member (Härdle & Simar, 2007). The result of a cluster analysis is that objects in a specific cluster share many characteristics, and are dissimilar to objects belonging to other clusters (Mooi & Sarstedt, 2011). Cluster analysis is a useful technique employed when large volumes of information need to be classified in a way that identifies structure within a multivariate data set; however cluster analysis itself provides no explanation for why such patterns exist (Hill & Lewicki, 2006) and hence in this research, it forms a descriptive pre-cursor to facilitate subsequent association analysis.

In this research, Ward's clustering algorithm was applied, since it is empirically recognised as one of best performing clustering algorithms (SAS Institute, 2008). The algorithm initially considers each observation as belonging to its own homogeneous cluster, and by progressively relaxing the criterion of what is considered unique, the algorithm proceeds to group together single observations initially, and resulting small clusters in subsequent iterations, in a manner which increases the within-cluster variance to the smallest possible degree (Härdle & Simar, 2007). The algorithm ends when all clusters are finally joined together, representing the total data set as one cluster (Hill & Lewicki, 2006). Ward's algorithm, like other methods which use Euclidian distance measures based on the least squares criterion, results in clusters of approximately equal size (Mooi & Sarstedt, 2011).

An important decision in assessing the analytical output of a cluster analysis lies in determining the number of clusters to select, yet no entirely satisfactory method to do this has been identified. SAS Institute (2008) reports that empirical assessment of over 30 methods to establish the number of clusters identified the three methods which performed best, as the cubic clustering criterion (CCC) developed by Sarle (1983), a pseudo F test developed by Calinski and Harabasz (1974) and a pseudo t^2 test developed by Duda and Hart (1973). These statistics are given as an output of the SAS clustering procedures, and SAS Institute (2008) recommends that the decision on number of clusters to select should be informed by consensus among the three statistics.

The SAS Institute (2008) guidance on consensus among the CCC, pseudo F and pseudo t^2 test was therefore taken as the means by which a robust decision could be made in deciding on where to place a partition between separate clusters. Also in line with SAS Institute (2008) guidance, no hypotheses were formulated to test the number of clusters since these either violate underlying assumptions for significance testing, generate implausible null hypotheses, or require complex non-parametric tests with heavy computational requirements.

In assessing whether or not the null hypothesis could be rejected, a less conventional visual method of making the determination was selected, as a means to provide additional qualitative insights that a statistics-based method would not yield. This approach was adopted from Baştürk *et al*. (2012).

It is considered good practice to assess the clusters formed for reliability of the results. Mooi and Sarstedt (2011) advise that the analysis be repeated on the data set over time to see whether cluster composition remains sufficiently stable. This was not possible in the current research design, since it was deemed important to use all data available over the limited time period of seven years in the regression models. This represents an area for testing in future research, when future years of GCI scores become available, provided the WEF maintains the same method of compiling the indicator as for the 2007-2013 period used here.

4.6.3. Establishing an association relationship between each cluster's competitiveness pattern and its PPPPC-GDP

The second step of the research methodology, as portrayed in Figure 4, required linear multiple regression models to be constructed, first on the total dataset as a baseline against which to compare the research results, and then on the resulting clusters. This latter analysis was repeated twice, first using the mean values over 2007-2013 for the twelve competitiveness pillar variables, as representative of the national 'stock' of competitiveness, for testing of Hypothesis 2, and then using the compound annual growth rates in these variables over 2007-2013 to represent the 'flow' of competitiveness during the period, for testing of Hypothesis 3. As discussed in Section 2.6, flow of competitiveness is not systematically incorporated into such analyses, and hence this step represents a contribution to the literature.

As discussed in Section 2.3, empirical growth studies usually take the form of cross-country panel growth regressions, comprising cross-sectional and time series dimensions. This research used the same approach, since the change in competitiveness (flow) was an important dimension for Hypothesis 2. The linear regression model described in Section 2.4 was employed.

Linear regression is a technique used to interpret the relationship between several independent or predictor variables and a dependent variable, by fitting a linear function of the independent variables as closely as possible to the observed dependent variable. This function is computed by minimising the sum of squares of deviations between the observed values and the linear function's calculated values (Hill &

Lewicki, 2006). The ‘best’ regression model is considered to be the simplest sub-model parsimoniously singled out from a more comprehensive model, which provides adequate explanation for the dependent variable (Hill & Lewicki, 2006).

Stepwise regression models achieve parsimony by iteratively adding (in the case of the forward entry procedure) or removing (in the case of the backward removal procedure) independent variables into / from the regression model depending on a pre-specified entry / exit criterion, and excluding all other variables which do not meet the criteria from the model (Hill & Lewicki, 2006). Forward stepwise regression proceeds at each step by performing the forward entry procedure to allow variables that are eligible in terms of the entry statistic to enter, and then backward removal to be performed, to exclude variables from the model whose exit statistics are exceeded (Hill & Lewicki, 2006). Thus at each step, a new and refined regression equation arises. The procedure terminates when no further variables enter or exit the model.

Stepwise regression presents two useful characteristics, for which reasons it was selected as the multiple regression tool for this research. Firstly, stepwise regression is a practical way to address multicollinearity among independent variables in a dataset. Multicollinearity, a condition where two or more independent variables are highly correlated with one another, creates significant difficulties in interpreting a regression model’s partial regression coefficients, since they become statistically unreliable (Weiers, 2011). Stepwise regression aids in addressing these concerns, since the software decides which additional variables enter into the model based on how much of the remaining variation in the dependent variable they explain (Weiers, 2011), thereby omitting excessive collinear variables from the model.

Secondly, where a regression model includes a high number of potential predictors (such as in this research, where 13 independent variables were identified), stepwise regression aids in determining the best linear model to apply, by balancing the need to explain the most possible variation in the dependent variable with the most parsimonious model possible (Mark & Goldberg, 1988; Weiers, 2011).

The model specifications for the stepwise regression were an entry statistic of $p_{entry} < 0.05$ for independent variables to enter the model, and $p_{exit} < 0.1$ for variables to remain in the model. This is in line with default settings for various statistic software packages, including the SAS® 9.2 software package used, since a $p_{entry} > p_{exit}$ could result in an infinite loop in the procedure. This means that entering variables are significant to the explanation of the dependent variable at a 5% level of significance, and exiting variables have significance in explaining the dependent variable at a 10% level of significance.

As a statistical measure of the ‘best’ multiple linear regression model to explain the relationship between the independent variables and the dependent variable, the coefficient of multiple determination, known as the R^2 value, adjusted to take account for the sample size and the number of independent variables, is used. This is known as the “adjusted R^2” value (Weiers, 2011). This represents the strength of a relationship between independent variables and the dependent variable, by providing a figure for the percentage of variation in the dependent variable’s value that can be explained by the variation in the independents’ values. (Saunders & Lewis, 2012). The adjusted R^2 value was therefore used to evaluate whether the regression models obtained for hypothesis 2 and 3 represented improvements over the baseline models against which they were compared, and thereby to determine whether or not the null hypotheses could be rejected. Since an R^2 value only provides an indication of the extent of association between variables, and makes no judgement about the causality of the dependents on the dependent, this component of the research has been described as “association” and not “causal”, which is sufficient for the purposes of addressing the research problem.

Selected diagnostics were performed to assess the resulting regression model for violation of its underlying assumptions, for reliability and validity, or assumptions were made on these aspects.

A regression model's underlying assumptions in terms of the errors (residuals) should always be analysed to test the model's validity (Waltenburg & McLauchlan, 2012). These assumptions are threefold, namely: the population of residual values ε_i (as per equation (1) in Section 2.4) is normally distributed with a mean of zero; the standard deviation or variance of the ε_i values about the regression line is constant regardless of the given values of the independent variables x_i (termed "homoscedasticity"); residuals ε_i are independent of each other (UCLA, n.d.; Weiers, 2011). Respectively, tests applied to some of the regressions to investigate the three residuals assumptions included a visual test for normality and plotting residuals *versus* x_i values (Weiers, 2011). Residuals not complying with these assumptions imply possible invalidity of the regression model (Weiers, 2011) – as discussed in Section 2.4, from the econometric view, from a practical perspective this points to significant predictors of economic growth that have not yet been endogenised into the regression model.

Cook's D statistic was calculated for the regression models, to ensure no individual observations unduly influenced or leveraged the resulting partial regression coefficients (UCLA, n.d.).

Since the stepwise regression modelling method addresses high levels of multicollinearity, no correlation matrix was prepared to test for this condition in the dataset as the problem is largely averted (Weiers, 2011).

It is noted that stepwise regression is not without its drawbacks. Mark and Goldberg (1988) caution that while a stepwise regression may develop the best model for a given sample, when a sub-sample of the data withheld outside of the model is used to test the "goodness of fit", the result is not always reliable. Consequently, stepwise regression is useful as a starting point to explore relationships among a set of possible independent variables and a dependent variable, as a starting point for further study (Mark & Goldberg, 1988). The intent of this research was to use a given data sample to demonstrate, by means of alternative descriptive techniques (cluster analysis) and regression model specifications, that an improved explanatory power of PPPPC-GDP is possible, and not to provide a detailed interpretation of resulting partial regression coefficients as reliable estimators of PPPPC-GDP for all countries over all time. Hence, the shortcomings of stepwise regression from a reliability perspective were not deemed to be of relevance to the research problem at hand.

4.6.4. Comparing the explanatory power of regressions performed on clusters with regressions formed on GDP per capita threshold segments

The third and final step of the research methodology, as portrayed in Figure 4, called for one further set of linear multiple regression models to be constructed, using as country groupings the GCI segments which the WEF forms from GDP *per capita* thresholds, as illustrated in Figure 2.

Section 2.6 presents the justification for testing growth regressions performed on clusters with similar competitiveness patterns against the typical procedure of testing growth regressions on groups of countries that have been segmented somewhat arbitrarily on GDP *per capita* thresholds.

The baseline for examining whether the cluster-based approach improves explanatory power is naturally the GDP *per capita* segmentation approach, in this instance as applied by the source of competitiveness data used in the research, namely the WEF's 'Stages of development' model for the GCI.

The regression models for the five WEF segments were specified identically to those for the cluster regressions constructed for Hypothesis 4, with the only difference being the countries forming part of the five segments. Segment members are listed in Appendix 8. These were formed by providing categorical code numbers for each country's WEF-specified development stage over the 2007-2013 period (Saunders &

Lewis, 2012), and averaging each country's category values to identify its 'mean' 'Stages of development' classification over the period. This was done to ensure the country groupings were synonymous to the clusters, which were formed from mean scores on competitiveness pillars over the 2007-2013 period.

The adjusted R^2 values obtained for these WEF segment regressions (as the baseline for the hypothesis test) were compared with the adjusted R^2 values obtained for the cluster regressions of Hypothesis 3, in order to assess whether the null hypothesis could be rejected.

4.7. Assumptions

A number of key assumptions were made during design of the research methodology.

As mentioned in Section 4.5, the validity of the GCI as an instrument accurately measuring national competitiveness is assumed, which has been highlighted as a concern by various academics (for instance Berger & Bristow, 2009; Lall, 2001). It is equally assumed that the quality of data collected for all countries in the data set is of equal quality.

Reliability tests on the GCI data set, and the resulting clusters and regressions were not performed, for reasons explained in Chapter 4. Hence it is assumed that the results are acceptably reliable, within the limitations specified in Section 4.8.

Multicollinearity tests among potential predictor variables were not performed due to the choice of stepwise regression models, as discussed in Chapter 4.

Due to limited available literature on the use of flow variables in place of stock variables in the Solow growth model, it has been assumed that such growth models also follow a similar multiple regression form; no tests were performed to assess for non-linearity.

Where other key assumptions were made, these have either been tested as described in Chapter 4, or noted as more significant limitations to the findings.

4.8. Limitations

From the outset, a number of limitations of this research were identified.

The literature review reports a lack of solid theoretical underpinnings for the concept of national competitiveness, and hence the variables employed by the GCI (which formed the independent variables for this research's regression models) are not credibly linked to a comprehensive framework of national competitiveness and economic growth.

The timeframe over which the research is conducted is constrained by available data sets, as discussed in Chapters 1 and 4. The relatively short period over which competitiveness scores are collected (seven years), practically means that this research can only capture a business cycle and not the structural aspects of an economic cycle - typically such a study should be conducted over a period of decades.

Developing countries are under-represented in the data set, due to lack of available information for the full time set under study. Non-probability sampling is used, therefore these findings cannot be reliably generalised to the rest of the universe or indeed other countries, over other time periods. Thus the external validity of the findings are unknowable, and caution is taken in making assertions beyond the sample, or beyond the time period.

As discussed in Chapters 1 and 4, the purpose of the study was an investigation of associations between national competitiveness and economic growth. It is noted that these associations should in no way be construed as implying a causal relationship with economic growth.

Taken together, these factors place limitations on making conclusive interpretations from the results to situations external to the present study.

5. Results

A free economy and strong communities honor the dignity of every person, rewarding effort with justice, promoting upward mobility, and building solidarity among citizens.

- Paul Ryan

As discussed in Chapter 3, four hypotheses were developed for investigation to address the overarching purpose of the research.

The chapter begins with descriptive statistics for the sample of 118 countries, along with preliminary analysis that was conducted to assess whether evidence of the anticipated associations could be found, prior to proceeding with the detailed research.

Following this, one section describes the process of finding homogeneous clusters from the total sample.

The sections thereafter present results for each of the hypothesis tests, in accordance with the research methodology outlined in Chapter 4.

5.1. Sample description, descriptive statistics and preliminary assessment of relationships among variables

Data sources for dependent and independent variables were discussed in Section 4.3, As described, of the 144 countries for which recent data was available in the GCI report, only 119 were included over the full 2007-2013 period. Of these, corresponding PPPPC-GDP data was available for 118 countries. The countries included in the research data set are those for which data is presented in Appendix 1.

A list of the 26 excluded countries is shown in Table 2. Of the 26 territories, 25 are classified as emerging or developing by the IMF (2012).

Table 2: Countries excluded from the preliminary GCI data set as a result of incomplete information

Cape Verde Islands	Liberia	Senegal
Gabon	Libya	Serbia
The Gambia	Malawi	Seychelles
Ghana	Moldova	Sierra Leone
Guinea	Montenegro	Suriname
Haiti	Oman	Trinidad and Tobago
Iran	Puerto Rico*	Yemen
Ivory Coast	Rwanda	

Source: Analysis performed on GCI data set (WEF, n.d.)

**Puerto Rico is not considered by the IMF to be an independent nation, and hence is not covered within its data set. The Puerto Rico territory has a GDP per capita that classifies as a developed nation*

According to the IMF (2012) database of advanced and emerging or developing economies, the global representation of the 118 countries within the refined sample for analysis is as reflected in Table 3.

Table 3: Representation of the world's economies within the refined research sample

	Advanced countries	Emerging and developing countries	Total
Number of countries within research data set	34	84	**118**
Number of countries in IMF (2012) database	35	154	**189**
Percentage of IMF (2012) countries represented in research data set	97%	55%	**63%**

Source: Research data set compiled from WEF (n.d.) and IMF (2012)

This analysis highlights an under-representation of emerging and developing countries in the sample, a limitation discussed in Section 4.8.

Descriptive statistics are outlined for the sample of 118 countries, and as per Saunders and Lewis (2012), measures of central tendency, dispersion and shape are considered. Table 4 summarises salient statistics for the dependent variable (compound annual growth rate in country PPPPC-GDP) and one of the independent variables, initial PPPPC-GDP at the start of the time series (2007).

Table 4: Descriptive statistics on total sample for dependent variable CAGR in PPPPC-GDP (2007-2013) and independent variable initial PPPPC-GDP (2007)

	CAGR PPPPC-GDP (2007-2013) (dependent variable)	Initial PPPPC-GDP (2007) (independent variable)
Mean	3.3%	$16,676
Std Error	0.2%	1,513
Median	3.3%	$10,446
Std Deviation	2.4%	$16,438
Skewness	0.43	1.36
Range	13.0%	$80,890
Minimum	-2.6%	$467
Maximum	10.3%	$81,357

Source: IMF (2012)

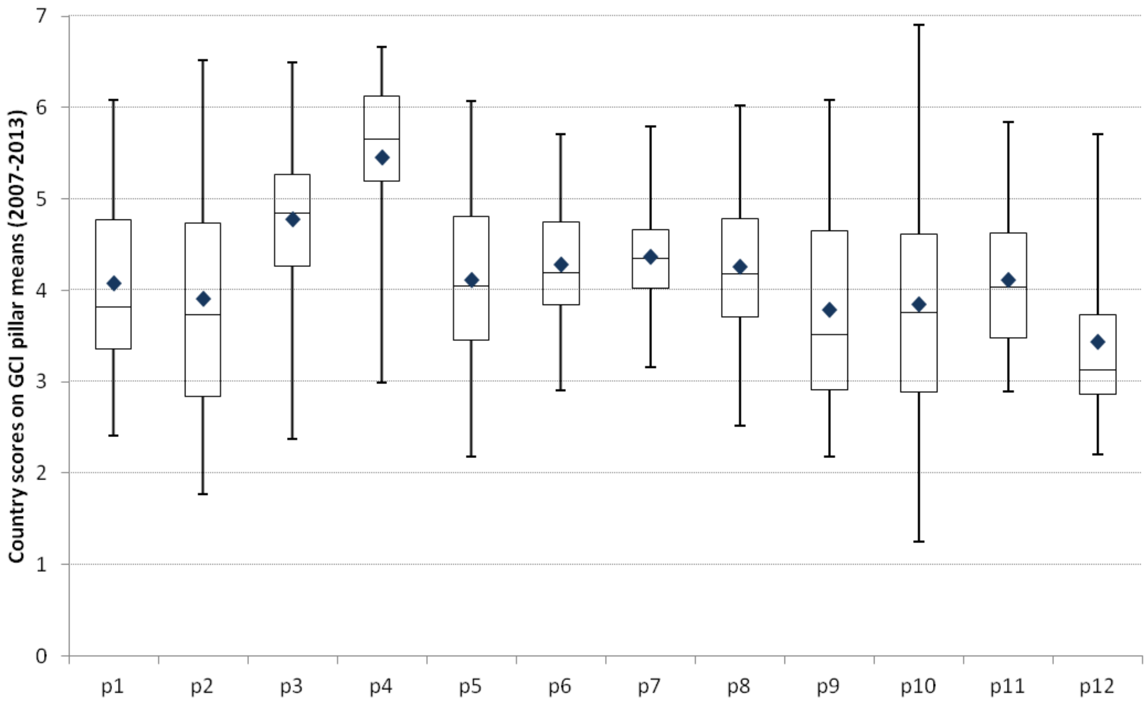
Mean growth in PPPPC-GDP for the entire sample over the period was 3.3%. With its relatively low skewness score of 0.43, the sample's growth rates approximate a normal distribution (Weiers, 2011). Initial PPPPC-GDP values for the sample have a mean of US $16,676, which significantly exceeds the median value of $10,446, and accordingly, a high skewness score of 1.36 is obtained. High positive skewness is typical when there is a limit to minimum values that can be recorded ($0 income *per capita*) but no limit to upper values in a distribution (since there is no ceiling value for income *per capita* a country can attain) (Weiers, 2011). The range in initial PPPPC-GDP is large, with the wealthiest nation recording a 200 times larger value than the poorest one.

Country scores on twelve competitiveness pillars are used to construct independent variables for the 118 sample members (along with initial PPPPC-GDP, the thirteenth variable).Competitiveness scores are considered both as ‘stock’ variables for Hypothesis 2, represented as means of GCI scores over the period 2007-2013, and ‘flow’ variables for Hypothesis 3, represented as the CAGR in scores over the period 2007-2013.

Figure 5 portrays descriptive statistics of the mean competitiveness scores on the twelve pillars for the sample over the period 2007-2013, using box-and-whisker plots which simultaneously display measures of central tendency and dispersion (Weiers, 2011). The greater the vertical length of each competitiveness pillar’s box-and-whisker plot, the greater the range in country scores for that pillar. The lower and upper limits of the ‘box’ show first and third quartiles respectively, while the horizontal line running through the box is the 50^{th} percentile or median value. Similar to the large range seen in the sample’s PPPPC-GDP values, GCI scores across the pillars show significant variance in values, particularly for pillars 2 (Infrastructure), 10 (Market size) and 12 (R&D Innovation). Mean pillar scores, indicated by blue diamond markers, hover around a score of 4 (out of a maximum possible score of 7) for most pillars, but a significantly higher mean score of 5.5 is attained for pillar 4 (Education).

The mean values for most pillars exceed the median values, indicating positive skewness in the pillar score distributions. Outliers have not been indicated in Figure 5, but were recorded for pillar 3 (1 outlier), pillar 4 (7 outliers), pillar 7 (4 outliers) and pillar 12 (9 outliers); since no country had multiple outlier values across these pillars, it was decided not to exclude any country from the sample. Data for country mean scores on the twelve GCI pillars are reflected in Appendix 1.

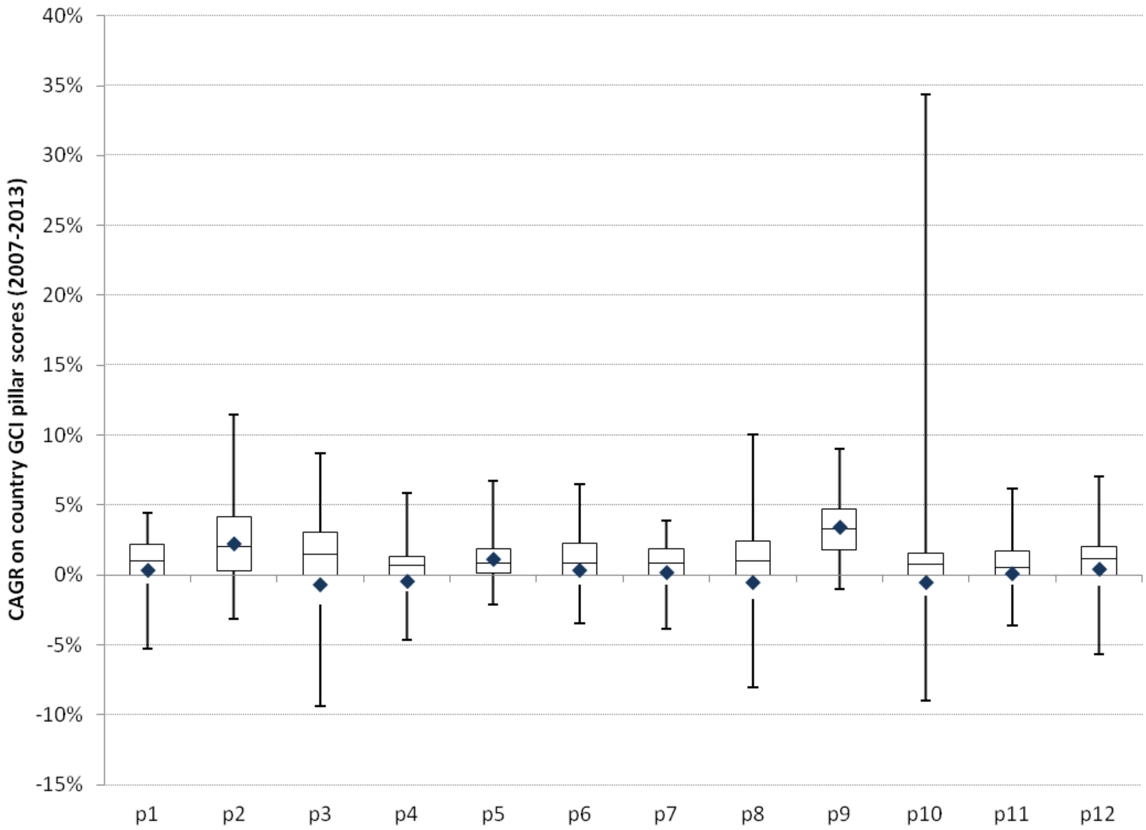
Figure 5: Box-and-whisker plot of country mean scores on the twelve GCI pillars (2007-2013)



Source: WEF (n.d.)

Figure 6 shows box-and-whisker plots for the CAGR in competitiveness pillar scores over the period 2007-2013. Whereas in Figure 5 there is prominent positive skewness for most pillar score distributions, in Figure 6, negative skewness is more prevalent, with the pillar means (represented by the blue diamond markers) mostly lying lower than the median values. The range in percentage change in country scores over the period lies within the -10% to +10% range, with the exception of pillar 10 (Market size), where an extreme outlier, Timor-Leste, extended the range, with a pillar 10 score that rose by 33% on a compound annual basis from a very low value of 0.33 in 2007. It was elected to leave Timor-Leste in the sample, which at the regression phase of the research (refer to Section 5.4) proved to be a limitation which required this decision to be revisited. Data for the CAGR in pillar scores are also reflected in Appendix 1.

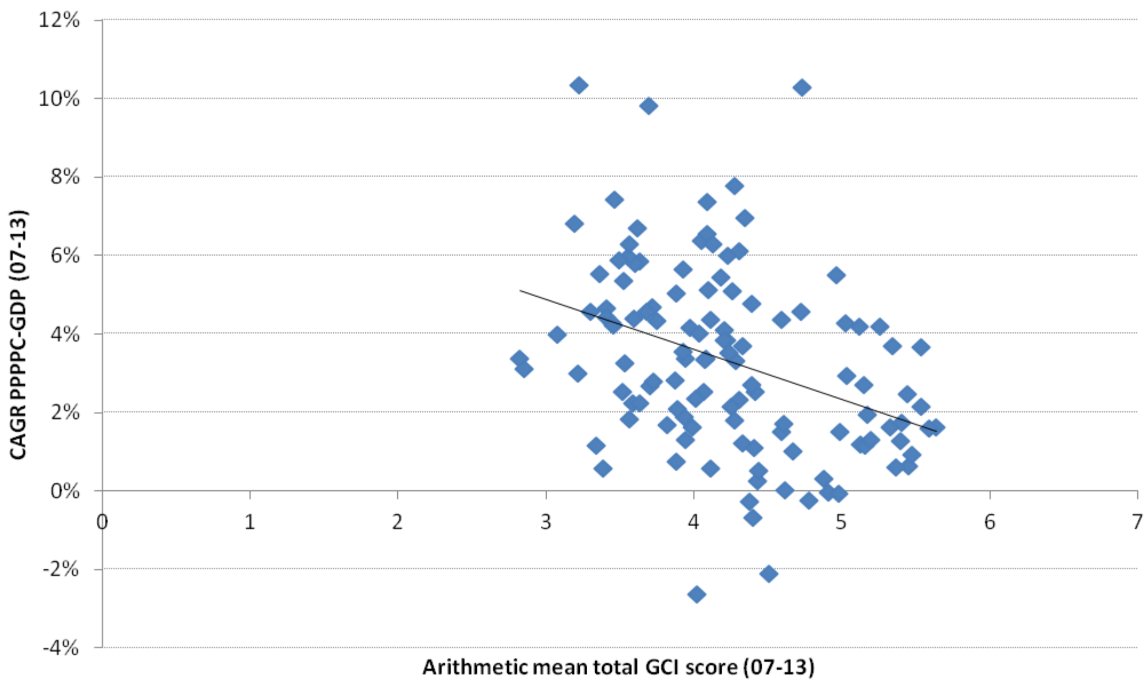
Figure 6: Box-and-whisker plot of CAGR on country pillar scores (2007-2013)



Source: WEF (n.d.)

The final piece of preliminary data assessment conducted was to compile two simple initial scatterplots to check whether some form of relationship might be evident between national competitiveness (the independent variable) and PPPPC-GDP (the dependent variable) for the chosen sample, to provide an early indication of whether the anticipated associations were present in the data. Figures 7 and 8 examine the evidence of stock and flow relationships between national competitiveness and PPPPC-GDP. For the purpose of preliminary assessment, this was done by simply using country aggregate GCI scores and not their underlying twelve pillar scores. Aggregate GCI scores for the sample are included in Appendix 1.

Figure 7: Scatterplot of country mean GCI score (2007-2013) and CAGR in PPPPC-GDP (2007-2013)

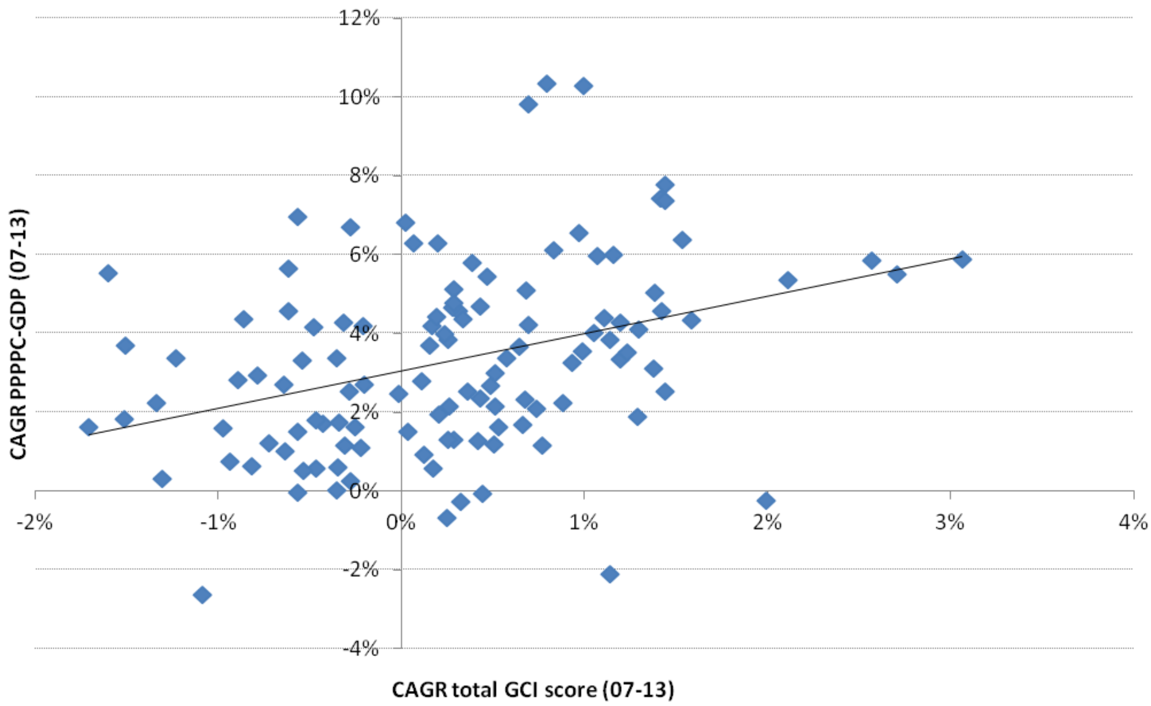


Source: WEF (n.d.)and IMF (2012)

Figure 7 shows the association found between countries' 'stocks' of competitiveness (measured in terms of average total GCI score over the period 2007-2013) and the growth in countries' income *per capita* (measured in CAGR of PPPPC-GDP over 2007-2013). A linear regression was fitted to aid visual analysis of the relationship, which demonstrated a trend of higher 'stocks' of competitiveness being negatively associated with economic growth over the period 2007-2013. While this seemingly contradicted the argument made in the literature review, the finding was intuitive when consideration was given to the limitations discussed in Section 4.8: the period selected for the time series overlaps the Great Recession, and the economic growth of advanced economies was more negatively impacted than for emerging and developing economies.

The second preliminary test of association is illustrated in Figure 8, where the change in PPPPC-GDP was plotted against the flow in competitiveness, measured as CAGR in total GCI scores for each country in the sample. The relationship was found to be positive, an interesting contrast with the results displayed in Figure 7, and well aligned with the anticipated outcomes highlighted in the literature gap in Section 2.6. This result provided confidence in the merit of hypothesis 3, and emphasised that evaluations of stocks and flows of competitiveness could provide different insights on economic growth drivers for countries.

Figure 8: Scatterplot of CAGR in country GCI score (2007-2013) and CAGR in PPPPC-GDP (2007-2013)

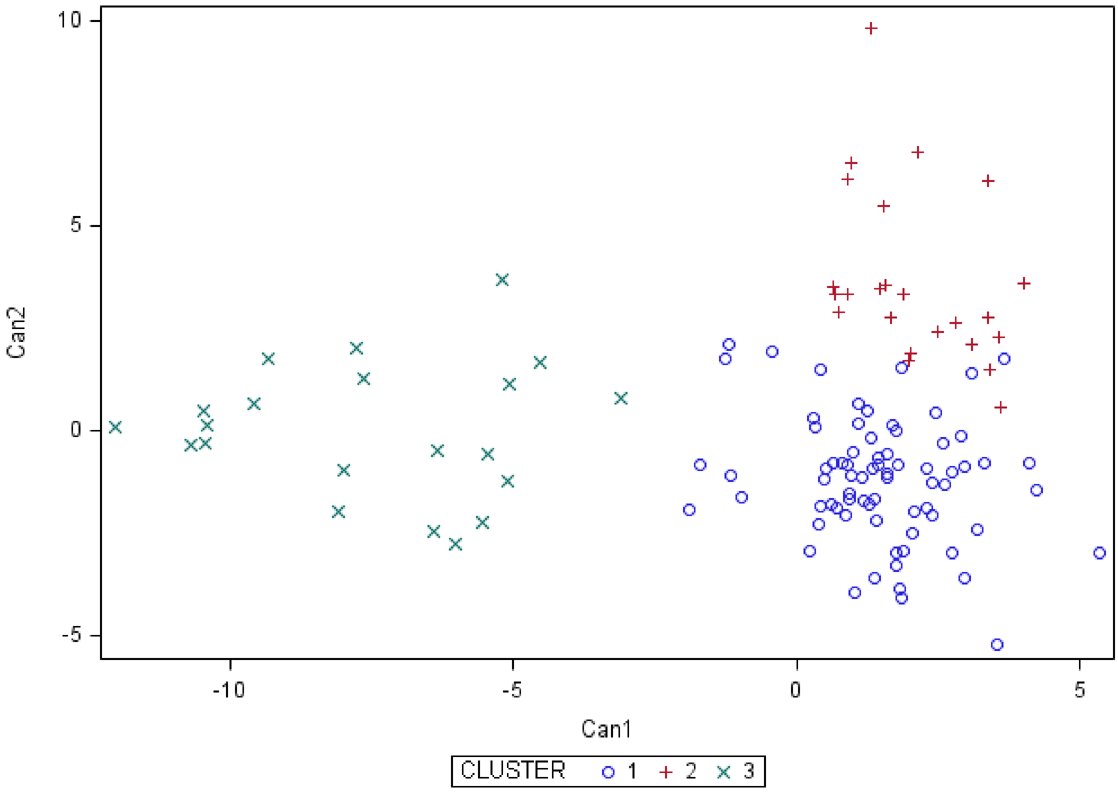


Source: WEF (n.d.)and IMF (2012)

5.2. Description of the country clusters formed

A cluster analysis was conducted on countries' arithmetic mean scores for each of the twelve GCI pillars over the period 2007-2013, as per the procedure outlined in Section 4.4.2. The results of the cluster analysis are included in Appendix 2, and a visual depiction of the three selected clusters in canonical form is displayed in Figure 9. The canonical form determines clustering between groups of countries with common characteristics (in terms of displaying patterns of similar scores on the twelve GCI pillars), and expresses these in lower-dimension canonical variables (Hill & Lewicki, 2006). Figure 9 illustrates that three reasonably well separated clusters were identified.

Figure 9: Canonical representation of three country clusters based on country mean scores for twelve GCI competitiveness pillars (2007-2013)



Source: WEF (n.d.)

The decision to use three clusters was based on consensus among the cubic clustering criterion (CCC), pseudo F and pseudo t^2 test, as discussed in Section 4.4.2.

SAS 9.2® output in Appendix 2 shows the results for these tests. The CCC points to a cluster number selection optimum at a local maximum on the chart, which in this case suggested three clusters. Similarly, the pseudo F test points to a local peak at two or three clusters, which concurs with the CCC result. The pseudo t^2 test requires identification of a low t^2 value preceding a sharp rise in t^2 value for the next fusion into a lower numbers of clusters (SAS Institute, 2008). The graph shows a t^2 value of ~30 at three clusters, which rises sharply to a t^2 value of ~60 if the two of those clusters were fused (reducing the total number of clusters to two). Thus, consensus among the three tests led to a conclusion that the optimal number of clusters for the research, based on the sample selected, was three.

The countries included in each cluster are shown in Appendix 3. Table 5 provides some descriptive statistics for each cluster, highlighting differences among the country groupings on total GCI competitiveness scores and PPPPC-GDP values.

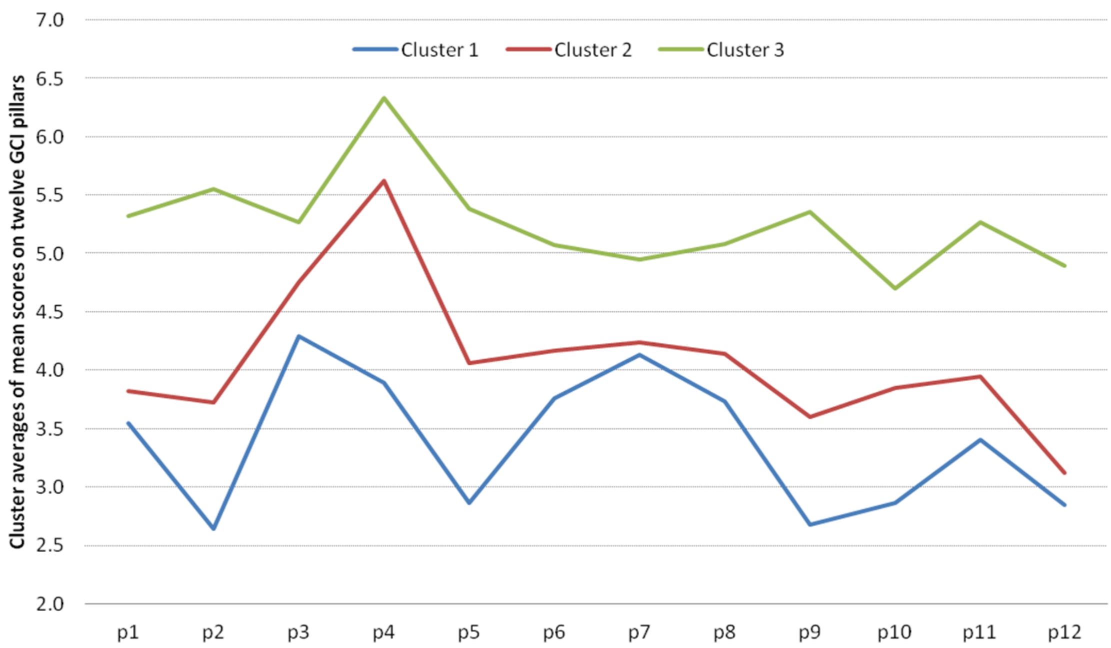
Table 5: Descriptive statistics for the total sample and three clusters formed on arithmetic means of scores on twelve competitiveness pillars (2007-2013)

	Total sample	Cluster 1	Cluster 2	Cluster 3
Number of observations	118	21	73	24
Average PPPPC-GDP (07-13)	$17,619	$ 3,220	$ 14,034	$ 41,118
Average CAGR in PPPPC-GDP (07-13)	3.3%	4.4%	3.4%	2.0%
Average total GCI score (07-13)	4.23	3.47	4.13	5.22
Average CAGR in total GCI score (07-13)	0.3%	0.4%	0.3%	0.1%

Cluster 1 formed with 21 members, Cluster 2 with 73 members, and Cluster 3 with 24 members. Table 5 shows a distinct difference in the average PPPPC-GDP for each cluster, suggesting possible similarities with the WEF's PPPPC-GDP threshold segmentation approach (refer to Figure 2), namely strong alignment between country membership of the WEF's lowest PPPPC-GDP segment 'Factor-driven economies' and Cluster 1, and between its highest PPPPC-GDP segment 'Innovation-driven economies' and Cluster 3. The results also aligned with Figure 8, since the cluster with highest average CAGR in PPPPC-GDP is associated with highest CAGR in total GCI score.

Figure 10 decomposes the total GCI score for each cluster into the twelve pillar variables, illustrating that Cluster 3 has the highest average pillar scores for all pillars, and similarly Cluster 1 has the lowest average pillar scores for all pillars. The table below the graph indicates the corresponding average CAGR in pillar scores for the twelve variables, drawing attention to the fact that, while Cluster 3 has the highest average pillar scores (or ‘stock’ of competitiveness), the biggest improvements in pillar scores (or ‘flows’ of competitiveness) over the period 2007-2013 were evenly split among Cluster 1 and Cluster 2 (indicated in orange highlighted cells). This suggests some convergence in competitiveness scores among the better and worse performing countries over the period.

Figure 10: Average cluster values for GCI pillar score means and CAGRs



Cluster averages of CAGR on twelve pillar scores

	p1	p2	p3	p4	p5	p6	p7	p8	p9	p10	p11	p12
Cluster 1	0.39%	1.72%	-0.26%	0.17%	0.98%	1.43%	0.39%	-0.37%	2.67%	-0.10%	0.65%	0.57%
Cluster 2	0.59%	2.93%	-0.58%	-0.69%	1.48%	0.41%	0.15%	-0.17%	4.15%	-0.74%	0.15%	0.28%
Cluster 3	-0.16%	0.79%	-1.06%	-0.18%	0.30%	-0.69%	0.23%	-1.56%	1.84%	-0.04%	-0.22%	0.92%

With descriptive statistics indicating distinct differences among the three clusters, attention is turned to addressing Hypothesis 1.

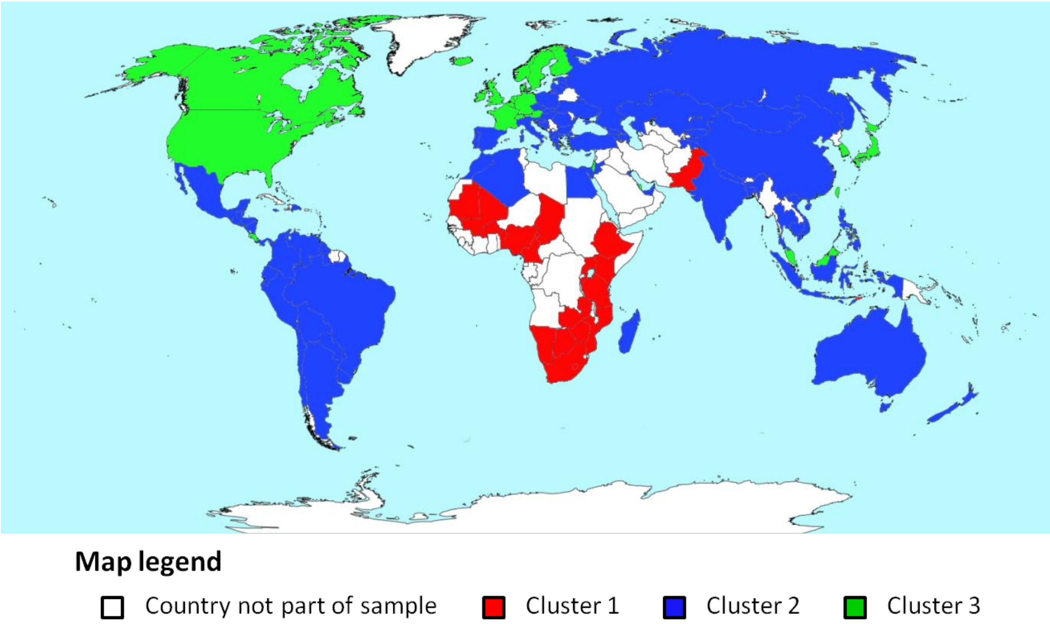
5.3. Hypothesis 1: Countries group dissimilarly according to the twelve pillars of competitiveness when compared with grouping according to GDP per capita

The first hypothesis sought to establish whether countries segmented by an endogenous, data-driven clustering approach on competitiveness scores would group differently than the typical approach of segmenting countries into different categories based on exogenous variables such as GDP per capita thresholds, an approach that the WEF adopts in its GCI.

Visual analysis was performed to address the hypothesis, by comparing the cluster results (shown in Figure 11) with the WEF's 'stages of development' segmentation of countries into five segments (shown in Figure 12). This approach was adopted from Bastürk et al. (2012).

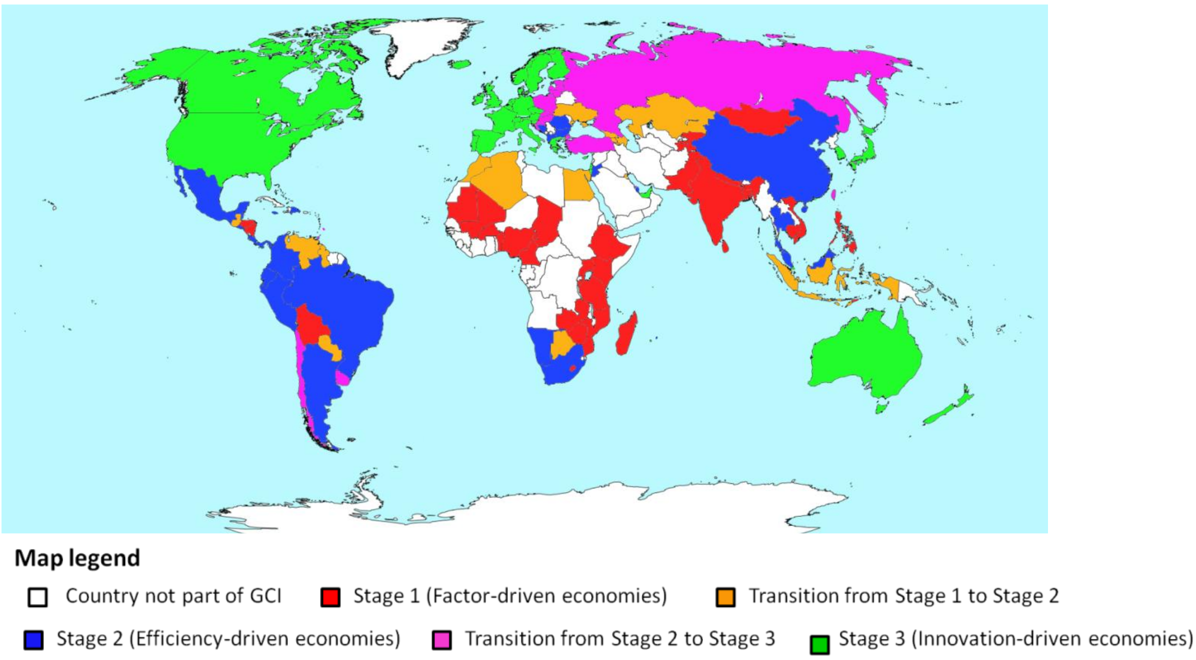
Comparison of the maps highlighted some key differences. A striking result from the cluster analysis was how closely the clusters were aligned with continental boundaries, with Cluster 1 largely confined to Africa, Cluster 2 encompassing most of Asia and South America, and Cluster 3 mainly composed of North American and European countries. Deviations from the continental pattern included northern Africa (which joined Cluster 2), Asian territories including Japan, South Korea, Malaysia and Taiwan (which joined Cluster 3), and southern European countries including Italy, France, Portugal and Greece (which joined Cluster 2).

Figure 11: Country groupings by cluster analysis results



Source: Blank political map obtained from www.free-world-maps.com (2009)

Figure 12: Country groupings according to WEF 'Stages of development' segments (average segment category over 2007-2013)



Source: Blank political map obtained from www.free-world-maps.com (2009)

The WEF segments do not follow such continental homogeneity, with Asia represented by members from all five ‘Stages of development’ segments, South America by four, and Africa by three.

Some similarities are apparent, for instance North America, much of the European Union, some Far East Asian countries and a number of African countries, align in terms of grouping in the highest or lowest categories: Cluster 1 and Cluster 3 appear to show a similar country membership with WEF Stage 1 and Stage 3 segments respectively.

It is particularly in Cluster 2 where significant differences arise, with countries from all five WEF segments represented in Cluster 2.

For the given sample over the given time period, it would appear that significant differences exist between the research’s competitiveness cluster formation approach and the WEF’s GDP *per capita* segmentation approach. This result held promising prospects that in subsequent research steps, different regression results would be obtained for the clusters versus the WEF’s traditional segmentation approach on PPPPC-GDP.

5.4. Hypothesis 2: Regressions based on clusters formed by the twelve GCI pillars improve explanatory power for purchasing power per capita GDP growth rate as compared to the equivalent regression for the heterogeneous total set of countries

The second hypothesis sought to establish whether regression models built on clusters formed by comparatively homogenous competitiveness patterns would improve upon the weak relationships typically found in regression models built for the heterogeneous total set of countries.

A forward stepwise multiple regression analysis was conducted on the total country sample and the three country clusters as described in Section 4.6.3. Table 6 presents a summary of the regression results, details of which are included in Appendix 3.

Diagnostics on the regression residuals were performed, confirming that the underlying assumptions of the regression model were met, as detailed in Section 4.6.3 (also included in Appendix 3). Residuals were approximately normally distributed, and no correlation was found between residuals and the predictors. No country provided undue leverage on any of the regression models, as determined by the Cook's D statistic, which was sufficiently low in all cases.

As discussed in Section 4.6.3, the interpretation of partial regression coefficients was beyond the scope of this research, hence no detailed discussion of the β_i values proceeds.

Table 6: Results of forward stepwise multiple regression analysis on total sample and three clusters, using arithmetic means of twelve competitiveness pillar scores and initial PPPPC-GDP as possible predictors (2007-2013)

	Total sample	Cluster 1	Cluster 2	Cluster 3
Observations	118	21	73	24
Intercept (α)	0.0059	-	-0.0377	0.0695
Adjusted R^2	0.31	-	0.47	0.51
Initial PPPPC-GDP (2007)**	-	-	-0.0207*	-
1: Institutions	-	-	-	-
2: Infrastructure	-	-	-	-
3: Macroeconomic environment	0.0091*	-	0.0112*	0.0117*
4: Health & primary education	-	-	-	-
5: Higher education & training	-	-	-	-
6: Goods market efficiency	-	-	-	-
7: Labour market efficiency	-0.0097*	-	-	-
8: Financial market development	-	-	-	-
9: Technological readiness	-	-	-	-0.0206*
10: Market size	-	-	-	-
11: Business sophistication	-	-	-	-
12: R&D innovation	-	-	0.0148*	-

** Variables enter the model at a significance level of p<0.05 and those that remain in the model, shown in the table, are significant at p<0.1*

***Variable specified in the model as Initial PPPPC-GDP divided by 10,000*

Table 6 reveals that an adjusted R^2 value of 32% was obtained for the total sample, meaning that 32% of the variance in compound annual growth in PPPPC-GDP is explained by the variance in the significant variables which were finally used in the model. Two of the thirteen independent variables, 'Macroeconomic environment' (pillar 3) and 'Labour market efficiency' (pillar 7) entered the model with a significance level of $p<0.05$, and remained in the model with a significance level of $p<0.1$.

For Cluster 1, no variables entered the model at significance level $p<0.05$, so no regression model was obtained.

The regression models for both Clusters 2 and 3 show a marked improvement in adjusted R^2 versus the total sample. 47% of the variance in compound annual growth in PPPPC-GDP for Cluster 2 is explained by the significant predictors Initial GDP, Macroeconomic environment and R&D innovation. For Cluster 3, 51% of the variance in compound annual growth in PPPPC-GDP is explained by the significant predictors Macroeconomic environment and Technological readiness.

While Macroeconomic environment' (pillar 3) is significant for the total sample as well as Cluster 2 and 3, the regression model for the total sample does not capture other significant variables identified for the clusters. It is also noteworthy that Initial PPPPC-GDP was only identified as a significant predictor for Cluster 2, with a negative association on PPPPC-GDP growth, potentially indicative of the convergence theory explained in Chapter 2.

The adjusted R^2 values for both Clusters 2 (47%) and 3 (51%) are reasonably improved over that for the total sample (32%), indicating that the grouping of countries into reasonably homogeneous competitiveness clusters has quite substantially improved the explanatory power of their resultant regression models over that for the total sample.

5.5. Hypothesis 3: Cluster regressions using the flows in twelve competitiveness pillar scores improve upon cluster regression on the stocks of the twelve competitiveness pillars

The third hypothesis sought to establish whether analysing flows in competitiveness (as measured by changes in the stocks of competitiveness over the 2007-2013 period), rather than the stocks themselves (as was the case for Hypothesis 2), could further improve the explanatory power of national competitiveness performance on economic growth performance.

The regressions performed on the total sample and the three clusters for testing of Hypothesis 2 were used as the baseline against which to compare for evidence of improvements in the explanatory power of the regression models, as measured by adjusted R^2 values. In a similar fashion, a forward stepwise multiple regression analysis was performed, and the regression models were specified in the same way, except that the twelve GCI pillars were incorporated as CAGRs over 2007-2013, rather as arithmetic means.

Diagnostics were run on regressions obtained for the total sample and the three clusters, as specified in Section 4.6.3. The Cook's D statistic for one country, Timor-Leste, revealed a high level of leverage on the regression model obtained for Cluster 1 (D>0.1) (refer to Appendix 6. This outlier had been identified during the preliminary descriptive statistics phase (refer to the discussion in Section 5.1 and the large distortion in the GCI pillar 10 score range in Figure 6) but the outlier was not removed at that stage. Due to this high influencing result, it was decided to remove the observation from the data set for the remaining regressions.

Thus, the regressions were re-performed for the total sample of 117 countries, and Cluster 1's remaining 20 countries (and subsequent diagnostics revealed no further concerns for leverage, or the residuals). Table 7 presents a summary of the results for the sample without Timor-Leste, details of which are included in Appendix 7. These are compared with the results for Hypothesis 2, as were shown in Table 6, on the original 118 country sample.

Table 7: Results of forward stepwise multiple regression analysis on total sample and three clusters, using arithmetic means (left panel) (left panel) and CAGRs (right panel) of twelve GCI competitiveness pillar scores and initial PPPPC-GDP (2007-2013) as possible predictors

	Regression using arithmetic means of GCI scores (as per Table 6)				**Regression using CAGRs of GCI scores (117 countries)**			
	Total sample	Cluster 1	Cluster 2	Cluster 3	Total sample	Cluster 1	Cluster 2	Cluster 3
Observations	118	21	73	24	117	20	73	24
Intercept (α)	0.0059	-	-0.0377	0.0695	0.0478	-	0.0682	0.0428
Adjusted R^2	0.31	-	0.47	0.51	0.42	-	0.59	0.87
Initial PPPPC-GDP (2007)**	-	-	-0.0207*	-	-0.0075*	-	-0.0169*	-0.0041*
1: Institutions	-	-	-	-	0.3257*	-	0.3091*	-
2: Infrastructure	-	-	-	-	-	-	-	0.3258*
3: Macroeconomic environment	0.0091*	-	0.0112*	0.0117*	0.1613*	-	-	0.2276*
4: Health & primary education	-	-	-	-	-	-	0.8942*	-
5: Higher education & training	-	-	-	-	-	-	-	-
6: Goods market efficiency	-	-	-	-	-	-	-	-
7: Labour market efficiency	-0.0097*	-	-	-	-	-	-	-0.3674*
8: Financial market development	-	-	-	-	-	-	-	-
9: Technological readiness	-	-	-	-0.0206*	-	-	-	-0.2898*
10: Market size	-	-	-	-	0.3791*	-	0.9866*	0.7839*
11: Business sophistication	-	-	-	-	-	-	-	-
12: R&D innovation	-	-	0.0148*	-	-	-	-	-

** Variables enter the model at a significance level of p<0.05 and those that remain in the model, shown in the table, are significant at p<0.1*
***Variable specified in the model as Initial PPPPC-GDP divided by 10,000*

The regression model for the total sample delivered a higher adjusted R^2 value, which increased from 31% when using arithmetic means (representing stocks) of competitiveness scores to 42% when using CAGRs (representing flows), showing an improvement in the model's ability to explain association in the compound annual growth in PPPPC-GDP of the sample's countries with the significant variables which entered the model. While the change (flow) in Macroeconomic environment (pillar 3), as measured by the CAGR in GCI scores, remained significant at $p<0.1$ in both regression models for the total sample, further significant flow variables entered the model: Initial GDP (again negatively associated with PPPPC-GDP growth), Institutions (pillar 1) and Market size (pillar 10). In particular, Market size was a significant predictor across all resulting clusters.

Once again, a regression model could not be obtained for Cluster 1, since no variables met the specified significance level of $p<0.05$ to enter the model, so no comparison of the means and CAGR approach is possible.

The regression model obtained for Cluster 2, however, revealed an improved adjusted R^2 value of 59% versus the stock variable approach's 47%. The flow model identified certain variables not accommodated in the regression model for the total sample as being significant to the explanation of Cluster 2 PPPPC-GDP growth, including Institutions (pillar 1) and Health and primary education (pillar 4).

Finally, for Cluster 3, six of thirteen variables were identified as significant in the flow regression model, dramatically increasing the adjusted R^2 to 87%. Three significant variables were identified as being negatively associated with this cluster's PPPPC-GDP growth in the context of the total set of significant predictors.

The results of these regression models indicate improvements in adjusted R^2 for the total sample and clusters 2 and 3, for their corresponding results using arithmetic means representing stocks of competitiveness.

5.6. Hypothesis 4: Regressions based on clusters formed by the twelve GCI pillars improve explanatory power for purchasing power parity GDP *per capita* growth rate as compared with regressions based on the WEF's purchasing power parity GDP *per capita* segments

The fourth hypothesis sought to establish whether clustering countries into groups exhibiting homogeneous competitiveness patterns improved the explanatory power of national competitiveness performance on economic growth performance, as compared with the traditional approach of segmenting countries along the lines of arbitrarily chosen thresholds for exogenous variables which are co-variant with economic growth, such as Initial PPPPC-GDP (as in the case of the WEF's GCI).

New forward stepwise regressions were performed on the five WEF segments, using the CAGR approach as for testing of Hypothesis 3. These formed a baseline for comparison with the cluster regressions obtained for Hypothesis 3. Evidence of improvements in the explanatory power of the regression models was measured by comparing adjusted R^2 values.

Diagnostics were run on regressions obtained for the WEF segments, as specified in Section 4.6.3, and all results were satisfactory (included with the regression results in Appendix 8). Table 8 presents a summary of the results. These are compared with the results for Hypothesis 3.

Table 8: Results of forward stepwise multiple regression analysis on total sample and five WEF segments (right panel) and three clusters (left panel), using CAGRs of twelve GCI competitiveness pillar scores and initial PPPPC-GDP (2007-2013) as possible predictors

	Regression using CAGRs of GCI scores on clusters (as per Table 7)				**Regression using CAGRs of GCI scores on 5 WEF segments**					
	Total sample	Cluster 1	Cluster 2	Cluster 3	Total sample	Stage 1	Transition Stage 1/2	Stage 2	Transition Stage 2/3	Stage 3
Observations	117	20	73	24	117	35	13	22	14	33
Intercept (α)	0.0478	-	0.0682	0.0428	0.0478	-	0.0317	0.0518	0.0262	0.0273
Adjusted R^2	0.42	-	0.59	0.87	0.42	-	0.29	0.19	0.59	0.64
Initial PPPPC-GDP (2007)**	-0.0075*	-	-0.0169*	-0.0041*	-0.0075*	-	-	-	-	-
1: Institutions	0.3257*	-	0.3091*	-	0.3257*	-	0.8153*	-	-	-
2: Infrastructure	-	-	-	0.3258*	-	-	-	-	-	-
3: Macro. Environment	0.1613*	-	-	0.2276*	0.1613*	-	-	-	-	0.1570*
4: Health & primary edu	-	-	0.8942*	-	-	-	-	0.8628*	-	-
5: Higher edu & training	-	-	-	-	-	-	-	-	-	-
6: Goods market efficiency	-	-	-	-	-	-	-	-	-	-
7: Labour market efficiency	-	-	-	-0.3674*	-	-	-	-	0.4907*	-
8: Fin. market development	-	-	-	-	-	-	-	-	-	-
9: Tech. readiness	-	-	-	-0.2898*	-	-	-	-	-	-0.4075*
10: Market size	0.3791*	-	0.9866*	0.7839*	0.3791*	-	-	-	-	0.6789*
11: Bus. Sophistication	-	-	-	-	-	-	-	-	-	-
12: R&D innovation	-	-	-	-	-	-	-	-	-0.7964*	-

** Variables enter the model at a significance level of $p<0.05$ and those that remain in the model, shown in the table, are significant at $p<0.1$*
***Variable specified in the model as Initial PPPPC-GDP divided by 10,000*

The regression model for the total sample remains unchanged from that obtained for Hypothesis 3, since both the sample and the regression model specification were identical.

Direct comparison of the clusters and WEF segments was done sparingly, since the underlying members are not identical. However, as highlighted in Section 5.2, Cluster 1 bears many similarities with WEF Stage 1, as does Cluster 3 with WEF Stage 3.

WEF Stage 1 exhibits the same non-result as Cluster 1, since no variables met the specified significance level of $p<0.05$ to enter the regression model.

The significant variables obtained for WEF Stage 3 bear resemblances to those of Cluster 3: Macroeconomic environment, Technological readiness and Market size are all significant, and their coefficients are all of the same sign. However, the adjusted R^2 value of 87% for Cluster 3 is clearly superior to WEF Stage 3's 64%, possibly as a result of other predictor variables included in the regression model on the basis of more homogeneity in competitiveness performance among the cluster members.

While comparisons between Cluster 2 and the remaining WEF segments (Transition Stage 1/2, Stage 2 and Transition Stage 2/3) was not possible, it was noted that Cluster 2's adjusted R^2 value of 59% was equal to the highest adjusted R^2 value of these three WEF segments, indicating that none of these WEF segments yielded better explanatory power for PPPPC-GDP growth than did Cluster 2.

Tentative comparison of the WEF segment regression models with the cluster regression models indicated that the cluster models produced higher adjusted R^2 values, representing better explanatory power for PPPPC-GDP growth than the WEF GDP *per capita* threshold segmentation approach to explaining economic growth.

5.7. Summary

The purpose of the research was to assess whether the explanatory power of economic growth regressions could be improved by assessing patterns of national competitiveness among countries. The competitiveness patterns of interest were twofold: relating specifically to differing natures of competitiveness performance, as assessed by the formation of homogeneous clusters based on twelve GCI pillar scores, and relating to the flow of competitiveness over time. Four research objectives and correspondingly four hypotheses were framed, to investigate the association between economic growth and national competitiveness patterns.

Results indicated that unpacking the different ways in which countries compete to sustain high productivity, and approaching the research problem as a dynamic system in which competitiveness flows are not subservient to competitiveness stocks, both go a considerable way to improving our understanding of the determinants of economic growth.

Chapter 6 follows with a discussion of the results.

6. Discussion

"... the world we live in is not an ergodic world; it is a non-ergodic world... If I say the world is ergodic, I mean that it has a stable underlying structure, such that we can develop theory that can be applied time after time, consistently.... the world with which we are concerned is continually changing, is continually novel. That does not mean that there are not ergodic aspects of the world. But we cannot develop theory that can be used over and over again and over time."

\- *Douglass C. North*

6.1. Introduction

The economic growth modeling literature has in the past two decades turned its attention toward exploring whether traditional views of the drivers of economic growth hold for all countries. Durlauf and Johnson (1995) spearheaded the effort to explore cross-country heterogeneity by modeling separate growth regressions for different groups of countries, and a number of methodological techniques have been since employed for this purpose, including GDP *per capita* thresholds (for example, Canarella & Pollard, 2004; WEF, 2012) and geographical location (for example, Easterly & Levine, 1997). Most recently, cluster analysis has emerged as a means to overcome the subjective segmentation of countries into distinct groups using observable, but somewhat arbitrarily defined thresholds.

This research pursued the cluster analysis line of research, employing the WEF's widely publicised and influential annual GCI as a data source to examine underlying patterns in the way countries compete, and how that might better explain economic growth trends. The research further concerned itself with an analysis of whether stocks of competitiveness adequately explained economic growth, or whether changing competitiveness dynamics provided improved regression relationships than past competitiveness performance alone.

Promising results for the given sample were achieved on all fronts. These are discussed in the context of the research objectives, as tested by the four stated hypotheses.

6.2. Hypothesis 1: Countries group dissimilarly according to the twelve pillars of competitiveness when compared with grouping according to GDP per capita

The first hypothesis sought to establish whether countries segmented by an endogenous, data-driven clustering approach on competitiveness scores would group differently than the typical approach of segmenting countries into different categories based on exogenous variables such as GDP *per capita* thresholds, an approach that the WEF adopts in its GCI. The null hypothesis was stated as:

H_0: Countries group similarly according to the twelve pillars of competitiveness when compared with grouping according to GDP *per capita*

As discussed in Section 5.1, three clusters were formed. These were visually compared with the five WEF five segments derived from their 'Stages of development' model (WEF, 2012) to assess differences and similarities in country membership.

A striking result from the cluster analysis was how closely the clusters were aligned with continental boundaries, which supports the likes of Easterly and Levine's (1997) geography-delimited economic growth study, but contrasts with the findings of Baştürk *et al.* (2012). For the given sample over the given time period, Cluster 1 was largely confined to Africa, Cluster 2 encompassed most of Asia and South America, and Cluster 3 was mainly composed of North American and European countries. The WEF segments were less geographically confined; in particular continents like Asia and

South America were found to host countries from most segments of the ‘Stages of development’ model. Deviations from the continental pattern in the clusters included northern Africa (which joined Cluster 2), Asian territories such as Japan, South Korea, Malaysia and Taiwan (which joined Cluster 3), and southern European countries including Italy, France, Portugal and Greece (which joined Cluster 2).

A further lens of political and/or economic associations can be used to analyse the country grouping patterns for similarities and differences between the two approaches. For instance, in the WEF segmentation, the initial members of the European Union (which constitute southern, western and northern Europe, geographically) all classify as innovation-driven economies, due to their high PPPPC-GDP levels. This is not the case for the cluster results, since Greece, Italy, France and Portugal clustered separately from their traditional European Union neighbours.

In the same vein, another country association, BRICS (Brazil, Russia, India, China and South Africa) is analysed. In the WEF segmentation Brazil, China and South Africa are grouped together (in the same PPPPC-GDP bracket), with India in the bottom segment and Russia one PPPPC-GDP bracket higher. This does not accord with the clustering approach of the research, where Brazil, Russia, India and China were members of Cluster 2, and South Africa a member of Cluster 1.

Some similarities are apparent. Figure 5 demonstrates that the three formed clusters have distinct average total GCI scores and equally distinct average PPPPC-GDP values, suggesting some alignment with GDP *per capita* segmentation principles. The maps in Figure 11 and Figure 12 show that North America, much of the European Union, some Far East Asian countries and a number of African countries, align in terms of grouping in the highest or lowest categories: Cluster 1 and Cluster 3 appear to show a similar country membership with WEF Stage 1 and Stage 3 segments respectively. It is particularly in Cluster 2 that significant differences arise, with countries from all five WEF segments represented in Cluster 2.

Weighing up similarities and differences, from visual inspection it is concluded that the country grouping outcomes are sufficiently different from each other to confidently reject the null hypothesis. Hence the alternative hypothesis is upheld and leads to the conclusion that the cluster results present different groupings than the WEF 'Stages of development' approach, based on the sample and time period analysed.

Beyond the hypothesis test which met the first research objective, the comparison of the two country groupings lends itself to interesting inferences based on the wealth of a country (measured by its mean PPPPC-GDP) contrasted with its competitiveness score (for simplicity, consider the country mean total GCI score). Although, as discussed in Section 4.1, causal analysis was beyond the scope of the research, if one accepts the general premise of economic growth theory literature that variables of a national competitiveness-type nature have been identified as drivers of GDP *per capita* growth (for example, Sala-i-Martin *et al*., 2004; Salimans, 2012), then the construction of a simple regression between a cluster's members' mean PPPPC-GDP values and their mean total GCI scores might reveal anomalies worthy of explanation (Porter *et al.*, 2007).

Countries with a higher PPPPC-GDP than their competitiveness score suggests ought to be the case, may not be able to sustain economic growth in the near- to mid-term. For instance, from Figure 11 and Figure 12 countries like Greece, Portugal and Italy rank in the highest GDP *per capita* segment (WEF Stage 3) but not in the cluster with highest average competitiveness score, hinting at possible future structural adjustments. From other segments, countries like Russia, South Africa, Argentina, Botswana and Slovenia may also fall into this scenario. Conversely, countries with lower PPPPC-GDP than their competitiveness score suggests ought to be the case, may demonstrate upside potential on their economic growth potential in the near- to mid-term (Porter *et al.*, 2007). From Figure 11 and Figure 12 countries like Nepal, Malaysia, Kazakhstan, China and Tajikistan fall into this category. Further detailed case research into instances such as these may shed more light on the nature of the influence of national competitiveness performance on economic growth.

6.3. Hypothesis 2: Regressions based on clusters formed by the twelve GCI pillars improve explanatory power for purchasing power per capita GDP growth rate as compared to the equivalent regression for the heterogeneous total set of countries

The second hypothesis sought to establish whether regression models built on clusters formed by comparatively homogenous competitiveness patterns would improve upon the weak relationships typically found in regression models built for the heterogeneous total set of countries. The null hypothesis was stated as:

H_0: Regressions based on clusters formed by the twelve GCI pillars do not improve explanatory power for purchasing power *per capita* GDP growth rate as compared to the equivalent regression for the heterogeneous total set of countries

Table 6 presents the results of the total sample and three cluster regressions. Comparison of adjusted R^2 values between the sample and the clusters was used as the basis to establish whether the clusters formed from comparatively homogeneous competitiveness patterns improved the resulting explanatory power of the economic growth regressions models that were constructed.

As explained in Section 5.3, an adjusted R^2 value of 32% was obtained for the total sample. This compared with no regression model being formed for Cluster 1, but marked improvements in adjusted R^2 values for Clusters 2 (47%) and 3 (51%).

The most similar literature comparison for this regression model specification is the Baştürk *et al*. (2012) study: both that study and this research recognise the potential improvements that could be realised in economic growth models if countries are grouped in accordance with the underlying patterns in the predictor variables (competitiveness performance) rather than the conventional approach of exogenously separating the data on *a priori* thresholds of the dependent variable (GDP *per capita*).

Both studies therefore performed cluster analysis to separate countries into homogeneous groups (in the Baştürk *et al*. (2012) instance, only developing countries are considered), and both employ means of various possible predictor variables of competitiveness-related metrics to construct regression models. Baştürk *et al*. (2012) concluded that their clusters formed on a developing country data set were different than conventional segmentation approaches, in that they followed no geographical boundaries, had no discernable differences in their mean GDP *per capita* or GDP *per capita* growth rates. That study did not however draw any comparisons on the economic growth explanatory power of its clustering approach with its result for the total data set; its emphasis lay in analysing partial regression coefficients to make inferences about the structural differences in drivers of economic growth among the two clusters.

This research differs from Baştürk *et al*. (2012) in some of its conclusions, in that the research finds some similarities with certain conventional approaches to country segmentation such as geographical location, and even mean GDP *per capita* thresholds. It cannot be concluded whether these differences are based on selected research methodologies and their respective limitations, or whether some more fundamental factor is at play. This research did not attempt, as Baştürk *et al*. (2012) did, to interpret partial regression coefficients, but emphasised the improvement in explanatory power of the regression models as the goal of the analysis.

The non-result obtained for Cluster 1 finds potential support in the literature. Durlauf, Kourtellos and Minkin (2001) find that heterogeneity in the coefficients of significant growth predictor variables was strongest for their GDP *per capita* segment of poorest countries (Appendix 7) lists least-developed countries as members of Cluster 1). This suggests that even after seemingly homogenising country groupings for competitiveness at the cluster level, much variability in underlying competitiveness performance may yet exist among Cluster 1 countries, rendering it difficult to identify uniformly significant predictor variables for most members. Furthermore Canarella and Pollard (2004) concluded that convergence in GDP *per capita* was evident for countries in the top three quartiles of their sample, but that the bottom (poorest) quartile behaved in a divergent manner, requiring an alternate theoretical paradigm to explain that quartile's result. These observations highlight the need for further detailed research into the nature of competitiveness and economic growth drivers for these poorest countries.

Thus, while no model was obtained for Cluster 1, on the basis of the significant improvement in the models for Clusters 2 and 3, as measured by comparison of their adjusted R^2 values with that for the total sample, the null hypothesis was rejected. It was concluded that regressions formed on clusters which take account of heterogeneity in the way countries compete, is a methodological enhancement to improving understanding of economic growth differences among countries, except for the poorest of nations.

Beyond meeting the second research objective, a further observation is noteworthy from the resulting regressions. An initial indication is provided on the extent of explanatory power which the GCI's competitiveness pillars confer on homogeneous clusters for economic growth. If it is accepted that the GCI scores are based on equal quality of data for developed and emerging countries and therefore measure equally accurately and reliably the underlying variables of the GCI metric (which may not be a reasonable assumption), then the result that the adjusted R^2 value for Cluster 3 (mainly developed nations) is higher than the adjusted R^2 value for Cluster 2 (mainly developing nations) and that a regression model for Cluster 1 (including numerous least developed countries) cannot be obtained may have political significance.

Durlauf *et al.* (2001) suggest that the Solow growth model "better capture[s] growth variation for richer than poorer economies" (p. 934), and Cammack (2006) opines that the true reasons for promoting a global notion of national competitiveness are to firmly entrench "the disciplines of capitalist competition" upon non-Western nations (p. 3). More is said on this point in Section 6.4.

6.4. Hypothesis 3: Cluster regressions using the flows in twelve competitiveness pillar scores improve upon cluster regression on the stocks of the twelve competitiveness

pillars

The third hypothesis sought to establish whether analysing flows in competitiveness (as measured by changes in the stocks of competitiveness over the 2007-2013 period), rather than the stocks themselves (as was the case for Hypothesis 2), could further improve the explanatory power of national competitiveness performance on economic growth performance. The null hypothesis was stated as:

H_0: Regressions using the flows in twelve competitiveness pillar scores for clusters do not improve upon regressions for clusters on the stocks of the twelve competitiveness pillars

The baseline for assessment of this methodological improvement was the set of regression models constructed for Hypothesis 2, which used arithmetic means of competitiveness variables (representing countries' existing stocks of competitiveness) as the predictors for PPPPC-GDP growth. Evidence of improvement in the explanatory power of regression models built using the flows of competitiveness variables (representing countries' changes in stocks of competitiveness) was assessed by comparing the adjusted R^2 values for the total sample under the 'flow model' approach with its 'stock model' counterpart in Hypothesis 2, and similar comparisons for each of the three clusters.

The sparse literature on the topic of flow and stock variables in economic growth models (discussed in Section 2.6) prompted the investigation, as did Douglass North's perspective on economic theory's tendencies to focus on 'ergodic' theory which place more emphasis on the continuation of past trends (in this research, operationalised as the accumulation of stocks of competitiveness, which happens over long periods of time) than on changing realities (in this research, operationalised as the flows of competitiveness, reflecting present-day improvements or declines in the accumulated stocks of competitiveness) (North, 1999).

Table 7 presents a summary of the results. The regression model for the total sample delivered a higher adjusted R^2 value, which increased from 31% when using arithmetic means (representing stocks) of competitiveness scores to 42% when using CAGRs (representing flows), to explain compound annual growth in PPPPC-GDP. As with the model specification for Hypothesis 2, a regression model could not be obtained for Cluster 1. The regression model obtained for Cluster 2 yielded an improved adjusted R^2 value of 59% versus the stock variable approach's 47%, identifying additional variables as being significant to the explanation of Cluster 2's PPPPC-GDP growth. For Cluster 3, six of thirteen variables were identified as significant predictors in the flow regression model, dramatically increasing the adjusted R^2 value to 87%.

The results may provide some insights on the question of why less-developed countries that rank at the bottom end of the GCI's scoreboard are achieving higher growth rates than countries with higher competitiveness scores (a trend that is also evident from the cluster descriptive statistics displayed in Table 5). WEF (2009) notes that its concept of competitiveness captures both static (stock) and dynamic (flow) components, since the level of productivity of a country "determines its ability to sustain its *level* of income... [and] is one of the key factors explaining an economy's *growth potential"* (p. 4). Yet, the results from these regression models built on flows of competitiveness (as measured by CAGRs in the GCI's twelve pillar scores) demonstrate that mean GCI scores (and hence, current country rankings on the GCI) may explain current national levels of GDP *per capita* adequately but not economic growth potential. Consequently, closer attention must be paid as to how competitiveness scores (or ranks) have changed over time and not the static scores themselves, if insights on economic growth prospects are to be understood.

Thus, the regression results supported the premise that flows in country competitiveness can improve the explanatory power of economic growth outcomes over a stocks-only regression model specification. The null hypothesis was rejected in favour of the alternate hypothesis, and it was concluded that the flows in competitiveness scores improved the explanation of PPPPC-GDP growth over an approach that considers only the stocks of competitiveness.

As highlighted in Section 6.3, a similar trend in adjusted R^2 values emerges when looking at the explanatory power of GCI competitiveness variables for PPPPC-GDP growth: Cluster 1 competitiveness scores do not allow a model to be constructed under the current specification, Cluster 2 shows reasonable strength in the GCI-PPPPC-GDP association, and Cluster 3 demonstrates an excellent model to explain the economic growth of (mostly) Western developed economies as a function of the WEF's competitiveness construct, for the given sample.

This again aligns with the Durlauf *et al.* (2001) result, and while the finding cannot be generalised to all other samples, it lends potential credence to Cammack's (2006) critique of the imposition of Western notions of capitalism on other economies. At a practical level, this unanticipated research finding merits further study – preferably by developing countries themselves – to develop more useful indicators to explain their economic growth prospects, which may not feature all, or even many, of the types of competitiveness indicators used in this research.

6.5. Hypothesis 4: Regressions based on clusters formed by the twelve GCI pillars improve explanatory power for purchasing power parity GDP per capita growth rate as compared with regressions based on the WEF's purchasing power parity GDP per capita segments

The fourth and final hypothesis sought to establish whether clustering countries into groups exhibiting homogeneous competitiveness patterns improved the explanatory power of national competitiveness performance on economic growth performance, as compared with the traditional approach of segmenting countries along the lines of arbitrarily chosen thresholds for exogenous predictors which are co-variant with economic growth, such as Initial PPPPC-GDP (as in the case of the WEF's GCI). The null hypothesis was stated as:

H_0: Regressions based on clusters formed endogenously by the twelve GCI pillars do not improve explanatory power for purchasing power parity GDP *per capita* growth rate as compared with regressions based on the WEF's exogenously formed purchasing power parity GDP *per capita* segments

Forward stepwise regression models were specified for the five WEF segments, using the same 'flow model' approach for testing of Hypothesis 3. The resulting WEF segment regressions formed a baseline for comparison with the cluster regressions obtained for Hypothesis 3. Evidence of improvements in the explanatory power of the regression models was measured by comparing adjusted R^2 values.

The regression model for the total sample remains unchanged from that obtained for Hypothesis 3, since both the sample and the regression model specification were identical.

In-depth comparison was not possible, given the differing number and membership of the WEF segments and the research clusters. Section 5.5. describes similarities between Cluster 1 and WEF Stage 1, and Cluster 3 and WEF Stage 3.

Aligned with findings for hypotheses 2 and 3, a regression model for WEF Stage 1 was not obtainable. The regression model for Cluster 3 is similar to that for WEF Stage 3 in terms of some of the significant variables specified and the sign on their coefficients, but Cluster 3 achieved a much higher adjusted R^2 value of 87% compared to WEF Stage 3's 64%.

Also of interest is the difference in results obtained for the predictor Initial PPPPC-GDP – whereas this was identified as a significant predictor for the total sample and both clusters for which regression models could be obtained, Initial PPPPC-GDP did not emerge as an important predictor for any of the WEF segments. This is unusual in light of the fact that the segments are specified on GDP *per capita* thresholds. Since this finding cannot be generalised due to the limitations on the sample, it cannot be concluded that this result will be repeatable for other samples on this data set over different time periods. Yet, there is merit in future explorations of whether there is any value to the WEF's 'Stages of development' segmentation if it is demonstrated not to be a significant predictor of economic growth, as these regression results have shown.

Cluster 2 could not be directly compared with the three remaining WEF segments, yet it was noted that Cluster 2's adjusted R^2 value of 59% was equal to the highest adjusted R^2 value of these three WEF segments, indicating that none of these yielded better explanatory power for PPPPC-GDP growth than did Cluster 2.

Tentative comparisons of regression models built on the WEF 'Stages of development' GDP *per capita* segmentations with the cluster regression models indicated that the cluster models produced higher adjusted R^2 values, representing better explanatory power for PPPPC-GDP growth. Cautiously, the null hypothesis was rejected in favour of the alternate hypothesis, and it was concluded that the cluster approach improved the explanation of PPPPC-GDP growth over the WEF's "Stages of development" country grouping.

6.6. Summary

Four hypotheses were formulated and tested to meet the overarching purpose of this research. These centred around the formation of homogeneous clusters of countries based on their underlying competitiveness patterns, and the specification of appropriate economic growth regression models to test the hypotheses. All four null hypotheses were rejected and consequently the alternate hypotheses are considered to hold for the given sample. It is concluded that the four stated research objectives have been met.

Country clusters formed from homogeneous national competitiveness performance are materially different in their membership than segments formed from a purely GDP *per* *capita* thresholds approach. Country clusters formed in this manner provide improved explanatory power for economic growth as a function of competitiveness predictors and initial GDP *per capita*, than an analysis at the aggregate heterogeneous sample level. Within these clusters, predictors specified as competitiveness flow variables, rather than competitiveness stocks variables, further improve the explanatory power of national competitiveness performance on economic growth performance. Lastly, the combined approach of these measures to specify growth regression models provides a much improved explanation of economic growth of sample countries than does *a priori* segmentation based on GDP *per capita* thresholds.

In combination, these findings demonstrate that an improved understanding of economic growth requires more detailed assessments of the patterns of national competitiveness exhibited by countries, both in terms of their differing natures of competitiveness performance, as well as in how their competitiveness performance evolves over time.

In addressing the research objectives, a number of areas for future research were uncovered, which could enhance understanding of how patterns of national competitiveness influence economic growth.

7. Conclusions and Recommendations

"Government's proper role is as a catalyst and challenger; it is to encourage – or even push – companies to raise their aspirations and move to higher levels of competitive performance, even though this process may be inherently unpleasant and difficult".

- *Michael E. Porter*

7.1. Conclusions

The purpose of the research was to establish whether the explanatory power of economic growth regressions can be improved by assessing patterns of national competitiveness among the world's countries, focusing on the differing natures of competitiveness performance among countries, and changes in competitiveness performance over time.

Four hypotheses were formulated and tested to meet the overarching purpose of this research.

The main finding is that there is value in examining the underlying patterns of national competitiveness performance if economic growth prospects are to be better understood. Segmenting countries along their underlying competitiveness performance similarities improves explanatory power of growth regressions against a one-size-fits-all approach on a heterogeneous country sample. The explanatory power can be even further enhanced by analysing the changes in a country's competitiveness performance, rather than overemphasising its past competitiveness capital.

The findings are even more pertinent for developing countries, particularly the least developed nations with lowest competitiveness scores. The results of this research echo those of Durlauf *et al.* (2001), in that economic growth regressions are poorly explained by traditional measures of competitiveness, and lend weight to emerging nations developing their own metrics to assess and improve on their competitiveness.

Business leaders

Discuss possible implications for multinationals looking to invest – should they be concerned about GCI results? How can it help them make FDI decisions? (or not) (Porter book chapter – speaks about FDI; perhaps bring back into Chapter 1? Additional reference! Also see in lit review find "foreign direct investment" – Berger & Bristow quote; search in folders for "political and economic determinants"… article speaks to FDI decisions

7.2. Recommendations

The findings of the research suggest that all stakeholders conducting assessments of economic growth (academics, business and political leaders alike) should analyse underlying competitiveness patterns if economic growth prospects of any nation are to be understood. This includes detailed assessment of performance along various competitiveness metrics, and their changes over periods of time.

Political analysts and leaders of developing nations are advised to consider their countries' scores and rankings on global competitiveness indices such as the GCI with circumspection. There is merit, as in Brand South Africa's approach (Brand South Africa, 2013), to developing customised competitiveness indices to better understand the drivers of a country's economic growth potential.

The above holds equally for business leaders and investors seeking to make resource allocation decisions: global competitiveness metrics may be deceptive, and these indices may not be reasonable proxies for economic growth prospects.

7.3. Future Research

In addressing the research objectives, two key areas for future research were uncovered, which could enhance understanding of how patterns of national competitiveness influence economic growth.

The finding that conventional economic growth regressions do not adequately explain economic growth implies much further work is needed to understand what confers competitiveness on developing nations, and how this affects their economic growth prospects.

The work could be extended to look at significant partial regression coefficients in more detail, and towards interpreting the extent to which marginal changes in these variables affect economic growth.

Given the limitations on the sample and time period selected, the study should be repeated with more years of data, when they are made available, in order to test the reliability of the findings.

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Appendices

1. Independent and dependent variables for research sample
2. Results of cluster analysis
3. Regression model results for Hypothesis 2
4. Arithmetic means of twelve competitiveness variables, initial PPPPC-GDP (07) and CAGR in PPPPC-GDP (07-13), arranged by cluster
5. CAGRs of twelve competitiveness variables, initial PPPPC-GDP (07) and CAGR in PPPPC-GDP (07-13), arranged by cluster
6. Regression model results for Hypothesis 2 on the total dataset – with Timor-Leste
7. Regression model results for Hypothesis 2 – without Timor-Leste
8. CAGRs of twelve competitiveness variables, initial PPPPC-GDP (07) and CAGR in PPPPC-GDP (07-13), arranged by five WEF segments

Appendix 1: Independent and dependent variables for research sample

Summary of country mean PPPPC-GDP (07-13) and CAGR PPPPC-GDP (07-13), and aggregate GCI scores as means (07-13) and CAGRs (07-13)

Country	arithmetic mean PPPPC-GDP 07-13	CAGR PPPPC-GDP (07-13)	Total GCI score arithmetic mean (07-13)	Total GCI score CAGR (07-13)
Albania	7420	4.34%	3.747	1.58%
Algeria	7138	2.81%	3.875	-0.89%
Argentina	16219	5.64%	3.928	-0.61%
Armenia	5446	1.67%	3.818	0.66%
Australia	40057	2.69%	5.149	-0.20%
Austria	40601	1.93%	5.170	0.20%
Azerbaijan	9718	5.98%	4.228	1.16%
Bahrain	29519	-2.11%	4.508	1.14%
Bangladesh	1799	6.69%	3.620	-0.28%
Barbados	24904	1.11%	4.407	-0.22%
Belgium	37016	1.19%	5.124	0.50%
Benin	1593	2.23%	3.589	0.88%
Bolivia	4619	4.40%	3.594	1.11%
Bosnia and Herzegovina	7910	2.68%	3.703	0.48%
Botswana	15575	3.38%	4.083	-0.35%
Brazil	11229	4.09%	4.204	1.29%
Bulgaria	13377	3.33%	4.075	1.19%
Burkina Faso	1272	4.56%	3.298	0.31%
Burundi	588	3.36%	2.824	0.58%
Cambodia	2142	5.86%	3.636	2.57%
Cameroon	2227	2.53%	3.518	1.44%
Canada	39841	1.61%	5.329	-0.25%
Chad	1817	3.13%	2.854	1.37%
Chile	16636	4.57%	4.721	-0.62%
China	7655	10.29%	4.730	0.99%
Colombia	9821	4.36%	4.111	0.33%
Costa Rica	11534	3.85%	4.221	1.14%
Croatia	18045	0.58%	4.111	-0.47%
Cyprus	27482	-0.69%	4.396	0.25%
Czech Republic	26418	1.52%	4.590	-0.57%
Denmark	37085	0.64%	5.451	-0.82%
Dominican Republic	8824	4.68%	3.717	0.43%
Ecuador	8075	4.58%	3.678	1.42%
Egypt	6224	3.36%	3.945	-1.23%
El Salvador	7482	1.62%	3.992	-1.71%

Estonia	20278	1.00%	4.667	-0.63%
Ethiopia	1018	7.42%	3.460	1.42%
Finland	35499	0.91%	5.472	0.12%
France	34464	1.16%	5.159	-0.31%
Georgia	5298	5.04%	3.877	1.38%
Germany	36831	2.46%	5.444	-0.01%
Greece	27045	-2.62%	4.015	-1.09%
Guatemala	4986	1.90%	3.931	1.29%
Guyana	7193	5.37%	3.521	2.11%
Honduras	4394	2.10%	3.884	0.74%
Hong Kong SAR	46998	3.71%	5.338	0.15%
Hungary	19273	1.21%	4.325	-0.72%
Iceland	38993	0.32%	4.880	-1.30%
India	3393	6.97%	4.341	-0.57%
Indonesia	4425	6.11%	4.305	0.83%
Ireland	41787	-0.03%	4.908	-0.57%
Israel	30289	2.93%	5.031	-0.78%
Italy	30145	-0.26%	4.377	0.33%
Jamaica	8944	0.74%	3.879	-0.94%
Japan	34593	1.73%	5.406	-0.34%
Jordan	5737	3.32%	4.286	-0.54%
Kazakhstan	12453	5.44%	4.180	0.46%
Kenya	1703	2.79%	3.722	0.11%
Korea Rep.	29856	4.19%	5.117	0.17%
Kuwait	41191	1.73%	4.603	-0.43%
Kyrgyz Republic	2289	4.66%	3.407	0.28%
Latvia	16682	1.80%	4.274	-0.47%
Lesotho	1821	5.52%	3.363	-1.60%
Lithuania	18803	2.52%	4.416	-0.28%
Luxembourg	80296	-0.08%	4.976	0.44%
Macedonia FYR	10048	3.55%	3.925	0.99%
Madagascar	953	0.56%	3.387	0.17%
Malaysia	15529	4.28%	5.027	-0.31%
Mali	1069	1.16%	3.340	0.77%
Malta	25051	2.31%	4.304	0.67%
Mauritania	1986	3.01%	3.218	0.51%
Mauritius	14239	5.09%	4.255	0.68%
Mexico	14466	2.16%	4.252	0.51%
Mongolia	4515	9.82%	3.697	0.69%
Morocco	4833	5.12%	4.094	0.29%
Mozambique	1034	6.81%	3.193	0.02%
Namibia	7149	4.17%	3.974	-0.48%
Nepal	1200	4.42%	3.405	0.19%
Netherlands	41311	1.27%	5.393	0.42%

New Zealand	27925	1.50%	4.986	0.04%
Nicaragua	3108	3.25%	3.536	0.93%
Nigeria	2443	5.80%	3.605	0.39%
Norway	53524	1.31%	5.194	0.29%
Pakistan	2747	2.23%	3.629	-1.34%
Panama	13174	7.76%	4.274	1.44%
Paraguay	5878	4.28%	3.451	1.20%
Peru	9483	6.37%	4.047	1.53%
Philippines	3934	4.01%	4.033	1.05%
Poland	19113	4.79%	4.388	0.29%
Portugal	23023	0.24%	4.429	-0.28%
Qatar	89467	5.51%	4.960	2.71%
Romania	12378	2.53%	4.067	0.36%
Russian Federation	16376	3.84%	4.206	0.25%
Singapore	55790	3.66%	5.538	0.64%
Slovak Republic	22608	3.68%	4.325	-1.51%
Slovenia	28504	0.53%	4.438	-0.54%
South Africa	10718	2.71%	4.392	-0.64%
Spain	30185	0.03%	4.613	-0.35%
Sri Lanka	5301	7.38%	4.090	1.44%
Sweden	39417	2.15%	5.532	0.26%
Switzerland	43737	1.64%	5.636	0.53%
Taiwan China	35330	4.19%	5.253	-0.21%
Tajikistan	1970	5.96%	3.555	1.07%
Tanzania	1525	6.28%	3.560	0.20%
Thailand	9253	4.35%	4.594	-0.86%
Timor-Leste	8002	10.33%	3.226	0.79%
Trinidad and Tobago	20159	1.31%	3.939	0.26%
Turkey	13710	3.53%	4.239	1.23%
Uganda	1323	4.21%	3.458	0.70%
Ukraine	7162	2.37%	4.013	0.43%
United Arab Emirates	48398	-0.23%	4.778	1.99%
United Kingdom	36220	0.61%	5.365	-0.35%
United States	47832	1.58%	5.590	-0.98%
Uruguay	14025	6.56%	4.088	0.97%
Venezuela	12686	1.82%	3.559	-1.51%
Vietnam	3165	6.28%	4.126	0.07%
Zambia	1532	5.88%	3.495	3.06%
Zimbabwe	483	3.99%	3.074	0.24%

Country arithmetic means for twelve GCI pillar scores, 07-13

Country	p1	p2	3	4	5	6	7	8	9	10	11	12
Albania	3.523	2.820	4.482	5.652	3.577	3.921	4.338	3.701	3.222	2.813	3.476	2.373
Algeria	3.347	3.120	5.949	5.515	3.398	3.477	3.403	2.815	2.620	4.286	3.055	2.630
Argentina	2.954	3.330	4.843	5.768	4.356	3.395	3.481	3.309	3.395	4.871	3.881	2.992
Armenia	3.541	3.223	4.615	5.296	3.658	3.810	4.622	3.680	2.892	2.602	3.387	2.807
Australia	5.528	5.456	5.592	6.366	5.503	5.133	4.990	5.599	5.242	5.064	4.744	4.416
Austria	5.459	5.717	5.339	6.296	5.367	5.151	4.652	4.849	5.302	4.588	5.560	4.685
Azerbaijan	3.871	3.756	5.588	5.077	3.792	4.012	4.755	3.938	3.350	3.470	3.856	3.356
Bahrain	4.867	4.826	5.714	6.008	4.450	4.915	4.561	5.202	4.403	2.810	4.260	3.025
Bangladesh	3.077	2.243	4.545	4.894	2.652	3.911	4.020	4.082	2.494	4.365	3.457	2.557
Barbados	5.138	5.217	4.020	6.402	4.977	4.203	4.609	4.784	4.665	1.959	4.192	3.393
Belgium	5.012	5.610	4.837	6.528	5.651	5.138	4.404	4.958	5.200	4.790	5.347	4.737
Benin	3.563	2.508	4.655	4.549	3.003	3.771	4.102	3.689	2.577	2.367	3.390	2.994
Bolivia	2.893	2.571	4.877	5.296	3.553	3.196	3.450	3.338	2.434	3.142	3.185	2.467
Bosnia and Herzegovina	3.174	2.670	4.693	5.647	3.613	3.615	4.161	3.763	3.029	3.123	3.308	2.628
Botswana	4.732	3.707	4.960	4.256	3.611	4.019	4.467	4.591	3.079	2.851	3.480	3.013
Brazil	3.549	3.554	4.009	5.449	4.184	3.835	4.144	4.332	3.790	5.576	4.532	3.500
Bulgaria	3.248	3.211	5.176	5.750	4.117	4.003	4.404	4.059	3.700	3.849	3.576	2.941
Burkina Faso	3.717	2.288	4.223	3.307	2.536	3.787	4.270	3.474	2.506	2.549	3.162	2.948
Burundi	2.841	2.055	3.107	3.850	2.199	3.136	4.140	2.524	2.178	1.515	2.888	2.350
Cambodia	3.501	2.799	4.059	4.683	2.836	4.104	4.677	3.476	2.693	3.168	3.482	2.795
Cameroon	3.269	2.305	5.019	4.105	2.961	3.762	4.041	3.284	2.632	3.167	3.366	2.862
Canada	5.425	5.941	5.202	6.481	5.551	5.173	5.350	5.394	5.430	5.441	5.039	4.837
Chad	2.681	1.769	4.234	2.995	2.179	2.903	3.955	2.857	2.180	2.480	2.953	2.489
Chile	4.885	4.658	5.819	5.595	4.515	4.850	4.767	4.806	4.128	4.333	4.471	3.448
China	4.109	4.251	6.130	5.860	4.064	4.359	4.556	3.868	3.284	6.731	4.312	3.798
Colombia	3.521	3.244	4.929	5.542	4.032	3.949	4.224	4.078	3.338	4.595	4.090	3.181
Costa Rica	4.213	3.221	4.260	5.982	4.453	4.366	4.669	3.983	3.733	3.381	4.460	3.633
Croatia	3.672	4.275	4.851	5.878	4.328	3.938	4.128	4.048	3.964	3.627	3.842	3.232
Cyprus	4.795	4.970	4.846	6.416	4.718	4.789	4.433	4.907	4.298	2.903	4.368	3.456
Czech Republic	3.814	4.498	5.188	5.998	4.965	4.657	4.651	4.472	4.595	4.478	4.629	3.915
Denmark	5.950	5.909	5.683	6.418	5.861	5.238	5.453	5.329	5.864	4.272	5.531	5.036
Dominican Republic	3.170	3.016	4.488	4.895	3.451	3.861	4.118	3.634	3.382	3.608	3.772	2.680
Ecuador	2.985	2.971	5.337	5.445	3.340	3.408	3.496	3.428	2.899	3.744	3.505	2.569
Egypt	3.995	3.754	3.507	5.402	3.570	3.918	3.263	3.699	3.145	4.725	3.927	3.003
El Salvador	3.431	4.025	4.741	5.402	3.452	4.306	4.268	4.138	3.162	3.239	3.916	2.587
Estonia	4.848	4.599	5.638	6.158	5.175	4.846	4.864	4.752	5.156	3.017	4.278	3.749
Ethiopia	3.787	2.612	4.021	4.004	2.616	3.742	4.277	3.219	2.343	3.524	3.157	2.672
Finland	6.055	5.745	5.784	6.657	6.073	5.117	4.843	5.442	5.541	4.186	5.453	5.611
France	5.010	6.399	4.853	6.359	5.334	4.817	4.260	4.967	5.243	5.746	5.301	4.682
Georgia	3.789	3.480	3.979	5.511	3.707	4.068	4.705	3.813	2.955	2.808	3.281	2.630
Germany	5.536	6.516	5.257	6.132	5.395	5.069	4.411	4.990	5.359	5.989	5.832	5.306
Greece	3.875	4.449	3.768	6.004	4.574	4.079	3.703	3.904	3.816	4.483	3.969	3.122
Guatemala	3.245	3.574	4.629	5.227	3.311	4.200	4.072	4.143	3.275	3.495	4.141	2.949

Guyana	3.287	2.776	3.265	5.515	3.628	3.909	4.003	3.712	2.911	1.940	3.612	2.658
Honduras	3.395	3.255	4.555	5.369	3.304	3.954	3.798	4.062	2.980	3.137	3.721	2.740
Hong Kong SAR	5.629	6.505	6.013	6.085	4.969	5.610	5.652	6.022	5.788	4.719	5.159	4.148
Hungary	3.901	4.134	4.565	5.856	4.685	4.266	4.376	4.314	4.273	4.312	4.025	3.574
Iceland	5.544	5.607	4.046	6.601	5.654	4.764	5.353	4.412	5.844	2.431	4.881	4.577
India	4.146	3.483	4.343	5.127	4.013	4.392	4.140	4.936	3.271	6.126	4.606	3.735
Indonesia	3.885	3.255	5.085	5.483	4.010	4.539	4.304	4.291	3.163	5.231	4.420	3.564
Ireland	5.238	4.520	4.757	6.374	5.216	5.246	4.900	4.708	5.103	4.211	5.016	4.414
Israel	4.741	4.757	4.862	6.176	5.054	4.699	4.840	5.352	5.151	4.275	4.996	5.384
Italy	3.625	4.427	4.421	6.203	4.569	4.261	3.664	3.799	4.404	5.648	4.849	3.471
Jamaica	3.645	3.673	3.059	5.350	3.893	4.208	4.319	4.468	3.805	2.808	3.889	3.061
Japan	5.049	5.868	4.254	6.316	5.225	5.092	5.071	4.721	5.167	6.127	5.842	5.588
Jordan	4.697	4.213	4.200	5.752	4.379	4.439	4.020	4.354	3.551	3.229	4.101	3.254
Kazakhstan	3.670	3.496	5.472	5.373	4.186	4.122	4.935	3.671	3.378	4.098	3.639	2.999
Kenya	3.322	2.882	3.847	4.439	3.620	4.047	4.540	4.702	2.979	3.463	4.052	3.407
Korea Rep.	4.338	5.634	6.081	6.234	5.448	4.795	4.420	4.400	5.424	5.512	5.042	4.966
Kuwait	4.394	4.280	6.493	5.664	3.957	4.327	4.555	4.405	3.645	3.661	4.263	3.007
Kyrgyz Republic	2.926	2.476	3.413	5.182	3.669	3.613	4.360	3.474	2.429	2.526	3.185	2.292
Latvia	3.945	4.016	4.824	5.870	4.780	4.361	4.651	4.484	4.117	3.182	3.890	3.074
Lesotho	3.348	2.335	4.855	3.690	2.859	3.814	4.103	3.443	2.483	1.929	3.121	2.545
Lithuania	4.000	4.390	4.967	5.892	4.975	4.342	4.517	4.183	4.409	3.537	4.264	3.391
Luxembourg	5.647	5.533	5.961	6.123	4.548	5.357	4.625	5.498	5.773	3.157	4.951	4.376
Macedonia FYR	3.562	3.194	5.147	5.690	3.916	4.016	4.082	3.989	3.322	2.814	3.451	2.881
Madagascar	3.202	2.318	3.717	4.848	2.702	3.786	4.369	3.061	2.542	2.727	3.298	2.903
Malaysia	4.900	5.171	5.275	6.128	4.701	5.037	4.840	5.450	4.311	4.680	4.977	4.293
Mali	3.552	2.632	4.466	3.301	2.660	3.742	3.933	3.242	2.605	2.552	3.214	2.976
Malta	4.743	4.414	4.818	6.130	4.625	4.552	4.027	5.241	4.903	2.450	4.224	3.297
Mauritania	3.432	2.349	3.839	4.110	2.274	3.461	3.894	2.989	2.657	2.131	3.220	2.501
Mauritius	4.516	4.201	4.347	5.778	4.022	4.630	4.290	4.806	3.646	2.709	4.252	2.998
Mexico	3.502	3.721	5.247	5.718	3.933	4.085	3.929	4.034	3.469	5.510	4.140	3.104
Mongolia	3.146	2.299	4.954	5.260	3.790	3.876	4.567	3.410	2.917	2.323	3.103	2.846
Morocco	3.979	3.674	4.943	5.454	3.544	4.150	3.537	3.932	3.339	4.053	3.819	3.025
Mozambique	3.306	2.388	4.005	3.339	2.447	3.554	3.908	3.261	2.639	2.887	3.150	2.697
Namibia	4.429	4.361	5.174	4.357	3.149	4.070	4.450	4.540	3.085	2.571	3.570	2.806
Nepal	3.119	1.889	4.674	4.622	2.691	3.700	3.632	3.691	2.429	3.037	3.211	2.413
Netherlands	5.658	5.900	5.419	6.428	5.607	5.282	4.788	5.165	5.902	5.075	5.569	4.904
New Zealand	5.916	4.751	5.305	6.571	5.508	5.288	5.140	5.652	5.051	3.836	4.691	4.107
Nicaragua	3.161	2.520	3.950	5.266	3.146	3.673	4.012	3.589	2.590	2.807	3.278	2.527
Nigeria	3.321	2.237	5.002	3.309	3.079	4.176	4.344	4.225	2.869	4.423	3.969	3.093
Norway	5.794	5.031	6.080	6.369	5.557	4.938	4.957	5.444	5.687	4.287	5.126	4.589
Pakistan	3.423	2.947	3.828	4.233	2.860	4.001	3.634	4.177	2.818	4.658	3.818	3.078
Panama	3.818	4.237	5.019	5.677	3.892	4.366	4.112	4.964	3.842	3.185	4.251	3.126
Paraguay	2.761	2.221	4.315	5.255	2.980	3.801	3.727	3.727	2.678	3.090	3.266	2.199
Peru	3.420	3.024	4.974	5.326	3.815	4.210	4.345	4.505	3.286	4.265	3.996	2.726

Philippines	3.332	2.900	4.856	5.296	4.050	4.072	3.961	4.006	3.276	4.651	4.148	2.909
Poland	3.896	3.356	4.848	6.060	4.810	4.296	4.479	4.453	3.920	5.041	4.137	3.286
Portugal	4.553	5.197	4.450	6.141	4.710	4.413	3.990	4.379	4.688	4.368	4.259	3.736
Qatar	5.465	4.706	6.065	6.330	4.677	4.848	4.865	5.036	4.477	3.464	4.669	3.969
Romania	3.518	2.935	4.621	5.643	4.307	4.057	4.137	4.097	3.677	4.415	3.739	3.025
Russian Federation	3.138	3.945	5.288	5.701	4.431	3.747	4.528	3.359	3.435	5.690	3.537	3.259
Singapore	6.086	6.357	5.713	6.409	5.646	5.710	5.788	5.908	5.687	4.405	5.173	5.143
Slovak Republic	3.724	3.953	5.112	5.925	4.453	4.528	4.612	4.762	4.377	3.987	4.174	3.157
Slovenia	4.296	4.649	5.336	6.253	5.158	4.519	4.300	4.186	4.561	3.473	4.469	3.723
South Africa	4.469	4.190	4.932	4.029	4.071	4.676	4.094	5.359	3.631	4.871	4.489	3.610
Spain	4.368	5.548	4.941	6.037	4.823	4.449	3.999	4.503	4.693	5.461	4.679	3.595
Sri Lanka	3.927	3.655	3.567	5.875	3.950	4.385	3.766	4.323	3.145	3.774	4.383	3.465
Sweden	5.913	5.714	5.861	6.453	5.848	5.263	4.750	5.360	6.086	4.585	5.699	5.483
Switzerland	5.822	6.247	5.940	6.375	5.705	5.289	5.776	5.286	5.848	4.511	5.794	5.646
Taiwan China	4.776	5.535	5.585	6.433	5.616	5.187	4.811	4.602	5.280	5.172	5.271	5.240
Tajikistan	3.735	2.632	3.511	5.173	3.339	3.646	4.334	3.180	2.584	2.491	3.285	2.926
Tanzania	3.786	2.436	4.152	4.260	2.568	3.841	4.345	3.952	2.615	3.277	3.496	3.027
Thailand	4.064	4.696	5.388	5.577	4.315	4.552	4.831	4.492	3.552	5.023	4.327	3.384
Timor-Leste	3.149	1.950	5.267	3.953	2.645	3.414	4.116	2.900	2.362	1.249	2.904	2.287
Trinidad and Tobago	3.601	3.914	5.332	5.676	4.019	3.947	4.202	4.563	3.586	2.776	3.886	2.965
Turkey	3.788	3.933	4.641	5.543	4.004	4.403	3.603	4.177	3.728	5.163	4.256	3.218
Uganda	3.340	2.389	4.227	3.810	2.807	3.744	4.779	3.898	2.751	3.155	3.428	2.987
Ukraine	3.098	3.505	4.245	5.590	4.442	3.719	4.424	3.693	3.209	4.624	3.679	3.198
United Arab Emirates	5.287	5.848	5.828	5.911	4.569	5.074	4.892	4.673	4.783	4.240	4.825	3.718
United Kingdom	5.269	5.794	4.793	6.307	5.400	5.119	5.312	5.439	5.682	5.787	5.393	4.799
United States	4.782	5.914	4.540	6.054	5.662	5.116	5.662	5.242	5.458	6.901	5.557	5.703
Uruguay	4.574	3.936	4.434	5.789	4.343	4.110	3.869	3.859	3.707	3.166	3.724	3.116
Venezuela	2.407	2.676	4.298	5.491	3.886	3.023	3.164	3.266	3.125	4.388	3.233	2.602
Vietnam	3.747	3.108	4.652	5.526	3.487	4.127	4.572	3.939	3.206	4.578	3.801	3.260
Zambia	3.896	2.533	4.055	3.728	2.861	4.014	4.006	4.446	2.745	2.570	3.469	2.894
Zimbabwe	3.236	2.658	2.370	4.134	3.152	3.345	3.507	3.756	2.455	2.084	3.262	2.617

Country CAGRs for twelve GCI pillar scores, 07-13

Country	p1	p2	3	4	5	6	7	8	9	10	11	12
Albania	3.51%	11.43%	-2.23%	-1.27%	5.40%	3.79%	1.39%	-2.39%	6.71%	-1.10%	1.07%	3.94%
Algeria	-5.28%	1.47%	-2.31%	-2.12%	0.18%	-3.31%	-3.81%	-4.05%	1.86%	-0.18%	-3.58%	-5.64%
Argentina	-1.13%	1.16%	-2.67%	-1.17%	0.71%	-2.29%	-0.74%	-0.36%	4.32%	-0.09%	-1.08%	-0.73%
Armenia	2.57%	5.58%	-1.36%	-0.76%	3.28%	2.02%	0.47%	2.81%	5.25%	-1.85%	1.63%	-0.81%

Australia	-0.88%	0.36%	-0.69%	0.16%	0.44%	-1.66%	-0.84%	-1.55%	1.24%	-0.01%	-0.68%	1.13%
Austria	-1.45%	0.71%	-0.27%	0.02%	0.04%	-1.35%	0.80%	-0.93%	2.17%	-0.25%	-0.25%	1.80%
Azerbaijan	1.81%	2.08%	2.46%	-0.87%	1.83%	2.08%	1.17%	-0.93%	7.05%	-1.13%	0.60%	0.93%
Bahrain	3.45%	3.35%	-1.69%	-0.48%	3.97%	2.11%	3.25%	-1.53%	3.42%	0.19%	1.63%	3.48%
Bangladesh	1.97%	-0.65%	-2.23%	-0.14%	1.98%	0.90%	-0.89%	-2.16%	3.76%	-1.17%	0.36%	-1.27%
Barbados	0.22%	2.82%	-4.41%	-0.56%	0.95%	0.55%	0.79%	-2.03%	3.58%	-2.17%	1.43%	1.34%
Belgium	0.45%	0.31%	-1.04%	1.41%	0.72%	-0.18%	2.02%	-1.57%	2.83%	-0.36%	-0.55%	1.74%
Benin	1.30%	3.38%	0.00%	-0.21%	2.00%	0.31%	2.66%	-0.77%	4.45%	-1.08%	0.21%	1.35%
Bolivia	2.75%	5.73%	2.33%	-2.09%	1.80%	1.25%	-0.69%	0.82%	3.53%	0.29%	3.31%	4.57%
Bosnia and Herzegovina	2.97%	7.58%	-2.75%	-1.85%	3.87%	1.81%	-0.54%	-3.76%	8.99%	-1.48%	1.11%	2.49%
Botswana	1.13%	-0.15%	-3.34%	1.02%	0.99%	1.67%	0.14%	-1.22%	1.25%	0.20%	0.80%	0.92%
Brazil	1.95%	4.03%	4.15%	-1.75%	0.74%	0.50%	1.94%	1.82%	5.54%	0.18%	0.17%	-0.40%
Bulgaria	1.76%	4.41%	0.15%	-0.35%	1.15%	1.79%	1.64%	-0.71%	6.74%	-1.24%	1.05%	-0.10%
Burkina Faso	-0.58%	1.01%	1.38%	0.85%	0.43%	0.43%	0.92%	-1.86%	1.06%	-1.57%	-1.10%	-1.17%
Burundi	-2.13%	0.66%	4.22%	2.68%	-1.44%	1.83%	-0.98%	-3.02%	2.16%	-5.20%	-0.74%	-1.25%
Cambodia	3.59%	4.09%	1.88%	1.26%	4.73%	1.80%	0.07%	8.27%	6.43%	-2.28%	3.12%	3.82%
Cameroon	1.60%	4.92%	-1.11%	2.17%	2.14%	2.62%	2.69%	1.56%	2.50%	-1.62%	1.35%	1.46%
Canada	1.38%	-0.39%	-1.77%	0.05%	0.14%	-0.69%	0.76%	-1.13%	0.94%	-0.13%	-1.05%	-0.43%
Chad	1.45%	4.26%	1.93%	-2.78%	3.37%	2.42%	1.67%	0.00%	2.87%	2.83%	2.13%	3.93%
Chile	0.57%	0.27%	0.31%	-1.04%	1.02%	-0.72%	-0.64%	-0.30%	2.28%	0.12%	-1.24%	0.23%
China	2.82%	3.03%	-0.62%	1.24%	2.87%	0.58%	1.25%	6.04%	3.15%	0.05%	1.03%	1.55%
Colombia	-1.38%	3.02%	1.36%	-1.23%	1.68%	0.15%	-0.11%	0.34%	3.95%	-0.30%	-0.64%	-0.23%
Costa Rica	0.81%	5.85%	3.10%	-0.67%	2.63%	0.11%	-0.74%	-0.72%	4.92%	-1.60%	0.40%	0.25%
Croatia	-0.42%	3.78%	-0.53%	-0.52%	1.07%	-0.59%	-1.02%	-0.86%	5.04%	-1.24%	-2.07%	-0.78%
Cyprus	0.00%	0.79%	-4.68%	0.00%	1.69%	-0.03%	1.59%	-1.36%	4.29%	-1.61%	-0.21%	0.61%
Czech Republic	-0.98%	1.44%	-0.73%	-0.46%	-0.27%	-0.58%	-1.12%	-0.40%	2.45%	-0.17%	-1.26%	-0.69%
Denmark	-1.94%	-1.02%	-1.56%	-1.88%	-1.16%	-1.31%	-0.71%	-3.03%	1.52%	-0.91%	-0.57%	0.44%
Dominican Republic	0.70%	0.14%	-2.34%	-0.50%	2.65%	1.31%	0.03%	1.84%	3.60%	-1.04%	1.06%	0.78%
Ecuador	2.28%	4.89%	-1.03%	0.09%	4.64%	2.08%	-0.58%	1.77%	6.33%	0.94%	1.14%	2.38%
Egypt	-2.03%	0.34%	-2.24%	-2.09%	-2.11%	-0.83%	-0.82%	2.05%	3.89%	0.11%	-0.63%	-1.03%
El Salvador	-3.55%	-0.46%	-3.12%	-1.20%	0.12%	-0.72%	-2.62%	-0.91%	1.89%	-1.22%	-0.88%	-1.32%
Estonia	0.95%	1.39%	0.38%	-0.11%	-0.17%	-0.93%	1.26%	-0.90%	0.77%	-1.99%	-0.70%	1.07%
Ethiopia	2.18%	3.13%	-1.93%	4.70%	2.20%	1.60%	0.17%	-0.17%	2.32%	-0.94%	1.40%	1.74%
Finland	0.01%	-0.58%	-0.40%	0.42%	0.15%	-1.11%	1.05%	0.12%	1.27%	-0.63%	-0.39%	0.84%
France	-0.75%	-0.46%	-1.44%	-0.57%	-1.26%	-2.16%	1.36%	-0.06%	3.00%	-0.12%	-1.61%	0.40%
Georgia	2.94%	9.22%	0.37%	0.01%	1.40%	1.81%	1.59%	0.29%	8.05%	-1.25%	1.98%	-0.77%
Germany	-1.12%	-0.56%	1.74%	0.71%	1.33%	-1.26%	0.57%	-2.55%	2.46%	0.06%	-0.78%	0.16%
Greece	-4.05%	1.22%	-9.41%	-0.56%	0.73%	-1.46%	-0.33%	-4.34%	5.70%	-0.91%	-1.62%	-1.82%
Guatemala	1.30%	4.68%	-0.43%	-0.59%	3.32%	2.41%	2.07%	4.16%	4.78%	-0.94%	1.67%	1.38%
Guyana	3.62%	4.94%	5.21%	-1.72%	6.72%	1.64%	2.27%	1.93%	6.74%	-3.18%	3.33%	4.04%
Honduras	1.77%	2.05%	-0.22%	-1.18%	2.07%	2.92%	-1.97%	3.31%	5.94%	-0.99%	1.91%	1.70%
Hong Kong SAR	0.33%	1.29%	0.10%	0.20%	0.98%	-1.06%	0.17%	-1.01%	1.81%	0.27%	-0.59%	0.34%
Hungary	-2.17%	2.22%	2.17%	-0.94%	-0.69%	-0.56%	-0.87%	-2.04%	1.84%	-0.99%	-2.69%	-0.51%
Iceland	-2.40%	0.96%	-5.15%	-0.76%	-0.10%	-2.16%	-1.23%	-6.11%	0.72%	-2.88%	-1.29%	0.64%

India	-2.22%	1.03%	-1.18%	-0.64%	-1.10%	-1.49%	1.40%	0.48%	1.38%	0.12%	-2.21%	-2.05%
Indonesia	0.48%	4.91%	2.85%	0.86%	1.71%	-1.45%	-1.88%	-0.71%	4.14%	-0.44%	-0.11%	0.58%
Ireland	-0.19%	4.10%	-8.72%	0.21%	-0.08%	-0.75%	0.49%	-8.02%	3.72%	-0.96%	-0.24%	0.94%
Israel	-0.13%	0.21%	-0.64%	-1.92%	-1.30%	-1.96%	-1.11%	-2.15%	-0.99%	-0.57%	-0.39%	0.54%
Italy	-0.81%	4.42%	-1.76%	-0.51%	0.39%	-0.05%	0.78%	-1.69%	1.68%	-0.29%	0.18%	1.32%
Jamaica	-0.08%	0.14%	-4.31%	-2.69%	0.98%	-0.73%	-0.24%	-0.65%	0.10%	-0.69%	-0.74%	-1.31%
Japan	0.41%	-0.68%	-3.70%	0.52%	-0.35%	-0.74%	-1.01%	-0.68%	1.76%	-0.01%	-0.14%	-0.76%
Jordan	-0.48%	0.23%	-1.27%	-0.95%	0.79%	0.31%	-0.10%	-0.88%	4.01%	-1.50%	1.21%	0.33%
Kazakhstan	1.65%	4.08%	0.48%	-0.92%	0.70%	-0.13%	0.14%	-3.08%	6.38%	0.14%	-0.77%	-1.20%
Kenya	1.10%	4.29%	-4.53%	-0.47%	0.61%	0.42%	1.64%	0.39%	3.61%	-0.84%	0.16%	0.09%
Korea Rep.	-1.22%	2.16%	0.03%	0.61%	0.53%	-0.26%	-0.19%	-1.49%	0.85%	0.40%	-0.16%	0.64%
Kuwait	-0.89%	0.16%	0.07%	-1.83%	-0.86%	-0.88%	-2.69%	-3.09%	1.69%	3.09%	-1.89%	-0.78%
Kyrgyz Republic	1.04%	2.78%	-0.32%	-1.45%	0.77%	1.29%	0.38%	0.60%	4.89%	-1.56%	-0.24%	-2.36%
Latvia	0.23%	1.07%	-1.20%	-0.30%	-0.39%	-0.19%	0.71%	-1.49%	3.39%	-1.90%	-0.91%	0.91%
Lesotho	-0.60%	3.75%	-4.70%	-4.66%	-0.15%	2.27%	0.03%	-0.94%	1.84%	-5.46%	1.05%	-0.25%
Lithuania	0.93%	2.70%	-3.38%	-0.38%	0.71%	-0.08%	-0.05%	-1.99%	4.74%	-1.14%	-0.58%	0.76%
Luxembourg	0.40%	1.31%	0.35%	0.31%	1.16%	-0.32%	0.07%	-2.45%	2.75%	-1.46%	-0.35%	2.64%
Macedonia FYR	3.49%	4.80%	-0.99%	-1.55%	0.88%	3.02%	1.56%	0.22%	7.44%	-1.78%	0.31%	-0.93%
Madagascar	-1.88%	-0.33%	4.04%	-0.83%	0.79%	1.60%	0.65%	-2.38%	1.64%	-2.91%	0.00%	-0.42%
Malaysia	-0.79%	-0.80%	-0.41%	-0.45%	0.14%	-0.30%	-0.26%	-0.38%	0.44%	0.48%	-0.20%	-0.12%
Mali	-1.90%	4.51%	1.08%	0.05%	2.05%	1.30%	-0.45%	0.84%	4.73%	-1.84%	0.77%	0.10%
Malta	0.11%	4.09%	-1.03%	0.18%	2.24%	0.59%	1.45%	-0.69%	2.78%	-2.16%	1.27%	2.13%
Mauritania	-2.40%	7.43%	6.40%	-2.82%	-0.84%	1.25%	-1.98%	-1.65%	0.76%	-4.60%	0.07%	0.77%
Mauritius	1.71%	1.38%	0.53%	-0.60%	1.55%	1.17%	1.73%	-0.85%	3.42%	-1.82%	0.28%	-0.98%
Mexico	0.10%	2.14%	0.51%	-1.75%	0.93%	0.32%	0.54%	2.18%	3.03%	0.23%	0.68%	0.90%
Mongolia	1.56%	5.27%	-0.44%	-0.23%	0.72%	1.63%	1.05%	-1.40%	7.97%	0.57%	1.88%	0.47%
Morocco	1.59%	3.88%	-0.27%	-1.31%	0.38%	1.57%	2.18%	2.46%	4.60%	-0.70%	0.67%	-0.69%
Mozambique	1.01%	0.67%	-1.73%	0.45%	0.46%	2.18%	-1.11%	-0.96%	4.22%	-3.37%	1.00%	0.04%
Namibia	0.68%	-0.22%	-4.03%	-1.19%	-0.10%	0.73%	-0.32%	0.40%	2.88%	-2.26%	0.38%	0.99%
Nepal	0.71%	-0.24%	0.52%	-0.23%	1.45%	0.14%	0.49%	0.79%	1.65%	-2.70%	-0.19%	-0.90%
Netherlands	0.40%	0.81%	-1.55%	0.30%	0.61%	-0.14%	1.26%	-1.76%	1.30%	0.11%	0.21%	1.94%
New Zealand	0.95%	1.44%	-2.73%	-0.48%	0.81%	-0.64%	-0.03%	-1.72%	2.52%	-1.04%	-0.37%	1.18%
Nicaragua	1.32%	4.17%	1.18%	-0.57%	1.10%	1.52%	0.52%	0.10%	3.97%	-3.08%	1.28%	0.81%
Nigeria	-0.01%	-1.01%	1.38%	-1.79%	2.20%	0.09%	1.50%	-0.71%	3.73%	1.76%	0.42%	-0.70%
Norway	-0.15%	0.38%	0.99%	-1.13%	-0.03%	-0.83%	0.04%	-0.12%	1.44%	-0.03%	-0.15%	1.96%
Pakistan	-0.49%	-2.38%	-6.47%	0.43%	1.11%	-0.75%	-0.23%	-0.98%	2.26%	-0.52%	-0.48%	-0.41%
Panama	1.15%	4.24%	0.61%	-1.59%	1.93%	1.42%	0.65%	-0.03%	8.32%	0.96%	0.28%	2.33%
Paraguay	3.08%	4.32%	3.24%	-2.79%	2.23%	3.87%	2.05%	3.19%	6.13%	-1.49%	2.68%	2.33%
Peru	1.30%	5.48%	2.95%	-1.41%	1.69%	1.60%	2.07%	2.12%	3.39%	0.52%	-0.32%	-0.45%
Philippines	1.28%	3.23%	2.40%	-0.78%	1.83%	-0.30%	0.70%	2.20%	3.41%	-1.27%	0.37%	0.01%
Poland	2.05%	2.86%	-1.71%	-1.12%	0.64%	0.52%	0.17%	1.92%	5.43%	0.21%	0.12%	-0.87%
Portugal	-2.24%	2.19%	-3.78%	-0.97%	1.26%	-0.70%	-1.34%	-4.17%	4.29%	-0.79%	-0.24%	0.71%
Qatar	2.05%	4.19%	0.64%	-0.90%	2.82%	2.98%	1.07%	-0.19%	5.94%	6.31%	5.29%	6.27%
Romania	0.07%	2.89%	1.34%	-0.92%	0.73%	-0.74%	0.02%	0.34%	3.76%	-0.63%	-2.15%	-0.83%

Russian Federation	0.82%	5.56%	1.12%	-0.11%	1.10%	-0.94%	-0.81%	-1.39%	6.32%	0.54%	-1.68%	-1.72%
Singapore	0.41%	0.39%	0.57%	1.62%	1.38%	-0.54%	0.45%	-0.52%	1.59%	1.77%	-0.18%	1.32%
Slovak Republic	-2.38%	2.13%	-1.76%	0.25%	0.19%	-0.83%	-1.95%	-1.78%	1.31%	-0.66%	-0.74%	-2.31%
Slovenia	-0.85%	2.03%	-2.13%	-0.50%	0.38%	-0.67%	-0.83%	-5.16%	2.53%	-0.99%	-1.61%	1.04%
South Africa	-0.43%	-1.23%	-1.88%	-3.49%	-0.97%	-0.22%	-0.42%	1.72%	2.94%	-0.83%	-0.94%	-1.18%
Spain	-0.52%	1.90%	-4.79%	-0.81%	0.77%	-1.09%	-0.12%	-3.58%	3.55%	-0.20%	-1.13%	0.63%
Sri Lanka	3.87%	6.60%	-1.59%	0.16%	2.99%	0.83%	1.87%	1.78%	5.21%	-1.14%	3.13%	0.67%
Sweden	0.73%	0.36%	0.89%	-1.20%	-0.44%	-0.26%	1.23%	-0.01%	1.10%	-0.09%	-0.17%	0.91%
Switzerland	0.05%	0.06%	1.56%	0.42%	0.78%	0.09%	0.92%	0.32%	1.30%	-0.20%	0.21%	0.72%
Taiwan China	1.00%	1.15%	-0.71%	-0.80%	-0.19%	-0.18%	-0.13%	1.81%	0.25%	-0.02%	-0.84%	-1.23%
Tajikistan	2.42%	1.18%	-1.49%	0.16%	4.48%	2.42%	1.66%	1.56%	4.17%	-1.74%	3.63%	2.32%
Tanzania	-1.38%	-3.11%	-0.79%	3.98%	1.46%	-0.11%	0.84%	-0.39%	1.62%	0.99%	0.36%	-0.20%
Thailand	-2.16%	-0.25%	0.23%	-0.78%	-0.23%	-0.58%	-2.47%	-0.06%	-0.16%	-0.64%	-0.40%	-1.91%
Timor-Leste	2.78%	4.01%	0.95%	-0.97%	0.85%	3.28%	1.75%	-2.56%	2.87%	32.85%	1.37%	2.01%
Trinidad and Tobago	0.81%	5.33%	1.97%	-0.26%	1.83%	-0.06%	-0.91%	-2.47%	5.07%	-0.79%	-0.68%	-0.89%
Turkey	0.29%	4.24%	2.10%	-0.07%	0.46%	0.32%	1.21%	3.07%	4.69%	0.37%	-0.29%	0.14%
Uganda	1.41%	0.02%	-2.60%	3.88%	0.61%	1.23%	0.40%	2.99%	1.77%	-1.59%	0.60%	-0.59%
Ukraine	-0.03%	4.60%	-0.98%	0.41%	2.07%	0.31%	0.90%	-2.55%	6.07%	-0.91%	-0.12%	-0.12%
United Arab Emirates	1.73%	2.04%	0.59%	1.15%	3.20%	1.51%	1.67%	1.02%	3.72%	0.59%	1.72%	3.91%
United Kingdom	-0.27%	1.45%	-4.61%	-0.36%	0.03%	-1.23%	0.02%	-3.54%	1.67%	-0.13%	-0.60%	1.31%
United States	-1.64%	-0.93%	-3.30%	-0.39%	-0.23%	-2.11%	-1.29%	-2.34%	1.20%	0.21%	-1.37%	-0.92%
Uruguay	1.32%	3.68%	2.77%	0.26%	2.59%	1.74%	-2.65%	2.42%	6.97%	-0.78%	0.71%	0.97%
Venezuela	-0.47%	-0.25%	-5.60%	-1.70%	2.78%	-3.41%	-3.30%	-1.87%	2.16%	1.31%	-1.58%	-2.56%
Vietnam	-0.05%	4.20%	-3.95%	-0.04%	1.82%	0.71%	0.30%	1.31%	4.27%	-0.58%	-0.51%	-0.56%
Zambia	1.58%	4.32%	6.64%	1.48%	4.21%	5.82%	-0.21%	0.74%	3.10%	0.02%	5.52%	5.88%
Zimbabwe	1.90%	-2.11%	3.58%	0.18%	-0.56%	1.66%	-0.48%	-1.18%	3.13%	-9.00%	-0.73%	-1.66%

Appendix 2: Arithmetic means of twelve competitiveness variables, arranged by cluster

Cluster analysis based on arithmetic means (2007-2013) of each of 12 pillars

The CLUSTER Procedure
Ward's Minimum Variance Cluster Analysis

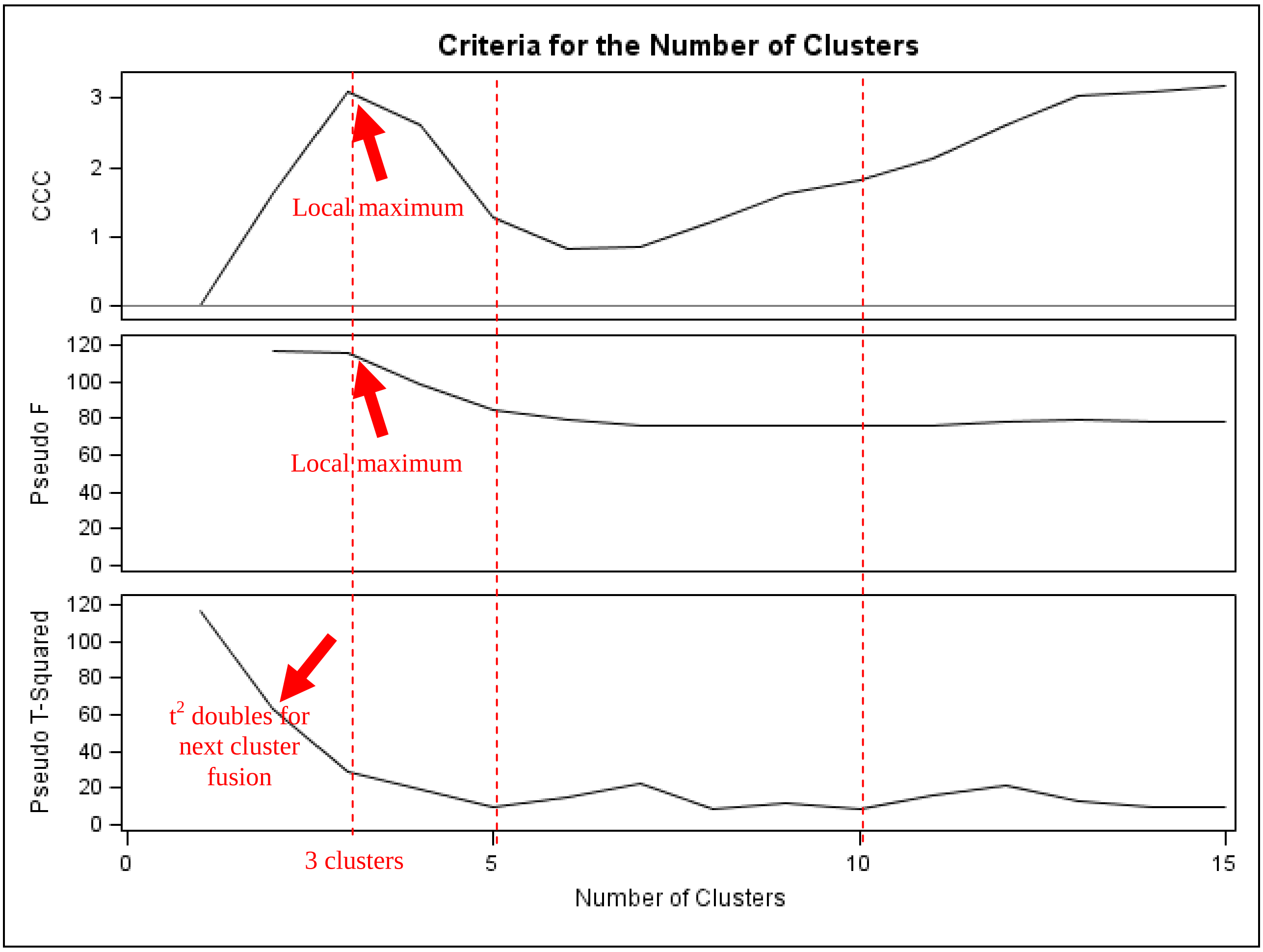
Eigenvalues of the Covariance Matrix				
	Eigenvalue	**Difference**	**Proportion**	**Cumulative**
1	14.7059430	8.2735768	0.6011	0.6011
2	6.4323662	3.1070149	0.2629	0.8641
3	3.3253513		0.1359	1.0000

Root-Mean-Square Total-Sample Standard Deviation	2.855618

Root-Mean-Square Distance Between Observations	6.994807

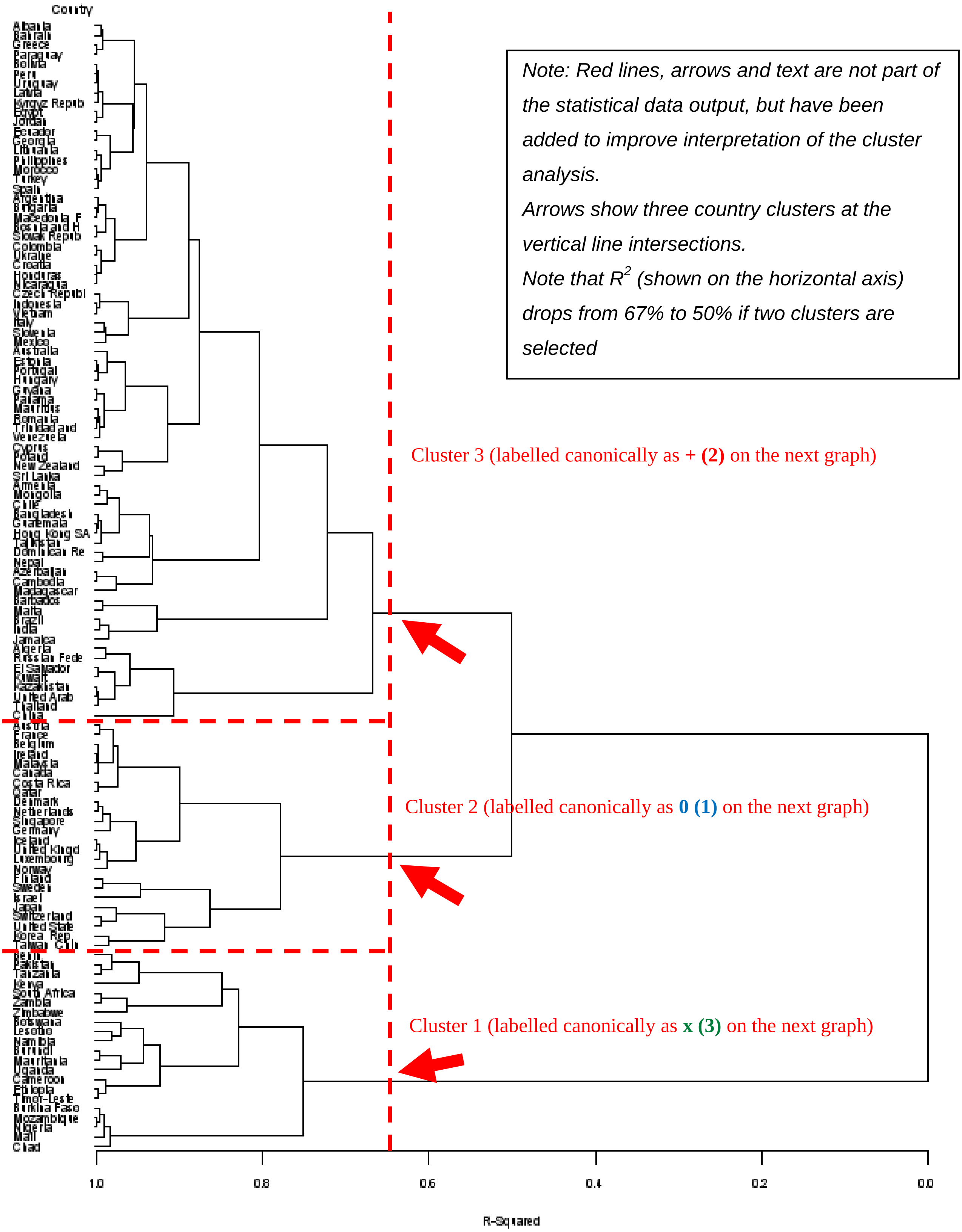
Cluster History										
NCL	**Clusters Joined**		**FREQ**	**SPRSQ**	**RSQ**	**ERSQ**	**CCC**	**PSF**	**PST2**	**Tie**
15	CL31	CL32	14	0.0049	.914	.894	3.18	78.4	9.5	
14	CL28	China	8	0.0066	.908	.887	3.08	78.6	9.7	
13	CL36	CL25	16	0.0070	.901	.879	3.05	79.3	13.1	
12	CL21	CL29	34	0.0107	.890	.870	2.62	77.9	21.6	
11	CL12	CL15	48	0.0129	.877	.859	2.13	76.3	15.8	
10	CL23	CL16	8	0.0136	.863	.847	1.81	75.9	8.2	
9	CL24	CL30	7	0.0149	.849	.833	1.61	76.3	11.5	
8	CL9	CL17	16	0.0198	.829	.816	1.22	76.0	8.3	
7	CL11	CL19	60	0.0241	.805	.795	0.85	76.2	22.4	
6	CL13	CL10	24	0.0259	.779	.768	0.83	78.8	15.0	
5	CL8	CL46	21	0.0281	.751	.734	1.27	85.0	9.8	
4	CL7	CL18	65	0.0288	.722	.685	2.60	98.6	19.7	

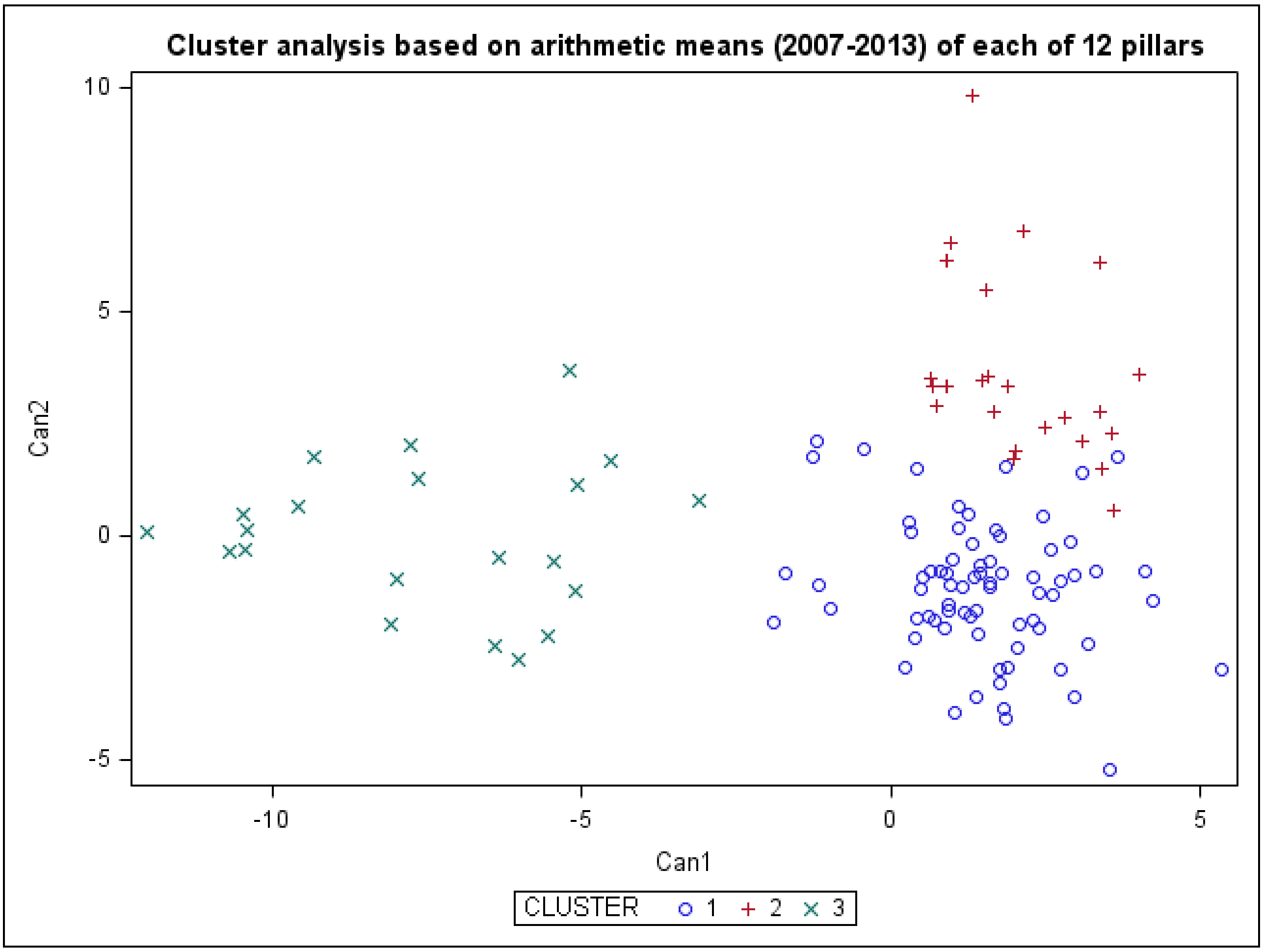
Cluster History										
NCL	**Clusters Joined**		**FREQ**	**SPRSQ**	**RSQ**	**ERSQ**	**CCC**	**PSF**	**PST2**	**Tie**
3	CL4	CL14	73	0.0538	.668	.611	3.09	116	29.0	
2	CL3	CL6	97	0.1669	.501	.458	1.63	117	63.6	
1	CL2	CL5	118	0.5012	.000	.000	0.00	.	117	



Note: Red lines, arrows and text are not part of the statistical data output, but have been added to improve interpretation of the graphs

Cluster analysis based on arithmetic means (2007-2013) of each of 12 pillars




Cluster analysis based on arithmetic means (2007-2013) of each of 12 pillars
Can2
10
5
0
-5
-10
-5
0
5
Can1
CLUSTER 1 2 3

Appendix 3: Results of regression model for Hypothesis 2

Relationship between CAGR of GDP_PPPPC for all countries and means of 12 pillars with PPPPC_07

The REG Procedure
Model: MODEL1
Dependent Variable: cagrppppc

Number of Observations Read	118
Number of Observations Used	118

Stepwise Selection: Step 1
Variable PPPPC_07 Entered: R-Square = 0.2591 and C(p) = 24.9307

Analysis of Variance					
Source	**DF**	**Sum of Squares**	**Mean Square**	**F Value**	**Pr > F**
Model	1	0.01714	0.01714	40.56	<.0001
Error	116	0.04902	0.00042260		
Corrected Total	117	0.06616			

Variable	**Parameter Estimate**	**Standard Error**	**Type II SS**	**F Value**	**Pr > F**
Intercept	0.04538	0.00270	0.11922	282.10	<.0001
PPPPC_07	-0.00736	0.00116	0.01714	40.56	<.0001

Stepwise Selection: Step 2
Variable meanp03 Entered: R-Square = 0.3152 and C(p) = 16.4022

Analysis of Variance					
Source	**DF**	**Sum of Squares**	**Mean Square**	**F Value**	**Pr > F**
Model	2	0.02086	0.01043	26.47	<.0001
Error	115	0.04531	0.00039397		
Corrected Total	117	0.06616			

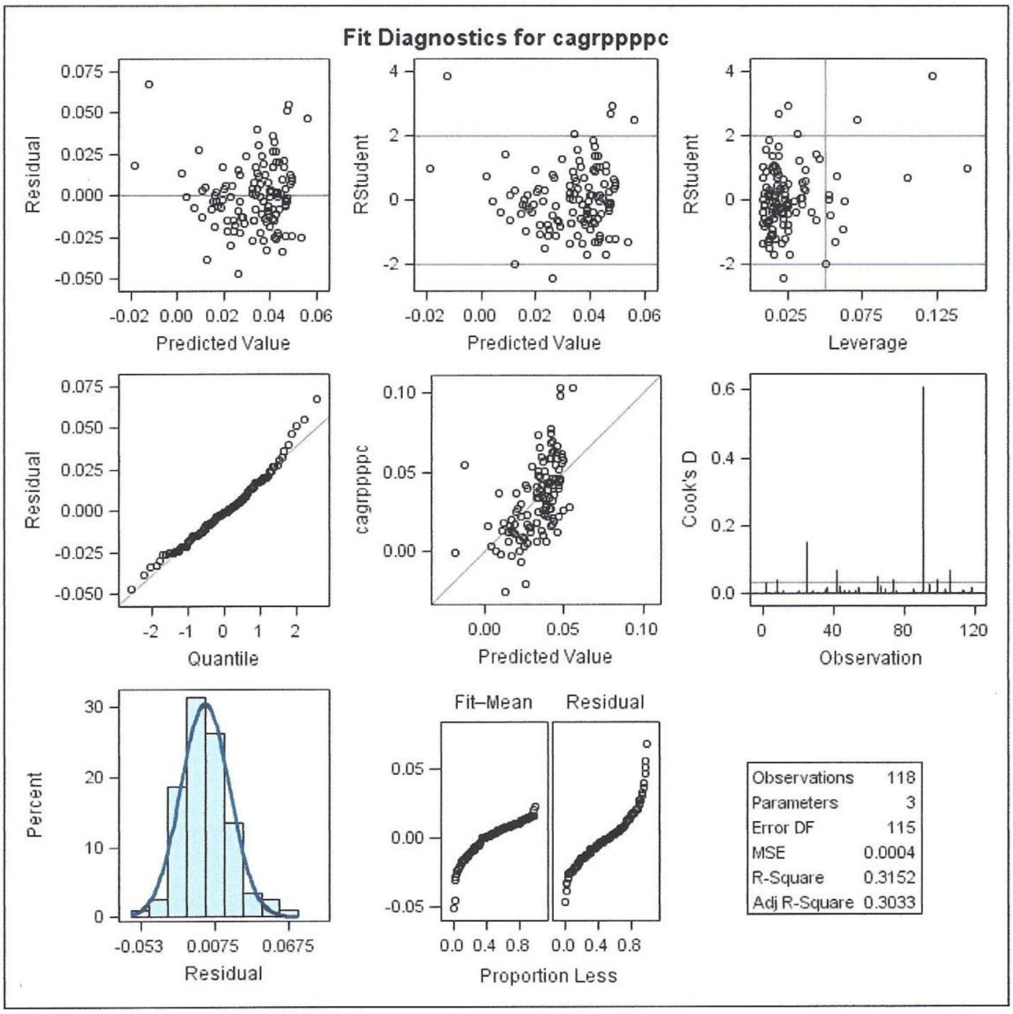
Variable	Parameter Estimate	Standard Error	Type II SS	F Value	Pr > F
Intercept	0.00585	0.01313	0.00007813	0.20	0.6569
meanp03	0.00906	0.00295	0.00372	9.43	0.0027
PPPPC_07	-0.00964	0.00134	0.02038	51.74	<.0001

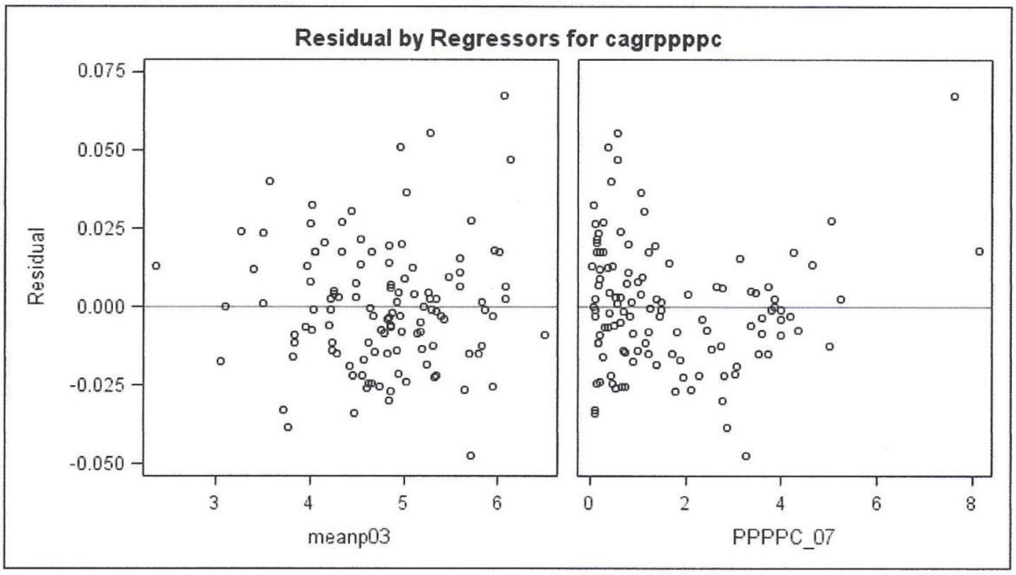
All variables left in the model are significant at the 0.1000 level.
No other variable met the 0.0500 significance level for entry into the model.

Summary of Stepwise Selection									
Step	Variable Entered	Variable Removed	Label	Number Vars In	Partial R^2	Model R^2	C(p)	F Value	Pr > F
1	PPPPC_07		PPPPC_07	1	0.2591	0.2591	24.9307	40.56	<.0001
2	meanp03			2	0.0561	0.3152	16.4022	9.43	0.0027

Relationship between CAGR of GDP_PPPPC for all countries and Means of 12 pillars

The REG Procedure
Model: MODEL1
Dependent Variable: cagrppppc




Residual by Regressors for cagrppppc
Residual
0.075
0.050
0.025
0.000
-0.025
-0.050
3
4
5
6
meanp03
0
2
4
6
8
PPPPC_07

Relationship between CAGR of GDP_PPPPC for Cluster 1 countries and means of 12 pillars with PPPPC_07

The REG Procedure
Model: MODEL1
Dependent Variable: cagrppppc

Number of Observations Read	21
Number of Observations Used	21

No variable met the 0.0500 significance level for entry into the model.

Relationship between CAGR of GDP_PPPPC for Cluster 2 countries and means of 12 pillars with PPPPC_07

The REG Procedure
Model: MODEL1
Dependent Variable: cagrppppc

Number of Observations Read	73
Number of Observations Used	73

Stepwise Selection: Step 1
Variable PPPPC_07 Entered: R-Square = 0.3575 and C(p) = 16.5646

Analysis of Variance					
Source	**DF**	**Sum of Squares**	**Mean Square**	**F Value**	**Pr > F**
Model	1	0.01615	0.01615	39.50	<.0001
Error	71	0.02903	0.00040885		
Corrected Total	72	0.04518			

Variable	**Parameter Estimate**	**Standard Error**	**Type II SS**	**F Value**	**Pr > F**
Intercept	0.05221	0.00371	0.08097	198.03	<.0001
PPPPC_07	-0.01357	0.00216	0.01615	39.50	<.0001

Stepwise Selection: Step 2
Variable meanp03 Entered: R-Square = 0.4464 and C(p) = 6.7267

Analysis of Variance					
Source	**DF**	**Sum of Squares**	**Mean Square**	**F Value**	**Pr > F**
Model	2	0.02017	0.01008	28.22	<.0001
Error	70	0.02501	0.00035732		
Corrected Total	72	0.04518			

Variable	Parameter Estimate	Standard Error	Type II SS	F Value	Pr > F
Intercept	-0.00045851	0.01609	2.90211E-7	0.00	0.9773
meanp03	0.01207	0.00360	0.00402	11.24	0.0013
PPPPC_07	-0.01719	0.00229	0.02015	56.39	<.0001

Stepwise Selection: Step 3
Variable meanp12 Entered: R-Square = 0.4911 and C(p) = 2.7664

Analysis of Variance					
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	3	0.02219	0.00740	22.20	<.0001
Error	69	0.02299	0.00033319		
Corrected Total	72	0.04518			

Variable	Parameter Estimate	Standard Error	Type II SS	F Value	Pr > F
Intercept	-0.03774	0.02169	0.00101	3.03	0.0863
meanp03	0.01115	0.00350	0.00339	10.16	0.0022
meanp12	0.01483	0.00602	0.00202	6.07	0.0163
PPPPC_07	-0.02069	0.00263	0.02067	62.03	<.0001

All variables left in the model are significant at the 0.1000 level.
No other variable met the 0.0500 significance level for entry into the model.

Summary of Stepwise Selection									
Step	Variable Entered	Variable Removed	Label	# Vars In	Partial R-Square	Model R-Square	C(p)	F Value	Pr > F
1	PPPPC _07		PPPPC _07	1	0.3575	0.3575	16.564 6	39.50	<.0001
2	meanp0 3			2	0.0889	0.4464	6.7267	11.24	0.0013
3	meanp1			3	0.0448	0.4911	2.7664	6.07	0.0163

Summary of Stepwise Selection									
Step	Variable Entered	Variable Removed	Label	# Vars In	Partial R-Square	Model R-Square	C(p)	F Value	Pr > F
	2								

Relationship between CAGR of GDP_PPPPC for Cluster 3 countries and means of 12 pillars with PPPPC_07

The REG Procedure
Model: MODEL1
Dependent Variable: cagrppppc

Number of Observations Read	24
Number of Observations Used	24

Stepwise Selection: Step 1
Variable meanp09 Entered: R-Square = 0.3405 and C(p) = 5.0309

Analysis of Variance					
Source	**DF**	**Sum of Squares**	**Mean Square**	**F Value**	**Pr > F**
Model	1	0.00182	0.00182	11.36	0.0028
Error	22	0.00352	0.00016007		
Corrected Total	23	0.00534			

Variable	Parameter Estimate	Standard Error	Type II SS	F Value	Pr > F
Intercept	0.10797	0.02610	0.00274	17.11	0.0004
meanp09	-0.01634	0.00485	0.00182	11.36	0.0028

Stepwise Selection: Step 2
Variable meanp03 Entered: R-Square = 0.5482 and C(p) = -0.8511

Analysis of Variance					
Source	**DF**	**Sum of Squares**	**Mean Square**	**F Value**	**Pr > F**
Model	2	0.00293	0.00146	12.74	0.0002
Error	21	0.00241	0.00011489		
Corrected Total	23	0.00534			

Variable	Parameter Estimate	Standard Error	Type II SS	F Value	Pr > F
Intercept	0.06950	0.02534	0.00086397	7.52	0.0122
meanp03	0.01165	0.00375	0.00111	9.65	0.0053
meanp09	-0.02063	0.00433	0.00260	22.66	0.0001

All variables left in the model are significant at the 0.1000 level.
No other variable met the 0.0500 significance level for entry into the model.

Summary of Stepwise Selection									
Step	Variable Entered	Variable Removed	Label	Number Vars In	Partial R-Square	Model R-Square	C(p)	F Value	Pr > F
1	meanp09			1	0.3405	0.3405	5.0309	11.36	0.0028
2	meanp03			2	0.2077	0.5482	-0.8511	9.65	0.0053

$$R^2(adj) = 1 - (1 - R^2)\frac{(n-1)}{(n-p)}$$

$$R^2(adj) = 1 - (1 - 0.5482)\frac{(24-1)}{(24-3)} = xxx$$

Appendix 4: Arithmetic means of twelve competitiveness variables, arranged by cluster – for Hypothesis 1

Country mean scores for twelve competitiveness pillars (07-13), for countries split by their clusters

Country	Cluster number	Cluster variables: country mean scores for twelve competitiveness pillars (2007-2013)												Initial GDP (2007)	Arithmetic mean total GCI score (07-13)	Arithmetic mean PPPPC-GDP (07-13)
		Pillar 1	Pillar 2	Pillar 3	Pillar 4	Pillar 5	Pillar 6	Pillar 7	Pillar 8	Pillar 9	Pillar 10	Pillar 11	Pillar 12			
Benin	1	3.563	2.508	4.655	4.549	3.003	3.771	4.102	3.689	2.577	2.367	3.390	2.994	1488	3.589	1593
Botswana	1	4.732	3.707	4.960	4.256	3.611	4.019	4.467	4.591	3.079	2.851	3.480	3.013	14344	4.083	15575
Burkina Faso	1	3.717	2.288	4.223	3.307	2.536	3.787	4.270	3.474	2.506	2.549	3.162	2.948	1123	3.298	1272
Burundi	1	2.841	2.055	3.107	3.850	2.199	3.136	4.140	2.524	2.178	1.515	2.888	2.350	530	2.824	588
Cameroon	1	3.269	2.305	5.019	4.105	2.961	3.762	4.041	3.284	2.632	3.167	3.366	2.862	2096	3.518	2227
Chad	1	2.681	1.769	4.234	2.995	2.179	2.903	3.955	2.857	2.180	2.480	2.953	2.489	1672	2.854	1817
Ethiopia	1	3.787	2.612	4.021	4.004	2.616	3.742	4.277	3.219	2.343	3.524	3.157	2.672	796	3.460	1018
Kenya	1	3.322	2.882	3.847	4.439	3.620	4.047	4.540	4.702	2.979	3.463	4.052	3.407	1593	3.722	1703
Lesotho	1	3.348	2.335	4.855	3.690	2.859	3.814	4.103	3.443	2.483	1.929	3.121	2.545	1540	3.363	1821
Mali	1	3.552	2.632	4.466	3.301	2.660	3.742	3.933	3.242	2.605	2.552	3.214	2.976	1002	3.340	1069
Mauritania	1	3.432	2.349	3.839	4.110	2.274	3.461	3.894	2.989	2.657	2.131	3.220	2.501	1858	3.218	1986
Mozambique	1	3.306	2.388	4.005	3.339	2.447	3.554	3.908	3.261	2.639	2.887	3.150	2.697	847	3.193	1034
Namibia	1	4.429	4.361	5.174	4.357	3.149	4.070	4.450	4.540	3.085	2.571	3.570	2.806	6399	3.974	7149
Nigeria	1	3.321	2.237	5.002	3.309	3.079	4.176	4.344	4.225	2.869	4.423	3.969	3.093	2052	3.605	2443

Pakistan	1		3.423	2.947	3.828	4.233	2.860	4.001	3.634	4.177	2.818	4.658	3.818	3.078	2583	3.629	2747
South Africa	1		4.469	4.190	4.932	4.029	4.071	4.676	4.094	5.359	3.631	4.871	4.489	3.610	9934	4.392	10718
Tanzania	1		3.786	2.436	4.152	4.260	2.568	3.841	4.345	3.952	2.615	3.277	3.496	3.027	1258	3.560	1525
Timor-Leste	1		3.149	1.950	5.267	3.953	2.645	3.414	4.116	2.900	2.362	1.249	2.904	2.287	5734	3.226	8002
Uganda	1		3.340	2.389	4.227	3.810	2.807	3.744	4.779	3.898	2.751	3.155	3.428	2.987	1149	3.458	1323
Zambia	1		3.896	2.533	4.055	3.728	2.861	4.014	4.006	4.446	2.745	2.570	3.469	2.894	1291	3.495	1532
Zimbabwe	1		3.236	2.658	2.370	4.134	3.152	3.345	3.507	3.756	2.455	2.084	3.262	2.617	467	3.074	483
Total:	21	*Ave*	3.552	2.644	4.297	3.893	2.865	3.763	4.138	3.739	2.676	2.870	3.407	2.850	2846	3.470	3220
Albania	2		3.523	2.820	4.482	5.652	3.577	3.921	4.338	3.701	3.222	2.813	3.476	2.373	6337	3.747	7420
Algeria	2		3.347	3.120	5.949	5.515	3.398	3.477	3.403	2.815	2.620	4.286	3.055	2.630	6573	3.875	7138
Argentina	2		2.954	3.330	4.843	5.768	4.356	3.395	3.481	3.309	3.395	4.871	3.881	2.992	13527	3.928	16219
Armenia	2		3.541	3.223	4.615	5.296	3.658	3.810	4.622	3.680	2.892	2.602	3.387	2.807	5324	3.818	5446
Australia	2		5.528	5.456	5.592	6.366	5.503	5.133	4.990	5.599	5.242	5.064	4.744	4.416	37226	5.149	40057
Azerbaijan	2		3.871	3.756	5.588	5.077	3.792	4.012	4.755	3.938	3.350	3.470	3.856	3.356	7786	4.228	9718
Bahrain	2		4.867	4.826	5.714	6.008	4.450	4.915	4.561	5.202	4.403	2.810	4.260	3.025	32720	4.508	29519
Bangladesh	2		3.077	2.243	4.545	4.894	2.652	3.911	4.020	4.082	2.494	4.365	3.457	2.557	1469	3.620	1799
Barbados	2		5.138	5.217	4.020	6.402	4.977	4.203	4.609	4.784	4.665	1.959	4.192	3.393	24373	4.407	24904
Bolivia	2		2.893	2.571	4.877	5.296	3.553	3.196	3.450	3.338	2.434	3.142	3.185	2.467	4043	3.594	4619
Bosnia and Herzegovina	2		3.174	2.670	4.693	5.647	3.613	3.615	4.161	3.763	3.029	3.123	3.308	2.628	7225	3.703	7910
Brazil	2		3.549	3.554	4.009	5.449	4.184	3.835	4.144	4.332	3.790	5.576	4.532	3.500	9894	4.204	11229
Bulgaria	2		3.248	3.211	5.176	5.750	4.117	4.003	4.404	4.059	3.700	3.849	3.576	2.941	12096	4.075	13377

Cambodia	2	3.501	2.799	4.059	4.683	2.836	4.104	4.677	3.476	2.693	3.168	3.482	2.795	1824	3.636	2142
Chile	2	4.885	4.658	5.819	5.595	4.515	4.850	4.767	4.806	4.128	4.333	4.471	3.448	14725	4.721	16636
China	2	4.109	4.251	6.130	5.860	4.064	4.359	4.556	3.868	3.284	6.731	4.312	3.798	5548	4.730	7655
Colombia	2	3.521	3.244	4.929	5.542	4.032	3.949	4.224	4.078	3.338	4.595	4.090	3.181	8683	4.111	9821
Croatia	2	3.672	4.275	4.851	5.878	4.328	3.938	4.128	4.048	3.964	3.627	3.842	3.232	17888	4.111	18045
Cyprus	2	4.795	4.970	4.846	6.416	4.718	4.789	4.433	4.907	4.298	2.903	4.368	3.456	27713	4.396	27482
Czech Republic	2	3.814	4.498	5.188	5.998	4.965	4.657	4.651	4.472	4.595	4.478	4.629	3.915	25294	4.590	26418
Dominican Republic	2	3.170	3.016	4.488	4.895	3.451	3.861	4.118	3.634	3.382	3.608	3.772	2.680	7626	3.717	8824
Ecuador	2	2.985	2.971	5.337	5.445	3.340	3.408	3.496	3.428	2.899	3.744	3.505	2.569	7024	3.678	8075
Egypt	2	3.995	3.754	3.507	5.402	3.570	3.918	3.263	3.699	3.145	4.725	3.927	3.003	5505	3.945	6224
El Salvador	2	3.431	4.025	4.741	5.402	3.452	4.306	4.268	4.138	3.162	3.239	3.916	2.587	7208	3.992	7482
Estonia	2	4.848	4.599	5.638	6.158	5.175	4.846	4.864	4.752	5.156	3.017	4.278	3.749	20971	4.667	20278
Georgia	2	3.789	3.480	3.979	5.511	3.707	4.068	4.705	3.813	2.955	2.808	3.281	2.630	4677	3.877	5298
Greece	2	3.875	4.449	3.768	6.004	4.574	4.079	3.703	3.904	3.816	4.483	3.969	3.122	28569	4.015	27045
Guatemala	2	3.245	3.574	4.629	5.227	3.311	4.200	4.072	4.143	3.275	3.495	4.141	2.949	4732	3.931	4986
Guyana	2	3.287	2.776	3.265	5.515	3.628	3.909	4.003	3.712	2.911	1.940	3.612	2.658	6191	3.521	7193
Honduras	2	3.395	3.255	4.555	5.369	3.304	3.954	3.798	4.062	2.980	3.137	3.721	2.740	4168	3.884	4394
Hong Kong SAR	2	5.629	6.505	6.013	6.085	4.969	5.610	5.652	6.022	5.788	4.719	5.159	4.148	42373	5.338	46998
Hungary	2	3.901	4.134	4.565	5.856	4.685	4.266	4.376	4.314	4.273	4.312	4.025	3.574	18805	4.325	19273
India	2	4.146	3.483	4.343	5.127	4.013	4.392	4.140	4.936	3.271	6.126	4.606	3.735	2725	4.341	3393
Indonesia	2	3.885	3.255	5.085	5.483	4.010	4.539	4.304	4.291	3.163	5.231	4.420	3.564	3690	4.305	4425
Italy	2	3.625	4.427	4.421	6.203	4.569	4.261	3.664	3.799	4.404	5.648	4.849	3.471	30646	4.377	30145
Jamaica	2	3.645	3.673	3.059	5.350	3.893	4.208	4.319	4.468	3.805	2.808	3.889	3.061	8898	3.879	8944

Jordan	2	4.697	4.213	4.200	5.752	4.379	4.439	4.020	4.354	3.551	3.229	4.101	3.254	5095	4.286	5737
Kazakhstan	2	3.670	3.496	5.472	5.373	4.186	4.122	4.935	3.671	3.378	4.098	3.639	2.999	10840	4.180	12453
Kuwait	2	4.394	4.280	6.493	5.664	3.957	4.327	4.555	4.405	3.645	3.661	4.263	3.007	39743	4.603	41191
Kyrgyz Republic	2	2.926	2.476	3.413	5.182	3.669	3.613	4.360	3.474	2.429	2.526	3.185	2.292	1997	3.407	2289
Latvia	2	3.945	4.016	4.824	5.870	4.780	4.361	4.651	4.484	4.117	3.182	3.890	3.074	17134	4.274	16682
Lithuania	2	4.000	4.390	4.967	5.892	4.975	4.342	4.517	4.183	4.409	3.537	4.264	3.391	18169	4.416	18803
Macedonia FYR	2	3.562	3.194	5.147	5.690	3.916	4.016	4.082	3.989	3.322	2.814	3.451	2.881	8961	3.925	10048
Madagascar	2	3.202	2.318	3.717	4.848	2.702	3.786	4.369	3.061	2.542	2.727	3.298	2.903	936	3.387	953
Malta	2	4.743	4.414	4.818	6.130	4.625	4.552	4.027	5.241	4.903	2.450	4.224	3.297	23379	4.304	25051
Mauritius	2	4.516	4.201	4.347	5.778	4.022	4.630	4.290	4.806	3.646	2.709	4.252	2.998	12118	4.255	14239
Mexico	2	3.502	3.721	5.247	5.718	3.933	4.085	3.929	4.034	3.469	5.510	4.140	3.104	13972	4.252	14466
Mongolia	2	3.146	2.299	4.954	5.260	3.790	3.876	4.567	3.410	2.917	2.323	3.103	2.846	3544	3.697	4515
Morocco	2	3.979	3.674	4.943	5.454	3.544	4.150	3.537	3.932	3.339	4.053	3.819	3.025	4124	4.094	4833
Nepal	2	3.119	1.889	4.674	4.622	2.691	3.700	3.632	3.691	2.429	3.037	3.211	2.413	1041	3.405	1200
New Zealand	2	5.916	4.751	5.305	6.571	5.508	5.288	5.140	5.652	5.051	3.836	4.691	4.107	27224	4.986	27925
Nicaragua	2	3.161	2.520	3.950	5.266	3.146	3.673	4.012	3.589	2.590	2.807	3.278	2.527	2856	3.536	3108
Panama	2	3.818	4.237	5.019	5.677	3.892	4.366	4.112	4.964	3.842	3.185	4.251	3.126	10426	4.274	13174
Paraguay	2	2.761	2.221	4.315	5.255	2.980	3.801	3.727	3.727	2.678	3.090	3.266	2.199	5238	3.451	5878
Peru	2	3.420	3.024	4.974	5.326	3.815	4.210	4.345	4.505	3.286	4.265	3.996	2.726	7784	4.047	9483
Philippines	2	3.332	2.900	4.856	5.296	4.050	4.072	3.961	4.006	3.276	4.651	4.148	2.909	3507	4.033	3934
Poland	2	3.896	3.356	4.848	6.060	4.810	4.296	4.479	4.453	3.920	5.041	4.137	3.286	16370	4.388	19113
Portugal	2	4.553	5.197	4.450	6.141	4.710	4.413	3.990	4.379	4.688	4.368	4.259	3.736	22697	4.429	23023
Romania	2	3.518	2.935	4.621	5.643	4.307	4.057	4.137	4.097	3.677	4.415	3.739	3.025	11494	4.067	12378

Russian Federation	2		3.138	3.945	5.288	5.701	4.431	3.747	4.528	3.359	3.435	5.690	3.537	3.259	14899	4.206	16376
Slovak Republic	2		3.724	3.953	5.112	5.925	4.453	4.528	4.612	4.762	4.377	3.987	4.174	3.157	20342	4.325	22608
Slovenia	2		4.296	4.649	5.336	6.253	5.158	4.519	4.300	4.186	4.561	3.473	4.469	3.723	28016	4.438	28504
Spain	2		4.368	5.548	4.941	6.037	4.823	4.449	3.999	4.503	4.693	5.461	4.679	3.595	30200	4.613	30185
Sri Lanka	2		3.927	3.655	3.567	5.875	3.950	4.385	3.766	4.323	3.145	3.774	4.383	3.465	4274	4.090	5301
Tajikistan	2		3.735	2.632	3.511	5.173	3.339	3.646	4.334	3.180	2.584	2.491	3.285	2.926	1643	3.555	1970
Thailand	2		4.064	4.696	5.388	5.577	4.315	4.552	4.831	4.492	3.552	5.023	4.327	3.384	8286	4.594	9253
Trinidad and Tobago	2		3.601	3.914	5.332	5.676	4.019	3.947	4.202	4.563	3.586	2.776	3.886	2.965	19464	3.939	20159
Turkey	2		3.788	3.933	4.641	5.543	4.004	4.403	3.603	4.177	3.728	5.163	4.256	3.218	12650	4.239	13710
Ukraine	2		3.098	3.505	4.245	5.590	4.442	3.719	4.424	3.693	3.209	4.624	3.679	3.198	6961	4.013	7162
United Arab Emirates	2		5.287	5.848	5.828	5.911	4.569	5.074	4.892	4.673	4.783	4.240	4.825	3.718	50130	4.778	48398
Uruguay	2		4.574	3.936	4.434	5.789	4.343	4.110	3.869	3.859	3.707	3.166	3.724	3.116	11359	4.088	14025
Venezuela	2		2.407	2.676	4.298	5.491	3.886	3.023	3.164	3.266	3.125	4.388	3.233	2.602	12189	3.559	12686
Vietnam	2		3.747	3.108	4.652	5.526	3.487	4.127	4.572	3.939	3.206	4.578	3.801	3.260	2607	4.126	3165
Total:	73	*Ave*	3.827	3.723	4.760	5.625	4.062	4.169	4.241	4.143	3.599	3.851	3.946	3.121	13229	4.126	14034
Austria	3		5.459	5.717	5.339	6.296	5.367	5.151	4.652	4.849	5.302	4.588	5.560	4.685	38621	5.170	40601
Belgium	3		5.012	5.610	4.837	6.528	5.651	5.138	4.404	4.958	5.200	4.790	5.347	4.737	35788	5.124	37016
Canada	3		5.425	5.941	5.202	6.481	5.551	5.173	5.350	5.394	5.430	5.441	5.039	4.837	38427	5.329	39841
Costa Rica	3		4.213	3.221	4.260	5.982	4.453	4.366	4.669	3.983	3.733	3.381	4.460	3.633	10466	4.221	11534
Denmark	3		5.950	5.909	5.683	6.418	5.861	5.238	5.453	5.329	5.864	4.272	5.531	5.036	37162	5.451	37085
Finland	3		6.055	5.745	5.784	6.657	6.073	5.117	4.843	5.442	5.541	4.186	5.453	5.611	35284	5.472	35499

France	3		5.010	6.399	4.853	6.359	5.334	4.817	4.260	4.967	5.243	5.746	5.301	4.682	33554	5.159	34464
Germany	3		5.536	6.516	5.257	6.132	5.395	5.069	4.411	4.990	5.359	5.989	5.832	5.306	34566	5.444	36831
Iceland	3		5.544	5.607	4.046	6.601	5.654	4.764	5.353	4.412	5.844	2.431	4.881	4.577	39754	4.880	38993
Ireland	3		5.238	4.520	4.757	6.374	5.216	5.246	4.900	4.708	5.103	4.211	5.016	4.414	43374	4.908	41787
Israel	3		4.741	4.757	4.862	6.176	5.054	4.699	4.840	5.352	5.151	4.275	4.996	5.384	27725	5.031	30289
Japan	3		5.049	5.868	4.254	6.316	5.225	5.092	5.071	4.721	5.167	6.127	5.842	5.588	33550	5.406	34593
Korea Rep.	3		4.338	5.634	6.081	6.234	5.448	4.795	4.420	4.400	5.424	5.512	5.042	4.966	26502	5.117	29856
Luxembourg	3		5.647	5.533	5.961	6.123	4.548	5.357	4.625	5.498	5.773	3.157	4.951	4.376	81357	4.976	80296
Malaysia	3		4.900	5.171	5.275	6.128	4.701	5.037	4.840	5.450	4.311	4.680	4.977	4.293	13748	5.027	15529
Netherlands	3		5.658	5.900	5.419	6.428	5.607	5.282	4.788	5.165	5.902	5.075	5.569	4.904	39821	5.393	41311
Norway	3		5.794	5.031	6.080	6.369	5.557	4.938	4.957	5.444	5.687	4.287	5.126	4.589	52427	5.194	53524
Qatar	3		5.465	4.706	6.065	6.330	4.677	4.848	4.865	5.036	4.477	3.464	4.669	3.969	76186	4.960	89467
Singapore	3		6.086	6.357	5.713	6.409	5.646	5.710	5.788	5.908	5.687	4.405	5.173	5.143	50302	5.538	55790
Sweden	3		5.913	5.714	5.861	6.453	5.848	5.263	4.750	5.360	6.086	4.585	5.699	5.483	37815	5.532	39417
Switzerland	3		5.822	6.247	5.940	6.375	5.705	5.289	5.776	5.286	5.848	4.511	5.794	5.646	41937	5.636	43737
Taiwan China	3		4.776	5.535	5.585	6.433	5.616	5.187	4.811	4.602	5.280	5.172	5.271	5.240	31384	5.253	35330
United Kingdom	3		5.269	5.794	4.793	6.307	5.400	5.119	5.312	5.439	5.682	5.787	5.393	4.799	36047	5.365	36220
United States	3		4.782	5.914	4.540	6.054	5.662	5.116	5.662	5.242	5.458	6.901	5.557	5.703	46467	5.590	47832
Total:	24	*Ave*	5.320	5.556	5.269	6.332	5.385	5.075	4.950	5.081	5.356	4.707	5.270	4.900	39261	5.216	41118

Appendix 5 – Regression results for Hypohtesis 2 on total data set – with Timor-Leste

Best regression between CAGR of GDP_PPPPC for all countries and CAGR's of 12 pillars plus PPPC_Initial

The REG Procedure
Model: MODEL1
Dependent Variable: cagrppppc

Number of Observations Read	118
Number of Observations Used	118

Analysis of Variance					
Source	**DF**	**Sum of Squares**	**Mean Square**	**F Value**	**Pr > F**
Model	4	0.03112	0.00778	25.08	<.0001
Error	113	0.03505	0.00031015		
Corrected Total	117	0.06616			

Root MSE	0.01761	**R-Square**	0.4703
Dependent Mean	0.03310	**Adj R-Sq**	0.4515
Coeff Var	53.21104		

Parameter Estimates						
Variable	**Label**	**DF**	**Parameter Estimate**	**Standard Error**	**t Value**	**Pr > |t|**
Intercept	Intercept	**1**	0.04501	0.00249	18.11	<.0001
cagrp01		**1**	0.32913	0.09979	3.30	0.0013
cagrp03		**1**	0.15824	0.06241	2.54	0.0126
cagrp10		**1**	0.19992	0.04730	4.23	<.0001
PPPPC_07	PPPPC_07	**1**	-0.00677	0.00103	-6.56	<.0001

Best regression between CAGR of GDP_PPPPC for all countries and CAGR's of 12 pillars plus PPPC_Initial

The REG Procedure
Model: MODEL1
Dependent Variable: cagrppppc

Obs	Dependent Variable	Predicted Value	Std Error Mean Predict	95% CL Mean		95% CL Predict		Residual	Std Error Residual	Student Residual	Cook's D
1	0.0434	0.0466	0.00389	0.0389	0.0543	0.0108	0.0823	-0.0031	0.0172	-0.183	0.000
2	0.0281	0.0192	0.00609	0.0071	0.0312	-0.0177	0.0561	0.0090	0.0165	0.542	0.008
3	0.0564	0.0277	0.00251	0.0227	0.0327	-0.007527	0.0630	0.0287	0.0174	1.645	0.011
4	0.0167	0.0440	0.00303	0.0380	0.0500	0.008624	0.0794	-0.0273	0.0173	-1.573	0.015
5	0.0269	0.0158	0.00279	0.0103	0.0213	-0.0195	0.0511	0.0111	0.0174	0.640	0.002
6	0.0193	0.0132	0.00318	0.0069	0.0195	-0.0223	0.0486	0.0062	0.0173	0.356	0.001
7	0.0598	0.0473	0.00268	0.0420	0.0526	0.0120	0.0826	0.0125	0.0174	0.720	0.002
8	**-0.0211**	**0.0319**	**0.00411**	**0.0238**	**0.0400**	**-0.003928**	**0.0677**	**-0.0530**	**0.0171**	**-3.096**	**0.110**
9	0.0669	0.0446	0.00299	0.0387	0.0506	0.009246	0.0800	0.0223	0.0174	1.283	0.010
10	0.0111	0.0179	0.00297	0.0120	0.0238	-0.0175	0.0533	-0.0069	0.0174	-0.393	0.001
11	0.0119	0.0199	0.00253	0.0149	0.0249	-0.0153	0.0552	-0.0080	0.0174	-0.461	0.001
12	0.0223	0.0461	0.00229	0.0416	0.0507	0.0109	0.0813	-0.0239	0.0175	-1.366	0.006
13	0.0440	0.0556	0.00312	0.0494	0.0618	0.0201	0.0910	-0.0115	0.0173	-0.665	0.003
14	0.0268	0.0426	0.00364	0.0354	0.0498	0.006969	0.0782	-0.0158	0.0172	-0.916	0.008
15	0.0338	0.0342	0.00260	0.0290	0.0393	-0.001109	0.0694	-0.0003	0.0174	-0.0183	0.000
16	0.0409	0.0517	0.00339	0.0449	0.0584	0.0161	0.0872	-0.0108	0.0173	-0.623	0.003
17	0.0333	0.0404	0.00214	0.0361	0.0446	0.005223	0.0755	-0.0071	0.0175	-0.403	0.000
18	0.0456	0.0414	0.00283	0.0358	0.0470	0.006062	0.0767	0.0042	0.0174	0.240	0.000
19	0.0336	0.0339	0.00513	0.0237	0.0441	-0.002428	0.0703	-0.0003	0.0168	-0.0185	0.000
20	0.0586	0.0540	0.00377	0.0465	0.0615	0.0183	0.0897	0.0046	0.0172	0.268	0.001
21	0.0253	0.0439	0.00251	0.0389	0.0489	0.008645	0.0791	-0.0186	0.0174	-1.067	0.005
22	0.0161	0.0205	0.00308	0.0144	0.0266	-0.0149	0.0559	-0.0043	0.0173	-0.250	0.000
23	0.0313	0.0574	0.00306	0.0513	0.0634	0.0219	0.0928	-0.0261	0.0173	-1.505	0.014

Obs	Dependent Variable	Predicted Value	Std Error Mean Predict	95% CL Mean		95% CL Predict		Residual	Std Error Residual	Student Residual	Cook's D
24	0.0457	0.0377	0.00174	0.0342	0.0411	0.002603	0.0727	0.0081	0.0175	0.460	0.000
25	0.1029	0.0497	0.00297	0.0438	0.0555	0.0143	0.0850	0.0532	0.0174	3.066	0.055
26	0.0436	0.0361	0.00302	0.0302	0.0421	0.000748	0.0715	0.0075	0.0174	0.431	0.001
27	0.0385	0.0423	0.00281	0.0367	0.0479	0.006962	0.0776	-0.0038	0.0174	-0.218	0.000
28	0.0058	0.0282	0.00183	0.0246	0.0319	-0.006854	0.0633	-0.0225	0.0175	-1.283	0.004
29	-0.0069	0.0156	0.00307	0.0095	0.0217	-0.0198	0.0511	-0.0225	0.0173	-1.300	0.011
30	0.0152	0.0232	0.00221	0.0188	0.0276	-0.0120	0.0583	-0.0080	0.0175	-0.458	0.001
31	0.0064	0.009180	0.00321	0.0028	0.0156	-0.0263	0.0446	-0.0028	0.0173	-0.162	0.000
32	0.0468	0.0364	0.00225	0.0319	0.0408	0.001193	0.0715	0.0104	0.0175	0.596	0.001
33	0.0458	0.0480	0.00267	0.0427	0.0533	0.0127	0.0833	-0.0022	0.0174	-0.124	0.000
34	0.0336	0.0313	0.00339	0.0246	0.0380	-0.004259	0.0668	0.0023	0.0173	0.135	0.000
35	0.0162	0.0211	0.00451	0.0121	0.0300	-0.0150	0.0571	-0.0048	0.0170	-0.283	0.001
36	0.0100	0.0306	0.00206	0.0265	0.0346	-0.004574	0.0657	-0.0205	0.0175	-1.172	0.004
37	0.0742	0.0467	0.00303	0.0407	0.0527	0.0113	0.0821	0.0275	0.0173	1.585	0.015
38	0.0091	0.0193	0.00252	0.0143	0.0243	-0.0160	0.0545	-0.0101	0.0174	-0.581	0.001
39	0.0116	0.0173	0.00246	0.0124	0.0222	-0.0179	0.0525	-0.0057	0.0174	-0.327	0.000
40	0.0504	0.0496	0.00305	0.0436	0.0557	0.0142	0.0850	0.0008	0.0173	0.046	0.000
41	0.0246	0.0208	0.00336	0.0141	0.0275	-0.0147	0.0563	0.0038	0.0173	0.222	0.000
42	-0.0262	-0.004370	0.00632	-0.0169	0.008161	-0.0414	0.0327	-0.0218	0.0164	-1.329	0.052
43	0.0190	0.0435	0.00212	0.0393	0.0477	0.008384	0.0787	-0.0246	0.0175	-1.406	0.006
44	0.0537	0.0546	0.00475	0.0452	0.0640	0.0185	0.0908	-0.0009	0.0170	-0.054	0.000
45	0.0210	0.0457	0.00233	0.0411	0.0503	0.0105	0.0809	-0.0247	0.0175	-1.414	0.007
46	0.0371	0.0181	0.00316	0.0119	0.0244	-0.0173	0.0536	0.0190	0.0173	1.094	0.008
47	0.0121	0.0266	0.00373	0.0192	0.0340	-0.009067	0.0623	-0.0145	0.0172	-0.840	0.007
48	0.0032	-0.003721	0.00422	-0.0121	0.004647	-0.0396	0.0322	0.0069	0.0171	0.405	0.002
49	0.0697	0.0342	0.00361	0.0271	0.0414	-0.001390	0.0698	0.0355	0.0172	2.058	0.037
50	0.0611	0.0477	0.00285	0.0421	0.0534	0.0124	0.0831	0.0134	0.0174	0.770	0.003

Obs	Dependent Variable	Predicted Value	Std Error Mean Predict	95% CL Mean		95% CL Predict		Residual	Std Error Residual	Student Residual	Cook's D
51	-0.0003	-0.000687	0.00550	-0.0116	0.0102	-0.0372	0.0359	0.0004	0.0167	0.023	0.000
52	0.0293	0.0237	0.00200	0.0197	0.0276	-0.0114	0.0588	0.0056	0.0175	0.319	0.000
53	-0.0026	0.0182	0.00233	0.0136	0.0229	-0.0170	0.0534	-0.0208	0.0175	-1.194	0.005
54	0.0074	0.0305	0.00300	0.0246	0.0365	-0.0049	0.0659	-0.0231	0.0174	-1.329	0.011
55	0.0173	0.0178	0.00288	0.0121	0.0235	-0.0176	0.0531	-0.0005	0.0174	-0.026	0.000
56	0.0332	0.0350	0.00229	0.0304	0.0395	-0.0002	0.0702	-0.0018	0.0175	-0.103	0.000
57	0.0544	0.0441	0.00208	0.0400	0.0483	0.0090	0.0793	0.0103	0.0175	0.586	0.001
58	0.0279	0.0387	0.00360	0.0316	0.0458	0.0031	0.0743	-0.0108	0.0172	-0.624	0.003
59	0.0419	0.0239	0.00255	0.0188	0.0290	-0.0113	0.0592	0.0180	0.0174	1.031	0.005
60	0.0173	0.0215	0.00344	0.0146	0.0283	-0.0141	0.0570	-0.0042	0.0173	-0.244	0.000
61	0.0466	0.0435	0.00224	0.0390	0.0479	0.0083	0.0786	0.0032	0.0175	0.182	0.000
62	0.0180	0.0285	0.00178	0.0249	0.0320	-0.0066	0.0635	-0.0104	0.0175	-0.595	0.001
63	0.0552	0.0237	0.00411	0.0155	0.0318	-0.0122	0.0595	0.0315	0.0171	1.842	0.039
64	0.0252	0.0282	0.00252	0.0232	0.0332	-0.0071	0.0634	-0.0030	0.0174	-0.170	0.000
65	-0.0008	-0.0111	0.00706	-0.0251	0.0029	-0.0487	0.0265	0.0103	0.0161	0.641	0.016
66	0.0355	0.0453	0.00362	0.0381	0.0525	0.0097	0.0809	-0.0098	0.0172	-0.569	0.003
67	0.0056	0.0388	0.00464	0.0296	0.0480	0.0027	0.0748	-0.0331	0.0170	-1.951	0.057
68	0.0428	0.0334	0.00217	0.0291	0.0377	-0.0018	0.0686	0.0094	0.0175	0.535	0.001
69	0.0116	0.0361	0.00361	0.0289	0.0433	0.0005	0.0717	-0.0245	0.0172	-1.420	0.018
70	0.0231	0.0236	0.00195	0.0197	0.0275	-0.0115	0.0587	-0.0005	0.0175	-0.027	0.000
71	0.0301	0.0368	0.00615	0.0246	0.0490	-0.0002	0.0737	-0.0067	0.0165	-0.407	0.005
72	0.0509	0.0396	0.00221	0.0352	0.0440	0.0045	0.0748	0.0113	0.0175	0.644	0.001
73	0.0216	0.0372	0.00187	0.0335	0.0409	0.0021	0.0723	-0.0156	0.0175	-0.890	0.002
74	0.0982	0.0482	0.00234	0.0435	0.0528	0.0130	0.0834	0.0500	0.0175	2.867	0.030
75	0.0512	0.0456	0.00225	0.0412	0.0501	0.0105	0.0808	0.0056	0.0175	0.321	0.000
76	0.0681	0.0383	0.00278	0.0328	0.0438	0.0030	0.0736	0.0298	0.0174	1.712	0.015
77	0.0417	0.0320	0.00311	0.0259	0.0382	-0.0034	0.0675	0.0097	0.0173	0.557	0.002

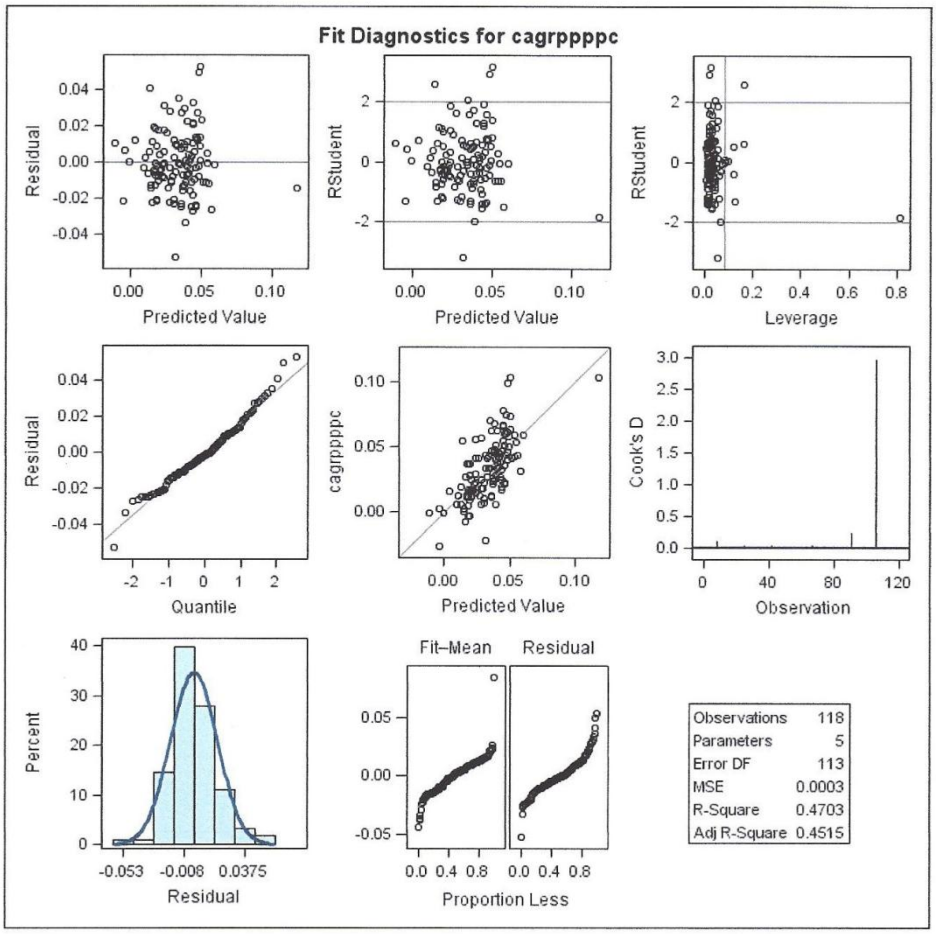
Obs	Dependent Variable	Predicted Value	Std Error Mean Predict	95% CL Mean		95% CL Predict		Residual	Std Error Residual	Student Residual	Cook's D
78	0.0442	0.0421	0.00243	0.0373	0.0469	0.0069	0.0773	0.0021	0.0174	0.119	0.000
79	0.0127	0.0171	0.00285	0.0115	0.0228	-0.0182	0.0525	-0.0045	0.0174	-0.259	0.000
80	0.0150	0.0233	0.00246	0.0184	0.0282	-0.0119	0.0585	-0.0083	0.0174	-0.476	0.001
81	0.0325	0.0431	0.00259	0.0380	0.0483	0.0079	0.0784	-0.0107	0.0174	-0.612	0.002
82	0.0580	0.0493	0.00285	0.0436	0.0550	0.0139	0.0846	0.0087	0.0174	0.501	0.001
83	0.0131	0.0105	0.00424	0.0021	0.0190	-0.0254	0.0464	0.0026	0.0171	0.152	0.000
84	0.0223	0.0304	0.00442	0.0216	0.0391	-0.0056	0.0663	-0.0081	0.0170	-0.473	0.003
85	0.0776	0.0446	0.00202	0.0406	0.0487	0.0095	0.0798	0.0330	0.0175	1.886	0.010
86	0.0428	0.0538	0.00358	0.0467	0.0609	0.0181	0.0894	-0.0109	0.0172	-0.635	0.003
87	0.0637	0.0497	0.00278	0.0442	0.0552	0.0144	0.0850	0.0140	0.0174	0.804	0.003
88	0.0401	0.0481	0.00265	0.0429	0.0534	0.0128	0.0834	-0.0080	0.0174	-0.459	0.001
89	0.0479	0.0384	0.00249	0.0334	0.0433	0.0031	0.0736	0.0095	0.0174	0.545	0.001
90	0.0024	0.0147	0.00328	0.0082	0.0212	-0.0208	0.0502	-0.0123	0.0173	-0.709	0.004
91	0.0551	0.0138	0.00713	-0.0003	0.0280	-0.0238	0.0515	0.0412	0.0161	2.560	0.257
92	0.0253	0.0383	0.00212	0.0341	0.0425	0.0032	0.0735	-0.0130	0.0175	-0.743	0.002
93	0.0384	0.0405	0.00198	0.0365	0.0444	0.0054	0.0756	-0.0020	0.0175	-0.117	0.000
94	0.0366	0.0168	0.00400	0.0089	0.0247	-0.0190	0.0526	0.0198	0.0172	1.154	0.015
95	0.0368	0.0193	0.00310	0.0131	0.0255	-0.0161	0.0547	0.0175	0.0173	1.010	0.007
96	0.0053	0.0179	0.00228	0.0134	0.0224	-0.0173	0.0531	-0.0126	0.0175	-0.723	0.002
97	0.0271	0.0322	0.00211	0.0281	0.0364	-0.0029	0.0674	-0.0052	0.0175	-0.297	0.000
98	0.0003	0.0149	0.00311	0.0087	0.0210	-0.0206	0.0503	-0.0146	0.0173	-0.842	0.005
99	0.0738	0.0501	0.00405	0.0420	0.0581	0.0142	0.0859	0.0238	0.0171	1.387	0.022
100	0.0215	0.0231	0.00300	0.0171	0.0290	-0.0123	0.0585	-0.0015	0.0174	-0.0878	0.000
101	0.0164	0.0189	0.00350	0.0119	0.0258	-0.0167	0.0544	-0.0025	0.0173	-0.143	0.000
102	0.0419	0.0259	0.00234	0.0213	0.0305	-0.0093	0.0611	0.0160	0.0175	0.916	0.003
103	0.0596	0.0460	0.00307	0.0399	0.0521	0.0106	0.0815	0.0136	0.0173	0.784	0.004
104	0.0628	0.0403	0.00322	0.0339	0.0467	0.0049	0.0758	0.0224	0.0173	1.296	0.012

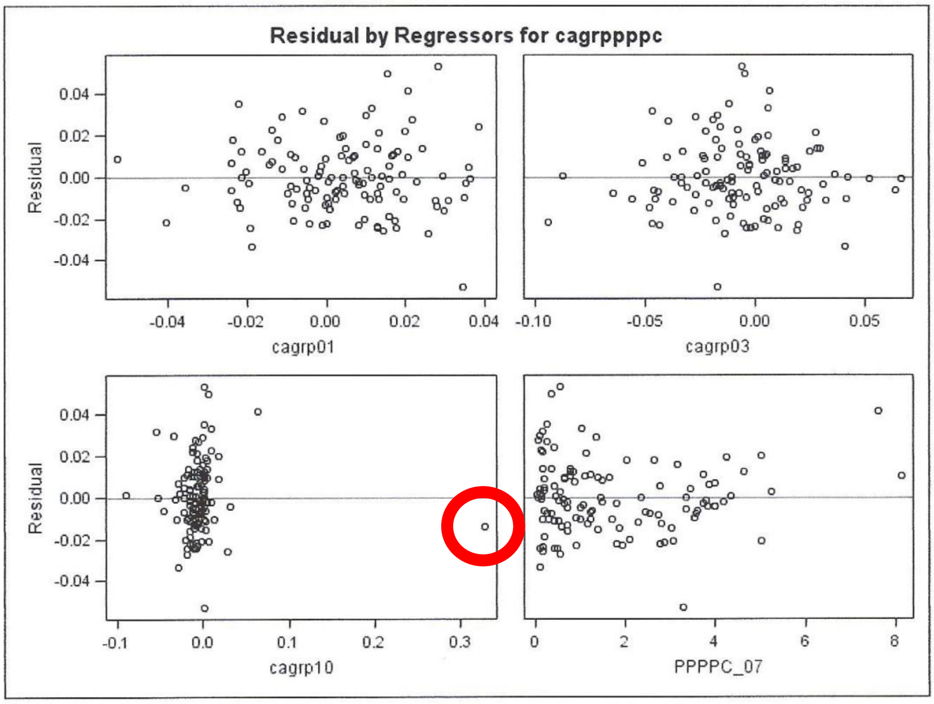
Obs	Dependent Variable	Predicted Value	Std Error Mean Predict	95% CL Mean		95% CL Predict		Residual	Std Error Residual	Student Residual	Cook's D
105	0.0435	0.0314	0.00335	0.0247	0.0380	-0.0041	0.0669	0.0122	0.0173	0.703	0.004
106	0.1033	0.1175	0.0159	0.0860	0.1489	0.0705	0.1644	-0.0141	0.00763	-1.852	2.968
107	0.0131	0.0361	0.00233	0.0314	0.0407	0.0009	0.0713	-0.0230	0.0175	-1.315	0.006
108	0.0353	0.0415	0.00240	0.0367	0.0462	0.0062	0.0767	-0.0062	0.0174	-0.355	0.000
109	0.0421	0.0416	0.00291	0.0358	0.0474	0.0062	0.0770	0.0005	0.0174	0.0308	0.000
110	0.0237	0.0368	0.00199	0.0329	0.0408	0.0017	0.0719	-0.0132	0.0175	-0.752	0.001
111	-0.002343	0.0189	0.00427	0.0104	0.0273	-0.0170	0.0548	-0.0212	0.0171	-1.242	0.019
112	0.006088	0.0122	0.00325	0.0057	0.0186	-0.0233	0.0477	-0.0061	0.0173	-0.352	0.001
113	0.0158	0.0033	0.00374	-0.0041	0.0108	-0.0323	0.0390	0.0125	0.0172	0.725	0.005
114	0.0656	0.0445	0.00263	0.0392	0.0497	0.0092	0.0798	0.0212	0.0174	1.216	0.007
115	0.0182	0.0290	0.00371	0.0216	0.0363	-0.0067	0.0646	-0.0108	0.0172	-0.626	0.004
116	0.0628	0.0357	0.00316	0.0294	0.0419	0.0002	0.0711	0.0272	0.0173	1.569	0.016
117	0.0588	0.0599	0.00470	0.0506	0.0692	0.0238	0.0960	-0.0010	0.0170	-0.0613	0.000
118	0.0399	0.0386	0.00517	0.0284	0.0489	0.0023	0.0750	0.0012	0.0168	0.0737	0.000

Sum of Residuals	0
Sum of Squared Residuals	0.03505
Predicted Residual SS (PRESS)	0.04366

_Best regression between CAGR of GDP_PPPPC for all countries and CAGRs of 12 pillars plus PPPC_Initial_

The REG Procedure
Model: MODEL1
Dependent Variable: cagrppppc




Residual by Regressors for cagrppppc
Residual
cagrp01
cagrp03
cagrp10
PPPPC_07

Appendix 6: CAGRs of twelve competitiveness variables, arranged by cluster

Country mean scores for CAGRs of twelve competitiveness pillars (07-13), for countries split by their clusters

Country	Cluster number	Cluster variables: country mean scores for twelve competitiveness pillars (2007-2013)												Initial GDP (2007)	CAGR total GCI score (07-13)	CAGR PPPPC-GDP (07-13)
		pillar 1	pillar 2	pillar 3	pillar 4	pillar 5	pillar 6	pillar 7	pillar 8	pillar 9	pillar 10	pillar 11	pillar 12			
Benin	1	1.30%	3.38%	0.00%	-0.21%	2.00%	0.31%	2.66%	-0.77%	4.45%	-1.08%	0.21%	1.35%	1488	0.88%	2.23%
Botswana	1	1.13%	-0.15%	-3.34%	1.02%	0.99%	1.67%	0.14%	-1.22%	1.25%	0.20%	0.80%	0.92%	14344	-0.35%	3.38%
Burkina Faso	1	-0.58%	1.01%	1.38%	0.85%	0.43%	0.43%	0.92%	-1.86%	1.06%	-1.57%	-1.10%	-1.17%	1123	0.31%	4.56%
Burundi	1	-2.13%	0.66%	4.22%	2.68%	-1.44%	1.83%	-0.98%	-3.02%	2.16%	-5.20%	-0.74%	-1.25%	530	0.58%	3.36%
Cameroon	1	1.60%	4.92%	-1.11%	2.17%	2.14%	2.62%	2.69%	1.56%	2.50%	-1.62%	1.35%	1.46%	2096	1.44%	2.53%
Chad	1	1.45%	4.26%	1.93%	-2.78%	3.37%	2.42%	1.67%	0.00%	2.87%	2.83%	2.13%	3.93%	1672	1.37%	3.13%
Ethiopia	1	2.18%	3.13%	-1.93%	4.70%	2.20%	1.60%	0.17%	-0.17%	2.32%	-0.94%	1.40%	1.74%	796	1.42%	7.42%
Kenya	1	1.10%	4.29%	-4.53%	-0.47%	0.61%	0.42%	1.64%	0.39%	3.61%	-0.84%	0.16%	0.09%	1593	0.11%	2.79%
Lesotho	1	-0.60%	3.75%	-4.70%	-4.66%	-0.15%	2.27%	0.03%	-0.94%	1.84%	-5.46%	1.05%	-0.25%	1540	-1.60%	5.52%
Mali	1	-1.90%	4.51%	1.08%	0.05%	2.05%	1.30%	-0.45%	0.84%	4.73%	-1.84%	0.77%	0.10%	1002	0.77%	1.16%
Mauritania	1	-2.40%	7.43%	6.40%	-2.82%	-0.84%	1.25%	-1.98%	-1.65%	0.76%	-4.60%	0.07%	0.77%	1858	0.51%	3.01%
Mozambique	1	1.01%	0.67%	-1.73%	0.45%	0.46%	2.18%	-1.11%	-0.96%	4.22%	-3.37%	1.00%	0.04%	847	0.02%	6.81%
Namibia	1	0.68%	-0.22%	-4.03%	-1.19%	-0.10%	0.73%	-0.32%	0.40%	2.88%	-2.26%	0.38%	0.99%	6399	-0.48%	4.17%
Nigeria	1	-0.01%	-1.01%	1.38%	-1.79%	2.20%	0.09%	1.50%	-0.71%	3.73%	1.76%	0.42%	-0.70%	2052	0.39%	5.80%
Pakistan	1	-0.49%	-2.38%	-6.47%	0.43%	1.11%	-0.75%	-0.23%	-0.98%	2.26%	-0.52%	-0.48%	-0.41%	2583	-1.34%	2.23%
South Africa	1	-0.43%	-1.23%	-1.88%	-3.49%	-0.97%	-0.22%	-0.42%	1.72%	2.94%	-0.83%	-0.94%	-1.18%	9934	-0.64%	2.71%

Tanzania	1		-1.38%	-3.11%	-0.79%	3.98%	1.46%	-0.11%	0.84%	-0.39%	1.62%	0.99%	0.36%	-0.20%	1258	0.20%	6.28%
Timor-Leste	1		2.78%	4.01%	0.95%	-0.97%	0.85%	3.28%	1.75%	-2.56%	2.87%	32.85%	1.37%	2.01%	5734	0.79%	10.33%
Uganda	1		1.41%	0.02%	-2.60%	3.88%	0.61%	1.23%	0.40%	2.99%	1.77%	-1.59%	0.60%	-0.59%	1149	0.70%	4.21%
Zambia	1		1.58%	4.32%	6.64%	1.48%	4.21%	5.82%	-0.21%	0.74%	3.10%	0.02%	5.52%	5.88%	1291	3.06%	5.88%
Zimbabwe	1		1.90%	-2.11%	3.58%	0.18%	-0.56%	1.66%	-0.48%	-1.18%	3.13%	-9.00%	-0.73%	-1.66%	467	0.24%	3.99%
Total:	21	*Ave*	0.39%	1.72%	-0.26%	0.17%	0.98%	1.43%	0.39%	-0.37%	2.67%	-0.10%	0.65%	0.57%	2846	0.4%	4.4%
Albania	2		3.51%	11.43%	-2.23%	-1.27%	5.40%	3.79%	1.39%	-2.39%	6.71%	-1.10%	1.07%	3.94%	6337	1.58%	4.34%
Algeria	2		-5.28%	1.47%	-2.31%	-2.12%	0.18%	-3.31%	-3.81%	-4.05%	1.86%	-0.18%	-3.58%	-5.64%	6573	-0.89%	2.81%
Argentina	2		-1.13%	1.16%	-2.67%	-1.17%	0.71%	-2.29%	-0.74%	-0.36%	4.32%	-0.09%	-1.08%	-0.73%	13527	-0.61%	5.64%
Armenia	2		2.57%	5.58%	-1.36%	-0.76%	3.28%	2.02%	0.47%	2.81%	5.25%	-1.85%	1.63%	-0.81%	5324	0.66%	1.67%
Australia	2		-0.88%	0.36%	-0.69%	0.16%	0.44%	-1.66%	-0.84%	-1.55%	1.24%	-0.01%	-0.68%	1.13%	37226	-0.20%	2.69%
Azerbaijan	2		1.81%	2.08%	2.46%	-0.87%	1.83%	2.08%	1.17%	-0.93%	7.05%	-1.13%	0.60%	0.93%	7786	1.16%	5.98%
Bahrain	2		3.45%	3.35%	-1.69%	-0.48%	3.97%	2.11%	3.25%	-1.53%	3.42%	0.19%	1.63%	3.48%	32720	1.14%	-2.11%
Bangladesh	2		1.97%	-0.65%	-2.23%	-0.14%	1.98%	0.90%	-0.89%	-2.16%	3.76%	-1.17%	0.36%	-1.27%	1469	-0.28%	6.69%
Barbados	2		0.22%	2.82%	-4.41%	-0.56%	0.95%	0.55%	0.79%	-2.03%	3.58%	-2.17%	1.43%	1.34%	24373	-0.22%	1.11%
Bolivia	2		2.75%	5.73%	2.33%	-2.09%	1.80%	1.25%	-0.69%	0.82%	3.53%	0.29%	3.31%	4.57%	4043	1.11%	4.40%
Bosnia and Herzegovina	2		2.97%	7.58%	-2.75%	-1.85%	3.87%	1.81%	-0.54%	-3.76%	8.99%	-1.48%	1.11%	2.49%	7225	0.48%	2.68%
Brazil	2		1.95%	4.03%	4.15%	-1.75%	0.74%	0.50%	1.94%	1.82%	5.54%	0.18%	0.17%	-0.40%	9894	1.29%	4.09%
Bulgaria	2		1.76%	4.41%	0.15%	-0.35%	1.15%	1.79%	1.64%	-0.71%	6.74%	-1.24%	1.05%	-0.10%	12096	1.19%	3.33%
Cambodia	2		3.59%	4.09%	1.88%	1.26%	4.73%	1.80%	0.07%	8.27%	6.43%	-2.28%	3.12%	3.82%	1824	2.57%	5.86%
Chile	2		0.57%	0.27%	0.31%	-1.04%	1.02%	-0.72%	-0.64%	-0.30%	2.28%	0.12%	-1.24%	0.23%	14725	-0.62%	4.57%
China	2		2.82%	3.03%	-0.62%	1.24%	2.87%	0.58%	1.25%	6.04%	3.15%	0.05%	1.03%	1.55%	5548	0.99%	10.29%
Colombia	2		-1.38%	3.02%	1.36%	-1.23%	1.68%	0.15%	-0.11%	0.34%	3.95%	-0.30%	-0.64%	-0.23%	8683	0.33%	4.36%
Croatia	2		-0.42%	3.78%	-0.53%	-0.52%	1.07%	-0.59%	-1.02%	-0.86%	5.04%	-1.24%	-2.07%	-0.78%	17888	-0.47%	0.58%
Cyprus	2		0.00%	0.79%	-4.68%	0.00%	1.69%	-0.03%	1.59%	-1.36%	4.29%	-1.61%	-0.21%	0.61%	27713	0.25%	-0.69%
Czech Republic	2		-0.98%	1.44%	-0.73%	-0.46%	-0.27%	-0.58%	-1.12%	-0.40%	2.45%	-0.17%	-1.26%	-0.69%	25294	-0.57%	1.52%

Dominican Republic	2	0.70%	0.14%	-2.34%	-0.50%	2.65%	1.31%	0.03%	1.84%	3.60%	-1.04%	1.06%	0.78%	7626	0.43%	4.68%
Ecuador	2	2.28%	4.89%	-1.03%	0.09%	4.64%	2.08%	-0.58%	1.77%	6.33%	0.94%	1.14%	2.38%	7024	1.42%	4.58%
Egypt	2	-2.03%	0.34%	-2.24%	-2.09%	-2.11%	-0.83%	-0.82%	2.05%	3.89%	0.11%	-0.63%	-1.03%	5505	-1.23%	3.36%
El Salvador	2	-3.55%	-0.46%	-3.12%	-1.20%	0.12%	-0.72%	-2.62%	-0.91%	1.89%	-1.22%	-0.88%	-1.32%	7208	-1.71%	1.62%
Estonia	2	0.95%	1.39%	0.38%	-0.11%	-0.17%	-0.93%	1.26%	-0.90%	0.77%	-1.99%	-0.70%	1.07%	20971	-0.63%	1.00%
Georgia	2	2.94%	9.22%	0.37%	0.01%	1.40%	1.81%	1.59%	0.29%	8.05%	-1.25%	1.98%	-0.77%	4677	1.38%	5.04%
Greece	2	-4.05%	1.22%	-9.41%	-0.56%	0.73%	-1.46%	-0.33%	-4.34%	5.70%	-0.91%	-1.62%	-1.82%	28569	-1.09%	-2.62%
Guatemala	2	1.30%	4.68%	-0.43%	-0.59%	3.32%	2.41%	2.07%	4.16%	4.78%	-0.94%	1.67%	1.38%	4732	1.29%	1.90%
Guyana	2	3.62%	4.94%	5.21%	-1.72%	6.72%	1.64%	2.27%	1.93%	6.74%	-3.18%	3.33%	4.04%	6191	2.11%	5.37%
Honduras	2	1.77%	2.05%	-0.22%	-1.18%	2.07%	2.92%	-1.97%	3.31%	5.94%	-0.99%	1.91%	1.70%	4168	0.74%	2.10%
Hong Kong SAR	2	0.33%	1.29%	0.10%	0.20%	0.98%	-1.06%	0.17%	-1.01%	1.81%	0.27%	-0.59%	0.34%	42373	0.15%	3.71%
Hungary	2	-2.17%	2.22%	2.17%	-0.94%	-0.69%	-0.56%	-0.87%	-2.04%	1.84%	-0.99%	-2.69%	-0.51%	18805	-0.72%	1.21%
India	2	-2.22%	1.03%	-1.18%	-0.64%	-1.10%	-1.49%	1.40%	0.48%	1.38%	0.12%	-2.21%	-2.05%	2725	-0.57%	6.97%
Indonesia	2	0.48%	4.91%	2.85%	0.86%	1.71%	-1.45%	-1.88%	-0.71%	4.14%	-0.44%	-0.11%	0.58%	3690	0.83%	6.11%
Italy	2	-0.81%	4.42%	-1.76%	-0.51%	0.39%	-0.05%	0.78%	-1.69%	1.68%	-0.29%	0.18%	1.32%	30646	0.33%	-0.26%
Jamaica	2	-0.08%	0.14%	-4.31%	-2.69%	0.98%	-0.73%	-0.24%	-0.65%	0.10%	-0.69%	-0.74%	-1.31%	8898	-0.94%	0.74%
Jordan	2	-0.48%	0.23%	-1.27%	-0.95%	0.79%	0.31%	-0.10%	-0.88%	4.01%	-1.50%	1.21%	0.33%	5095	-0.54%	3.32%
Kazakhstan	2	1.65%	4.08%	0.48%	-0.92%	0.70%	-0.13%	0.14%	-3.08%	6.38%	0.14%	-0.77%	-1.20%	10840	0.46%	5.44%
Kuwait	2	-0.89%	0.16%	0.07%	-1.83%	-0.86%	-0.88%	-2.69%	-3.09%	1.69%	3.09%	-1.89%	-0.78%	39743	-0.43%	1.73%
Kyrgyz Republic	2	1.04%	2.78%	-0.32%	-1.45%	0.77%	1.29%	0.38%	0.60%	4.89%	-1.56%	-0.24%	-2.36%	1997	0.28%	4.66%
Latvia	2	0.23%	1.07%	-1.20%	-0.30%	-0.39%	-0.19%	0.71%	-1.49%	3.39%	-1.90%	-0.91%	0.91%	17134	-0.47%	1.80%
Lithuania	2	0.93%	2.70%	-3.38%	-0.38%	0.71%	-0.08%	-0.05%	-1.99%	4.74%	-1.14%	-0.58%	0.76%	18169	-0.28%	2.52%
Macedonia FYR	2	3.49%	4.80%	-0.99%	-1.55%	0.88%	3.02%	1.56%	0.22%	7.44%	-1.78%	0.31%	-0.93%	8961	0.99%	3.55%
Madagascar	2	-1.88%	-0.33%	4.04%	-0.83%	0.79%	1.60%	0.65%	-2.38%	1.64%	-2.91%	0.00%	-0.42%	936	0.17%	0.56%
Malta	2	0.11%	4.09%	-1.03%	0.18%	2.24%	0.59%	1.45%	-0.69%	2.78%	-2.16%	1.27%	2.13%	23379	0.67%	2.31%
Mauritius	2	1.71%	1.38%	0.53%	-0.60%	1.55%	1.17%	1.73%	-0.85%	3.42%	-1.82%	0.28%	-0.98%	12118	0.68%	5.09%
Mexico	2	0.10%	2.14%	0.51%	-1.75%	0.93%	0.32%	0.54%	2.18%	3.03%	0.23%	0.68%	0.90%	13972	0.51%	2.16%
Mongolia	2	1.56%	5.27%	-0.44%	-0.23%	0.72%	1.63%	1.05%	-1.40%	7.97%	0.57%	1.88%	0.47%	3544	0.69%	9.82%

Morocco	2		1.59%	3.88%	-0.27%	-1.31%	0.38%	1.57%	2.18%	2.46%	4.60%	-0.70%	0.67%	-0.69%	4124	0.29%	5.12%
Nepal	2		0.71%	-0.24%	0.52%	-0.23%	1.45%	0.14%	0.49%	0.79%	1.65%	-2.70%	-0.19%	-0.90%	1041	0.19%	4.42%
New Zealand	2		0.95%	1.44%	-2.73%	-0.48%	0.81%	-0.64%	-0.03%	-1.72%	2.52%	-1.04%	-0.37%	1.18%	27224	0.04%	1.50%
Nicaragua	2		1.32%	4.17%	1.18%	-0.57%	1.10%	1.52%	0.52%	0.10%	3.97%	-3.08%	1.28%	0.81%	2856	0.93%	3.25%
Panama	2		1.15%	4.24%	0.61%	-1.59%	1.93%	1.42%	0.65%	-0.03%	8.32%	0.96%	0.28%	2.33%	10426	1.44%	7.76%
Paraguay	2		3.08%	4.32%	3.24%	-2.79%	2.23%	3.87%	2.05%	3.19%	6.13%	-1.49%	2.68%	2.33%	5238	1.20%	4.28%
Peru	2		1.30%	5.48%	2.95%	-1.41%	1.69%	1.60%	2.07%	2.12%	3.39%	0.52%	-0.32%	-0.45%	7784	1.53%	6.37%
Philippines	2		1.28%	3.23%	2.40%	-0.78%	1.83%	-0.30%	0.70%	2.20%	3.41%	-1.27%	0.37%	0.01%	3507	1.05%	4.01%
Poland	2		2.05%	2.86%	-1.71%	-1.12%	0.64%	0.52%	0.17%	1.92%	5.43%	0.21%	0.12%	-0.87%	16370	0.29%	4.79%
Portugal	2		-2.24%	2.19%	-3.78%	-0.97%	1.26%	-0.70%	-1.34%	-4.17%	4.29%	-0.79%	-0.24%	0.71%	22697	-0.28%	0.24%
Romania	2		0.07%	2.89%	1.34%	-0.92%	0.73%	-0.74%	0.02%	0.34%	3.76%	-0.63%	-2.15%	-0.83%	11494	0.36%	2.53%
Russian Federation	2		0.82%	5.56%	1.12%	-0.11%	1.10%	-0.94%	-0.81%	-1.39%	6.32%	0.54%	-1.68%	-1.72%	14899	0.25%	3.84%
Slovak Republic	2		-2.38%	2.13%	-1.76%	0.25%	0.19%	-0.83%	-1.95%	-1.78%	1.31%	-0.66%	-0.74%	-2.31%	20342	-1.51%	3.68%
Slovenia	2		-0.85%	2.03%	-2.13%	-0.50%	0.38%	-0.67%	-0.83%	-5.16%	2.53%	-0.99%	-1.61%	1.04%	28016	-0.54%	0.53%
Spain	2		-0.52%	1.90%	-4.79%	-0.81%	0.77%	-1.09%	-0.12%	-3.58%	3.55%	-0.20%	-1.13%	0.63%	30200	-0.35%	0.03%
Sri Lanka	2		3.87%	6.60%	-1.59%	0.16%	2.99%	0.83%	1.87%	1.78%	5.21%	-1.14%	3.13%	0.67%	4274	1.44%	7.38%
Tajikistan	2		2.42%	1.18%	-1.49%	0.16%	4.48%	2.42%	1.66%	1.56%	4.17%	-1.74%	3.63%	2.32%	1643	1.07%	5.96%
Thailand	2		-2.16%	-0.25%	0.23%	-0.78%	-0.23%	-0.58%	-2.47%	-0.06%	-0.16%	-0.64%	-0.40%	-1.91%	8286	-0.86%	4.35%
Trinidad and Tobago	2		0.81%	5.33%	1.97%	-0.26%	1.83%	-0.06%	-0.91%	-2.47%	5.07%	-0.79%	-0.68%	-0.89%	19464	0.26%	1.31%
Turkey	2		0.29%	4.24%	2.10%	-0.07%	0.46%	0.32%	1.21%	3.07%	4.69%	0.37%	-0.29%	0.14%	12650	1.23%	3.53%
Ukraine	2		-0.03%	4.60%	-0.98%	0.41%	2.07%	0.31%	0.90%	-2.55%	6.07%	-0.91%	-0.12%	-0.12%	6961	0.43%	2.37%
United Arab Emirates	2		1.73%	2.04%	0.59%	1.15%	3.20%	1.51%	1.67%	1.02%	3.72%	0.59%	1.72%	3.91%	50130	1.99%	-0.23%
Uruguay	2		1.32%	3.68%	2.77%	0.26%	2.59%	1.74%	-2.65%	2.42%	6.97%	-0.78%	0.71%	0.97%	11359	0.97%	6.56%
Venezuela	2		-0.47%	-0.25%	-5.60%	-1.70%	2.78%	-3.41%	-3.30%	-1.87%	2.16%	1.31%	-1.58%	-2.56%	12189	-1.51%	1.82%
Vietnam	2		-0.05%	4.20%	-3.95%	-0.04%	1.82%	0.71%	0.30%	1.31%	4.27%	-0.58%	-0.51%	-0.56%	2607	0.07%	6.28%
Total:	73	*Ave*	0.59%	2.93%	-0.58%	-0.69%	1.48%	0.41%	0.15%	-0.17%	4.15%	-0.74%	0.15%	0.28%	13229	0.32%	3.43%

Austria	3		-1.45%	0.71%	-0.27%	0.02%	0.04%	-1.35%	0.80%	-0.93%	2.17%	-0.25%	-0.25%	1.80%	38621	0.20%	1.93%
Belgium	3		0.45%	0.31%	-1.04%	1.41%	0.72%	-0.18%	2.02%	-1.57%	2.83%	-0.36%	-0.55%	1.74%	35788	0.50%	1.19%
Canada	3		1.38%	-0.39%	-1.77%	0.05%	0.14%	-0.69%	0.76%	-1.13%	0.94%	-0.13%	-1.05%	-0.43%	38427	-0.25%	1.61%
Costa Rica	3		0.81%	5.85%	3.10%	-0.67%	2.63%	0.11%	-0.74%	-0.72%	4.92%	-1.60%	0.40%	0.25%	10466	1.14%	3.85%
Denmark	3		-1.94%	-1.02%	-1.56%	-1.88%	-1.16%	-1.31%	-0.71%	-3.03%	1.52%	-0.91%	-0.57%	0.44%	37162	-0.82%	0.64%
Finland	3		0.01%	-0.58%	-0.40%	0.42%	0.15%	-1.11%	1.05%	0.12%	1.27%	-0.63%	-0.39%	0.84%	35284	0.12%	0.91%
France	3		-0.75%	-0.46%	-1.44%	-0.57%	-1.26%	-2.16%	1.36%	-0.06%	3.00%	-0.12%	-1.61%	0.40%	33554	-0.31%	1.16%
Germany	3		-1.12%	-0.56%	1.74%	0.71%	1.33%	-1.26%	0.57%	-2.55%	2.46%	0.06%	-0.78%	0.16%	34566	-0.01%	2.46%
Iceland	3		-2.40%	0.96%	-5.15%	-0.76%	-0.10%	-2.16%	-1.23%	-6.11%	0.72%	-2.88%	-1.29%	0.64%	39754	-1.30%	0.32%
Ireland	3		-0.19%	4.10%	-8.72%	0.21%	-0.08%	-0.75%	0.49%	-8.02%	3.72%	-0.96%	-0.24%	0.94%	43374	-0.57%	-0.03%
Israel	3		-0.13%	0.21%	-0.64%	-1.92%	-1.30%	-1.96%	-1.11%	-2.15%	-0.99%	-0.57%	-0.39%	0.54%	27725	-0.78%	2.93%
Japan	3		0.41%	-0.68%	-3.70%	0.52%	-0.35%	-0.74%	-1.01%	-0.68%	1.76%	-0.01%	-0.14%	-0.76%	33550	-0.34%	1.73%
Korea Rep.	3		-1.22%	2.16%	0.03%	0.61%	0.53%	-0.26%	-0.19%	-1.49%	0.85%	0.40%	-0.16%	0.64%	26502	0.17%	4.19%
Luxembourg	3		0.40%	1.31%	0.35%	0.31%	1.16%	-0.32%	0.07%	-2.45%	2.75%	-1.46%	-0.35%	2.64%	81357	0.44%	-0.08%
Malaysia	3		-0.79%	-0.80%	-0.41%	-0.45%	0.14%	-0.30%	-0.26%	-0.38%	0.44%	0.48%	-0.20%	-0.12%	13748	-0.31%	4.28%
Netherlands	3		0.40%	0.81%	-1.55%	0.30%	0.61%	-0.14%	1.26%	-1.76%	1.30%	0.11%	0.21%	1.94%	39821	0.42%	1.27%
Norway	3		-0.15%	0.38%	0.99%	-1.13%	-0.03%	-0.83%	0.04%	-0.12%	1.44%	-0.03%	-0.15%	1.96%	52427	0.29%	1.31%
Qatar	3		2.05%	4.19%	0.64%	-0.90%	2.82%	2.98%	1.07%	-0.19%	5.94%	6.31%	5.29%	6.27%	76186	2.71%	5.51%
Singapore	3		0.41%	0.39%	0.57%	1.62%	1.38%	-0.54%	0.45%	-0.52%	1.59%	1.77%	-0.18%	1.32%	50302	0.64%	3.66%
Sweden	3		0.73%	0.36%	0.89%	-1.20%	-0.44%	-0.26%	1.23%	-0.01%	1.10%	-0.09%	-0.17%	0.91%	37815	0.26%	2.15%
Switzerland	3		0.05%	0.06%	1.56%	0.42%	0.78%	0.09%	0.92%	0.32%	1.30%	-0.20%	0.21%	0.72%	41937	0.53%	1.64%
Taiwan China	3		1.00%	1.15%	-0.71%	-0.80%	-0.19%	-0.18%	-0.13%	1.81%	0.25%	-0.02%	-0.84%	-1.23%	31384	-0.21%	4.19%
United Kingdom	3		-0.27%	1.45%	-4.61%	-0.36%	0.03%	-1.23%	0.02%	-3.54%	1.67%	-0.13%	-0.60%	1.31%	36047	-0.35%	0.61%
United States	3		-1.64%	-0.93%	-3.30%	-0.39%	-0.23%	-2.11%	-1.29%	-2.34%	1.20%	0.21%	-1.37%	-0.92%	46467	-0.98%	1.58%
Total:	24	*Ave*	-0.16%	0.79%	-1.06%	-0.18%	0.30%	-0.69%	0.23%	-1.56%	1.84%	-0.04%	-0.22%	0.92%	39261	0.05%	2.04%

Appendix 7 – Regression analysis results for all countries excluding Timor-Leste
Best regression between CAGR of GDP_PPPPC for all except Timor and CAGR's of 12 pillars plus PPPC_Initial

The REG Procedure
Model: MODEL1
Dependent Variable: cagrppppc

Number of Observations Read	117
Number of Observations Used	117

Analysis of Variance					
Source	**DF**	**Sum of Squares**	**Mean Square**	**F Value**	**Pr > F**
Model	4	0.02720	0.00680	22.41	<.0001
Error	112	0.03398	0.00030342		
Corrected Total	116	0.06119			

Root MSE	0.01742	**R-Square**	0.4446
Dependent Mean	0.03250	**Adj R-Sq**	0.4248
Coeff Var	53.60288		

Parameter Estimates						
Variable	**Label**	**DF**	**Parameter Estimate**	**Standard Error**	**t Value**	**Pr > |t|**
Intercept	Intercept	**1**	0.04778	0.00287	16.66	<.0001
cagrp01		**1**	0.32573	0.09872	3.30	0.0013
cagrp03		**1**	0.16127	0.06175	2.61	0.0102
cagrp10		**1**	0.37910	0.10651	3.56	0.0005
PPPPC_07	PPPPC_07	**1**	-0.00751	0.00109	-6.86	<.0001

Best regression between CAGR of GDP_PPPPC for all except Timor and CAGR's of 12 pillars plus PPPC_Initial

The REG Procedure
Model: MODEL1
Dependent Variable: cagrppppc

Obs	Dependent Variable	Predicted Value	Std Error Mean Predict	95% CL Mean		95% CL Predict		Residual	Std Error Residual	Student Residual	Cook's D
1	0.0434	0.0467	0.0039	0.0391	0.0543	0.0114	0.0821	-0.0033	0.0170	-0.193	0.000
2	0.0281	0.0212	0.0061	0.0091	0.0334	-0.0153	0.0578	0.0069	0.0163	0.423	0.005
3	0.0564	0.0293	0.0026	0.0241	0.0345	-0.0056	0.0642	0.0271	0.0172	1.574	0.012
4	0.0167	0.0430	0.0031	0.0369	0.0490	0.0079	0.0780	-0.0262	0.0171	-1.529	0.015
5	0.0269	0.0158	0.0027	0.0104	0.0213	-0.0191	0.0508	0.0111	0.0172	0.646	0.002
6	0.0193	0.0127	0.0032	0.0064	0.0189	-0.0224	0.0478	0.0067	0.0171	0.388	0.001
7	0.0598	0.0475	0.0027	0.0422	0.0528	0.0126	0.0824	0.0123	0.0172	0.717	0.002
8	-0.0211	0.0324	0.0041	0.0243	0.0405	-0.0030	0.0679	-0.0535	0.0169	-3.161	0.116
9	0.0669	0.0451	0.0029	0.0392	0.0510	0.0101	0.0801	0.0218	0.0172	1.272	0.010
10	0.0111	0.0149	0.0033	0.0082	0.0215	-0.0203	0.0500	-0.0038	0.0171	-0.220	0.000
11	0.0119	0.0193	0.0025	0.0143	0.0243	-0.0155	0.0542	-0.0075	0.0172	-0.433	0.001
12	0.0223	0.0468	0.0023	0.0422	0.0514	0.0120	0.0816	-0.0245	0.0173	-1.421	0.007
13	0.0440	0.0585	0.0035	0.0517	0.0654	0.0233	0.0937	-0.0145	0.0171	-0.849	0.006
14	0.0268	0.0420	0.0036	0.0348	0.0492	0.0067	0.0772	-0.0152	0.0170	-0.890	0.007
15	0.0338	0.0361	0.0028	0.0306	0.0416	0.0012	0.0710	-0.0023	0.0172	-0.131	0.000
16	0.0409	0.0541	0.0036	0.0470	0.0612	0.0189	0.0893	-0.0132	0.0170	-0.774	0.005
17	0.0333	0.0400	0.0021	0.0358	0.0442	0.0052	0.0747	-0.0067	0.0173	-0.384	0.000
18	0.0456	0.0413	0.0028	0.0358	0.0469	0.0064	0.0763	0.0042	0.0172	0.246	0.000
19	0.0336	0.0275	0.0061	0.0154	0.0396	-0.0091	0.0641	0.0061	0.0163	0.373	0.004
20	0.0586	0.0525	0.0038	0.0449	0.0601	0.0172	0.0878	0.0061	0.0170	0.360	0.001
21	0.0253	0.0435	0.0025	0.0386	0.0485	0.0087	0.0784	-0.0182	0.0172	-1.057	0.005
22	0.0161	0.0201	0.0031	0.0140	0.0261	-0.0150	0.0551	-0.0039	0.0171	-0.229	0.000
23	0.0313	0.0651	0.0051	0.0549	0.0752	0.0291	0.1011	-0.0338	0.0166	-2.031	0.078
24	0.0457	0.0395	0.0020	0.0356	0.0435	0.0048	0.0743	0.0062	0.0173	0.357	0.000

Obs	Dependent Variable	Predicted Value	Std Error Mean Predict	95% CL Mean		95% CL Predict		Residual	Std Error Residual	Student Residual	Cook's D
25	0.1029	0.0520	0.0032	0.0457	0.0583	0.0169	0.0871	0.0509	0.0171	2.972	0.061
26	0.0436	0.0378	0.0031	0.0316	0.0440	0.0028	0.0729	0.0058	0.0171	0.339	0.001
27	0.0385	0.0415	0.0028	0.0359	0.0471	0.0065	0.0764	-0.0030	0.0172	-0.173	0.000
28	0.0058	0.0274	0.0019	0.0238	0.0311	-0.0073	0.0622	-0.0217	0.0173	-1.252	0.004
29	-0.0069	0.0133	0.0033	0.0068	0.0198	-0.0218	0.0485	-0.0202	0.0171	-1.183	0.010
30	0.0152	0.0238	0.0022	0.0194	0.0282	-0.0110	0.0586	-0.0086	0.0173	-0.499	0.001
31	0.0064	0.0076	0.0033	0.0011	0.0141	-0.0275	0.0427	-0.0012	0.0171	-0.071	0.000
32	0.0468	0.0366	0.0022	0.0322	0.0410	0.0018	0.0714	0.0102	0.0173	0.589	0.001
33	0.0458	0.0518	0.0033	0.0452	0.0585	0.0167	0.0870	-0.0060	0.0171	-0.350	0.001
34	0.0336	0.0338	0.0036	0.0267	0.0410	-0.0014	0.0691	-0.0002	0.0170	-0.013	0.000
35	0.0162	0.0211	0.0045	0.0123	0.0300	-0.0145	0.0568	-0.0049	0.0168	-0.291	0.001
36	0.0100	0.0282	0.0024	0.0234	0.0329	-0.0067	0.0630	-0.0181	0.0173	-1.051	0.004
37	0.0742	0.0476	0.0030	0.0416	0.0536	0.0126	0.0826	0.0266	0.0172	1.552	0.015
38	0.0091	0.0183	0.0026	0.0132	0.0233	-0.0166	0.0532	-0.0092	0.0172	-0.531	0.001
39	0.0116	0.0174	0.0024	0.0125	0.0222	-0.0175	0.0522	-0.0058	0.0172	-0.334	0.000
40	0.0504	0.0497	0.0030	0.0437	0.0557	0.0147	0.0847	0.0007	0.0172	0.042	0.000
41	0.0246	0.0212	0.0033	0.0146	0.0278	-0.0139	0.0563	0.0034	0.0171	0.200	0.000
42	-0.0262	-0.0055	0.0063	-0.0179	0.0070	-0.0422	0.0312	-0.0207	0.0162	-1.276	0.049
43	0.0190	0.0442	0.0021	0.0400	0.0484	0.0094	0.0790	-0.0252	0.0173	-1.460	0.007
44	0.0537	0.0513	0.0050	0.0413	0.0612	0.0153	0.0872	0.0024	0.0167	0.146	0.000
45	0.0210	0.0463	0.0023	0.0417	0.0510	0.0115	0.0811	-0.0253	0.0173	-1.465	0.008
46	0.0371	0.0182	0.0031	0.0120	0.0245	-0.0168	0.0533	0.0188	0.0171	1.100	0.008
47	0.0121	0.0263	0.0037	0.0190	0.0337	-0.0089	0.0616	-0.0142	0.0170	-0.835	0.007
48	0.0032	-0.0091	0.0051	-0.0192	0.0009	-0.0451	0.0268	0.0123	0.0167	0.739	0.010
49	0.0697	0.0370	0.0039	0.0294	0.0447	0.0017	0.0724	0.0326	0.0170	1.923	0.039
50	0.0611	0.0495	0.0030	0.0436	0.0554	0.0145	0.0845	0.0116	0.0172	0.677	0.003
51	-0.0003	-0.0031	0.0056	-0.0142	0.0080	-0.0393	0.0332	0.0028	0.0165	0.169	0.001

Obs	Dependent Variable	Predicted Value	Std Error Mean Predict	95% CL Mean		95% CL Predict		Residual	Std Error Residual	Student Residual	Cook's D
52	0.0293	0.0234	0.0020	0.0194	0.0273	-0.0114	0.0581	0.0059	0.0173	0.341	0.000
53	-0.0026	0.0182	0.0023	0.0136	0.0228	-0.0166	0.0530	-0.0208	0.0173	-1.205	0.005
54	0.0074	0.0313	0.0030	0.0253	0.0372	-0.0038	0.0663	-0.0238	0.0172	-1.388	0.012
55	0.0173	0.0179	0.0029	0.0123	0.0236	-0.0170	0.0529	-0.0006	0.0172	-0.036	0.000
56	0.0332	0.0347	0.0023	0.0301	0.0392	-0.0002	0.0695	-0.0015	0.0173	-0.086	0.000
57	0.0544	0.0463	0.0024	0.0416	0.0510	0.0115	0.0812	0.0081	0.0173	0.468	0.001
58	0.0279	0.0397	0.0036	0.0325	0.0468	0.0044	0.0749	-0.0117	0.0170	-0.688	0.004
59	0.0419	0.0255	0.0027	0.0202	0.0308	-0.0094	0.0604	0.0164	0.0172	0.952	0.004
60	0.0173	0.0269	0.0045	0.0180	0.0357	-0.0088	0.0625	-0.0096	0.0168	-0.571	0.005
61	0.0466	0.0432	0.0022	0.0388	0.0476	0.00845	0.0780	0.0034	0.0173	0.197	0.000
62	0.0180	0.0265	0.0021	0.0225	0.0306	-0.0082	0.0613	-0.0085	0.0173	-0.491	0.001
63	0.0552	0.0164	0.0056	0.0053	0.0275	-0.0198	0.0527	0.0388	0.0165	2.352	0.128
64	0.0252	0.0274	0.0025	0.0224	0.0324	-0.0075	0.0623	-0.0022	0.0172	-0.129	0.000
65	-0.0008	-0.0170	0.0077	-0.0321	-0.0018	-0.0547	0.0207	0.0162	0.0156	1.035	0.051
66	0.0355	0.0441	0.0037	0.0368	0.0513	0.0088	0.0793	-0.0086	0.0170	-0.502	0.002
67	0.0056	0.0364	0.0048	0.0270	0.0458	0.0007	0.0722	-0.0308	0.0168	-1.838	0.054
68	0.0428	0.0360	0.0026	0.0309	0.0411	0.0011	0.0709	0.0067	0.0172	0.391	0.001
69	0.0116	0.0356	0.0036	0.0285	0.0427	0.0004	0.0708	-0.0240	0.0170	-1.406	0.017
70	0.0231	0.0207	0.0025	0.0159	0.0256	-0.0141	0.0556	0.0024	0.0172	0.139	0.000
71	0.0301	0.0314	0.0067	0.0181	0.0448	-0.0056	0.0684	-0.0014	0.0161	-0.086	0.000
72	0.0509	0.0382	0.0023	0.0336	0.0428	0.0034	0.0730	0.0127	0.0173	0.735	0.002
73	0.0216	0.0393	0.0022	0.0350	0.0437	0.0046	0.0741	-0.0177	0.0173	-1.027	0.003
74	0.0982	0.0516	0.0030	0.0458	0.0575	0.0166	0.0867	0.0466	0.0172	2.714	0.044
75	0.0512	0.0468	0.0023	0.0422	0.0514	0.0120	0.0816	0.0045	0.0173	0.258	0.000
76	0.0681	0.0349	0.0033	0.0283	0.0414	-0.0003	0.0700	0.0332	0.0171	1.941	0.028
77	0.0417	0.0301	0.0032	0.0237	0.0365	-0.0050	0.0652	0.0116	0.0171	0.675	0.003
78	0.0442	0.0399	0.0027	0.0347	0.0452	0.0050	0.0749	0.0042	0.0172	0.245	0.000

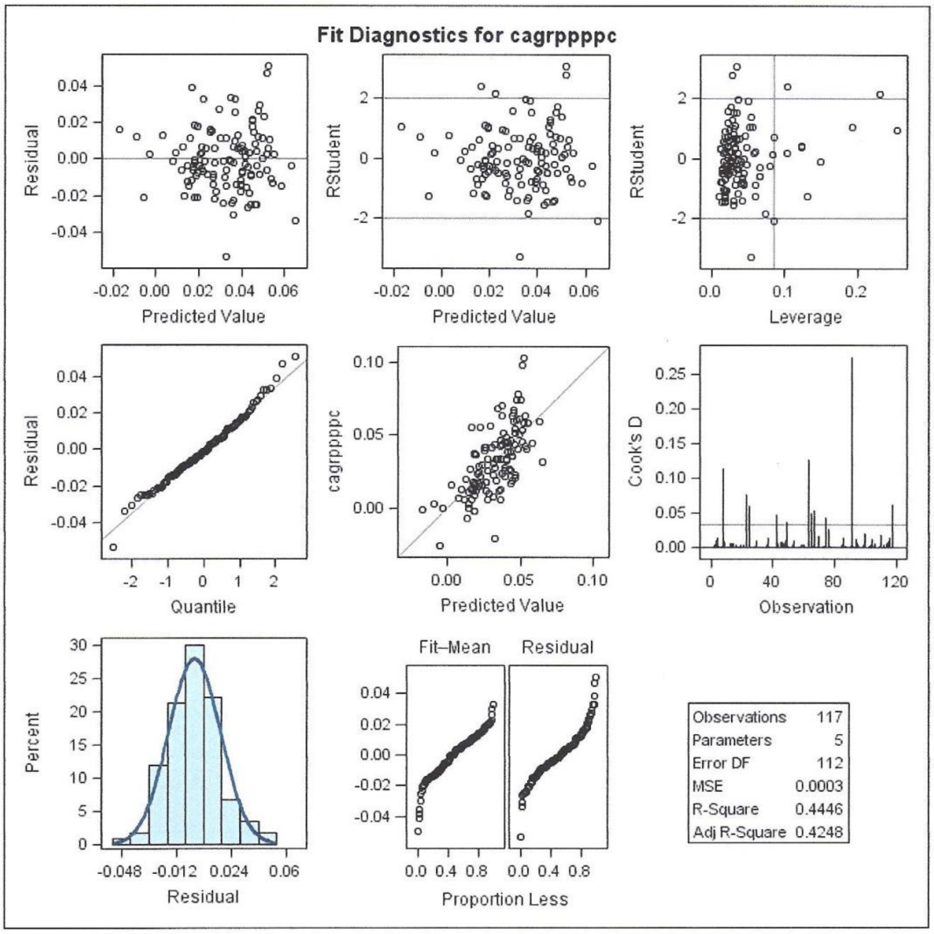
Obs	Dependent Variable	Predicted Value	Std Error Mean Predict	95% CL Mean		95% CL Predict		Residual	Std Error Residual	Student Residual	Cook's D
79	0.0127	0.0171	0.0028	0.0115	0.0227	-0.0179	0.0521	-0.0045	0.0172	-0.259	0.000
80	0.0150	0.0221	0.0025	0.0171	0.0271	-0.0128	0.0570	-0.0071	0.0172	-0.411	0.001
81	0.0325	0.0402	0.0030	0.0342	0.0461	0.0051	0.0752	-0.0077	0.0172	-0.448	0.001
82	0.0580	0.0551	0.0042	0.0468	0.0634	0.0196	0.0906	0.0029	0.0169	0.172	0.000
83	0.0131	0.0094	0.0043	0.0010	0.0178	-0.0261	0.0449	0.0037	0.0169	0.219	0.001
84	0.0223	0.0318	0.0044	0.0230	0.0406	-0.0038	0.0674	-0.0095	0.0168	-0.566	0.004
85	0.0776	0.0484	0.0028	0.0428	0.0539	0.0134	0.0833	0.0293	0.0172	1.704	0.016
86	0.0428	0.0535	0.0036	0.0464	0.0605	0.0182	0.0887	-0.0107	0.0171	-0.625	0.003
87	0.0637	0.0529	0.0032	0.0465	0.0593	0.0178	0.0880	0.0108	0.0171	0.632	0.003
88	0.0401	0.0484	0.0026	0.0432	0.0536	0.0135	0.0833	-0.0083	0.0172	-0.480	0.001
89	0.0479	0.0402	0.0027	0.0349	0.0454	0.0053	0.0751	0.0077	0.0172	0.447	0.001
90	0.0024	0.0143	0.0033	0.0079	0.0208	-0.0208	0.0494	-0.0119	0.0171	-0.696	0.003
91	0.0551	0.0222	0.0084	0.0057	0.0388	-0.0160	0.0605	0.0328	0.0153	2.147	0.276
92	0.0253	0.0392	0.0021	0.0349	0.0434	0.0044	0.0739	-0.0138	0.0173	-0.799	0.002
93	0.0384	0.0431	0.0024	0.0383	0.0479	0.0083	0.0780	-0.0047	0.0173	-0.272	0.000
94	0.0366	0.0190	0.0041	0.0108	0.0272	-0.0165	0.0545	0.0176	0.0169	1.037	0.013
95	0.0368	0.0194	0.0031	0.0133	0.0255	-0.0156	0.0545	0.0174	0.0171	1.016	0.007
96	0.0053	0.0168	0.0023	0.0122	0.0214	-0.0180	0.0516	-0.0115	0.0173	-0.667	0.002
97	0.0271	0.0328	0.0021	0.0286	0.0369	-0.0020	0.0675	-0.0057	0.0173	-0.330	0.000
98	0.0003	0.0149	0.0031	0.0088	0.0210	-0.0201	0.0500	-0.0146	0.0171	-0.854	0.005
99	0.0738	0.0503	0.0040	0.0423	0.0582	0.0149	0.0857	0.0235	0.0169	1.389	0.022
100	0.0215	0.0229	0.0030	0.0170	0.0288	-0.0121	0.0579	-0.0014	0.0172	-0.079	0.000
101	0.0164	0.0182	0.0035	0.0113	0.0251	-0.0170	0.0534	-0.0018	0.0171	-0.107	0.000
102	0.0419	0.0263	0.0023	0.0217	0.0309	-0.0086	0.0611	0.0156	0.0173	0.905	0.003
103	0.0596	0.0455	0.0031	0.0394	0.0515	0.0104	0.0805	0.0142	0.0171	0.827	0.004
104	0.0628	0.0448	0.0040	0.0369	0.0527	0.0094	0.0802	0.0180	0.0170	1.059	0.012
105	0.0435	0.0325	0.0034	0.0258	0.0392	-0.0027	0.0676	0.0111	0.0171	0.648	0.003

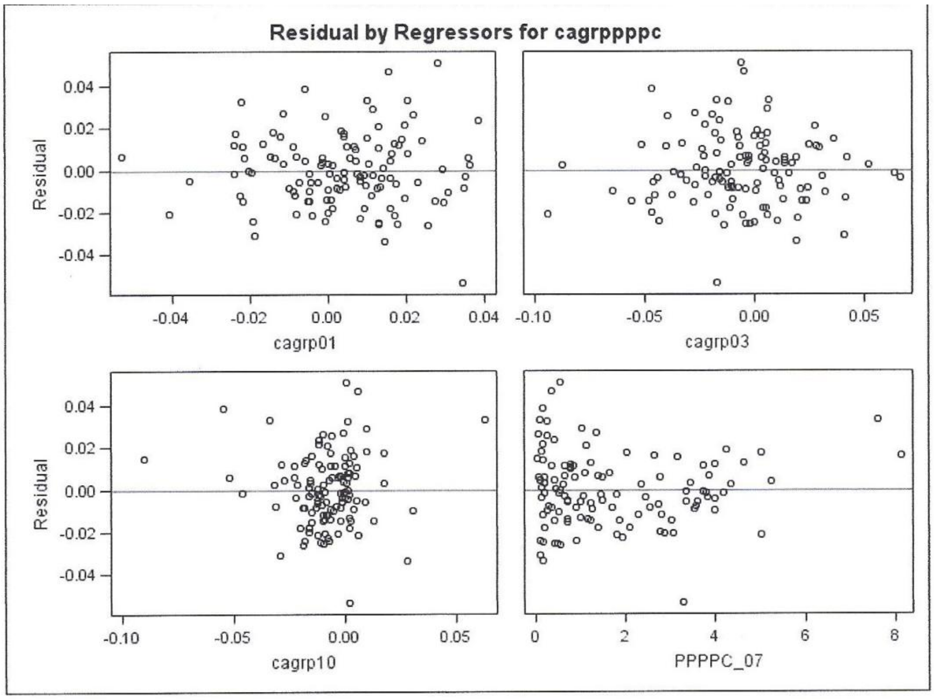
Obs	Dependent Variable	Predicted Value	Std Error Mean Predict	95% CL Mean		95% CL Predict		Residual	Std Error Residual	Student Residual	Cook's D
106	0.0131	0.0360	0.0023	0.0314	0.0406	0.0012	0.0708	-0.0229	0.0173	-1.327	0.006
107	0.0353	0.0440	0.0027	0.0386	0.0494	0.0091	0.0790	-0.0088	0.0172	-0.509	0.001
108	0.0421	0.0413	0.0029	0.0356	0.0470	0.0063	0.0763	0.0008	0.0172	0.0478	0.000
109	0.0237	0.0374	0.0020	0.0335	0.0414	0.0027	0.0722	-0.0138	0.0173	-0.796	0.002
110	-0.0023	0.0190	0.0042	0.0106	0.0273	-0.0166	0.0545	-0.0213	0.0169	-1.261	0.020
111	0.0061	0.0119	0.0032	0.0056	0.0183	-0.0232	0.0470	-0.0059	0.0171	-0.342	0.001
112	0.0158	0.0030	0.0037	-0.0043	0.0103	-0.0323	0.0383	0.0128	0.0170	0.753	0.005
113	0.0656	0.0450	0.0026	0.0398	0.0502	0.0101	0.0799	0.0206	0.0172	1.196	0.007
114	0.0182	0.0331	0.0043	0.0246	0.0415	-0.0025	0.0686	-0.0148	0.0169	-0.879	0.010
115	0.0628	0.0371	0.0032	0.0307	0.0434	0.0020	0.0722	0.0258	0.0171	1.505	0.016
116	0.0588	0.0628	0.0049	0.0530	0.0725	0.0269	0.0986	-0.0039	0.0167	-0.234	0.001
117	0.0399	0.0253	0.0088	0.0079	0.0427	-0.0134	0.0639	0.0146	0.0150	0.969	0.064

Sum of Residuals	0
Sum of Squared Residuals	0.03398
Predicted Residual SS (PRESS)	0.03799

Best regression between CAGR of GDP_PPPPC for all countries excluding Timor-Leste and CAGRs of 12 pillars plus PPPC_Initial

The REG Procedure
Model: MODEL1
Dependent Variable: cagrppppc




Residual by Regressors for cagrppppc
Residual
cagrp01
cagrp03
cagrp10
PPPPC_07
0.04
0.02
0.00
-0.02
-0.04
-0.10
-0.05
0.05
2
4
6
8

Best regression between CAGR of GDP_PPPPC for Cluster1 and CAGR's of 12 pillars plus PPPC_Initial

The REG Procedure
Model: MODEL1
Dependent Variable: cagrppppc

Number of Observations Read	20
Number of Observations Used	20

No variable met the 0.0500 significance level for entry into the model.

Best regression between CAGR of GDP_PPPPC for Cluster3 and CAGR's of 12 pillars plus PPPC_Initial

The REG Procedure
Model: MODEL1
Dependent Variable: cagrppppc

Number of Observations Read	73
Number of Observations Used	73

Analysis of Variance					
Source	**DF**	**Sum of Squares**	**Mean Square**	**F Value**	**Pr > F**
Model	4	0.02774	0.00694	27.05	<.0001
Error	68	0.01744	0.00025643		
Corrected Total	72	0.04518			

Root MSE	0.01601	**R-Square**	0.6140
Dependent Mean	0.03425	**Adj R-Sq**	0.5913
Coeff Var	46.75179		

Parameter Estimates						
Variable	**Label**	**DF**	**Parameter Estimate**	**Standard Error**	**t Value**	**Pr > |t|**
Intercept	Intercept	**1**	0.06819	0.00469	14.54	<.0001
cagrp01		**1**	0.30912	0.10413	2.97	0.0041
cagrp04		**1**	0.89424	0.23774	3.76	0.0004
cagrp10		**1**	0.98658	0.19018	5.19	<.0001
PPPPC_07	PPPPC_07	**1**	-0.01686	0.00194	-8.70	<.0001

Best regression between CAGR of GDP_PPPPC for Cluster3 and CAGR's of 12 pillars plus PPPC_Initial

The REG Procedure
Model: MODEL1
Dependent Variable: cagrppppc

Obs	Dependent Variable	Predicted Value	Std Error Mean Predict	95% CL Mean		95% CL Predict		Residual	Std Error Residual	Student Residual	Cook's D
1	0.0434	0.0462	0.0039	0.0385	0.0539	0.0133	0.0790	-0.0027	0.0155	-0.175	0.000
2	0.0281	0.0200	0.0069	0.0062	0.0339	-0.0148	0.0549	0.0081	0.0144	0.561	0.015
3	0.0564	0.0305	0.0028	0.0249	0.0362	-0.0019	0.0630	0.0259	0.0158	1.641	0.017
4	0.0167	0.0422	0.0032	0.0357	0.0486	0.0096	0.0748	-0.0254	0.0157	-1.623	0.022
5	0.0269	0.0041	0.0047	-0.0053	0.0135	-0.0292	0.0374	0.0228	0.0153	1.492	0.042
6	0.0598	0.0417	0.0024	0.0370	0.0465	0.0094	0.0740	0.0181	0.0158	1.144	0.006
7	-0.0211	0.0212	0.0055	0.0102	0.0322	-0.0126	0.0550	-0.0423	0.0150	-2.814	0.212
8	0.0669	0.0590	0.0033	0.0524	0.0656	0.0264	0.0916	0.0079	0.0157	0.504	0.002
9	0.0111	0.0014	0.0043	-0.0073	0.0101	-0.0317	0.0345	0.0097	0.0154	0.630	0.006
10	0.0440	0.0540	0.0049	0.0442	0.0638	0.0206	0.0874	-0.0100	0.0152	-0.654	0.009
11	0.0268	0.0341	0.0044	0.0252	0.0429	0.0009	0.0672	-0.0072	0.0154	-0.470	0.004
12	0.0409	0.0437	0.0038	0.0361	0.0513	0.0108	0.0765	-0.0028	0.0156	-0.179	0.000
13	0.0333	0.0379	0.0024	0.0332	0.0427	0.0056	0.0702	-0.0046	0.0158	-0.289	0.000
14	0.0586	0.0650	0.0059	0.0532	0.0769	0.0310	0.0991	-0.0064	0.0149	-0.431	0.006
15	0.0457	0.0370	0.0025	0.0320	0.0420	0.0046	0.0693	0.0088	0.0158	0.553	0.002
16	0.1029	0.0791	0.0061	0.0668	0.0914	0.0449	0.1133	0.0238	0.0148	1.608	0.089
17	0.0436	0.0353	0.0032	0.0290	0.0417	0.0028	0.0679	0.0083	0.0157	0.529	0.002
18	0.0058	0.0199	0.0026	0.0148	0.0249	-0.0125	0.0522	-0.0141	0.0158	-0.891	0.004
19	-0.0069	0.0056	0.0040	-0.0025	0.0136	-0.0274	0.0385	-0.0125	0.0155	-0.805	0.009
20	0.0152	0.0167	0.0030	0.0107	0.0228	-0.0158	0.0493	-0.0016	0.0157	-0.100	0.000
21	0.0468	0.0427	0.0022	0.0383	0.0471	0.0105	0.0750	0.0041	0.0159	0.256	0.000

Obs	Dependent Variable	Predicted Value	Std Error Mean Predict	95% CL Mean		95% CL Predict		Residual	Std Error Residual	Student Residual	Cook's D
22	0.0458	0.0734	0.0051	0.0632	0.0837	0.0399	0.1070	-0.0276	0.0152	-1.820	0.076
23	0.0336	0.0350	0.0047	0.0257	0.0443	0.0017	0.0683	-0.0014	0.0153	-0.091	0.000
24	0.0162	0.0223	0.0051	0.0121	0.0324	-0.0113	0.0558	-0.0060	0.0152	-0.395	0.003
25	0.0100	0.0151	0.0037	0.0079	0.0224	-0.0176	0.0479	-0.0051	0.0156	-0.327	0.001
26	0.0504	0.0571	0.0035	0.0502	0.0641	0.0244	0.0898	-0.0067	0.0156	-0.429	0.002
27	-0.0262	-0.0065	0.0055	-0.0174	0.0044	-0.0402	0.0273	-0.0197	0.0151	-1.310	0.045
28	0.0190	0.0497	0.0025	0.0448	0.0546	0.0173	0.0820	-0.0307	0.0158	-1.940	0.018
29	0.0537	0.0222	0.0063	0.0096	0.0348	-0.0121	0.0566	0.0315	0.0147	2.139	0.169
30	0.0210	0.0464	0.0027	0.0409	0.0518	0.0139	0.0788	-0.0253	0.0158	-1.606	0.016
31	0.0371	0.0023	0.0055	-0.0087	0.0133	-0.0315	0.0361	0.0348	0.0150	2.312	0.143
32	0.0121	0.0116	0.0035	0.0046	0.0187	-0.0211	0.0444	0.0005	0.0156	0.032	0.000
33	0.0697	0.0521	0.0049	0.0424	0.0619	0.0187	0.0855	0.0176	0.0153	1.151	0.027
34	0.0611	0.0667	0.0052	0.0565	0.0770	0.0332	0.1003	-0.0056	0.0152	-0.371	0.003
35	-0.0026	0.0066	0.0036	-0.0005	0.0138	-0.0261	0.0394	-0.0092	0.0156	-0.592	0.004
36	0.0074	0.0221	0.0049	0.0124	0.0319	-0.0113	0.0555	-0.0147	0.0152	-0.963	0.019
37	0.0332	0.0349	0.0030	0.0290	0.0407	0.0024	0.0673	-0.0017	0.0157	-0.106	0.000
38	0.0544	0.0482	0.0029	0.0424	0.0539	0.0157	0.0806	0.0062	0.0158	0.395	0.001
39	0.0173	0.0126	0.0078	-0.0030	0.0282	-0.0230	0.0481	0.0047	0.0140	0.334	0.007
40	0.0466	0.0397	0.0032	0.0333	0.0461	0.0071	0.0723	0.0069	0.0157	0.442	0.002
41	0.0180	0.0186	0.0032	0.0124	0.0249	-0.0139	0.0512	-0.0006	0.0157	-0.039	0.000
42	0.0252	0.0259	0.0024	0.0212	0.0306	-0.0064	0.0582	-0.0007	0.0158	-0.042	0.000
43	0.0355	0.0324	0.0046	0.0232	0.0416	-0.0009	0.0657	0.0031	0.0153	0.203	0.001
44	0.0056	0.0246	0.0055	0.0136	0.0356	-0.0092	0.0584	-0.0190	0.0150	-1.263	0.043
45	0.0231	0.0094	0.0043	0.0009	0.0179	-0.0237	0.0425	0.0137	0.0154	0.891	0.012

Obs	Dependent Variable	Predicted Value	Std Error Mean Predict	95% CL Mean		95% CL Predict		Residual	Std Error Residual	Student Residual	Cook's D
46	0.0509	0.0297	0.0029	0.0240	0.0354	-0.0028	0.0622	0.0212	0.0158	1.345	0.012
47	0.0216	0.0316	0.0033	0.0249	0.0382	-0.0011	0.0642	-0.0100	0.0157	-0.638	0.004
48	0.0982	0.0706	0.0045	0.0617	0.0795	0.0374	0.1037	0.0277	0.0154	1.799	0.054
49	0.0512	0.0476	0.0028	0.0419	0.0533	0.0151	0.0800	0.0036	0.0158	0.231	0.000
50	0.0442	0.0400	0.0042	0.0316	0.0484	0.0069	0.0730	0.0042	0.0154	0.272	0.001
51	0.0150	0.0107	0.0035	0.0037	0.0176	-0.0220	0.0434	0.0044	0.0156	0.279	0.001
52	0.0325	0.0320	0.0045	0.0229	0.0410	-0.0012	0.0652	0.0005	0.0154	0.034	0.000
53	0.0776	0.0494	0.0042	0.0411	0.0578	0.0164	0.0825	0.0282	0.0155	1.825	0.049
54	0.0428	0.0293	0.0062	0.0169	0.0416	-0.0050	0.0635	0.0136	0.0148	0.918	0.030
55	0.0637	0.0516	0.0036	0.0444	0.0588	0.0188	0.0843	0.0121	0.0156	0.777	0.006
56	0.0401	0.0468	0.0026	0.0417	0.0519	0.0145	0.0792	-0.0067	0.0158	-0.423	0.001
57	0.0479	0.0389	0.0033	0.0324	0.0454	0.0063	0.0715	0.0090	0.0157	0.572	0.003
58	0.0024	0.0065	0.0037	-0.0008	0.0139	-0.0263	0.0393	-0.0041	0.0156	-0.263	0.001
59	0.0253	0.0346	0.0020	0.0306	0.0387	0.0024	0.0668	-0.0093	0.0159	-0.585	0.001
60	0.0384	0.0500	0.0035	0.0431	0.0570	0.0173	0.0827	-0.0116	0.0156	-0.741	0.005
61	0.0368	0.0222	0.0043	0.0137	0.0308	-0.0108	0.0553	0.0146	0.0154	0.946	0.014
62	0.0053	0.0040	0.0036	-0.0031	0.0112	-0.0287	0.0368	0.0012	0.0156	0.079	0.000
63	0.0003	0.0065	0.0036	-0.0007	0.0136	-0.0263	0.0392	-0.0062	0.0156	-0.395	0.002
64	0.0738	0.0631	0.0042	0.0547	0.0716	0.0301	0.0962	0.0107	0.0154	0.691	0.007
65	0.0596	0.0572	0.0038	0.0497	0.0648	0.0244	0.0901	0.0024	0.0156	0.155	0.000
66	0.0435	0.0343	0.0037	0.0269	0.0417	0.0015	0.0671	0.0092	0.0156	0.593	0.004
67	0.0131	0.0278	0.0023	0.0231	0.0324	-0.0045	0.0601	-0.0147	0.0158	-0.925	0.004
68	0.0353	0.0508	0.0034	0.0439	0.0577	0.0181	0.0835	-0.0155	0.0156	-0.993	0.010
69	0.0237	0.0511	0.0038	0.0435	0.0588	0.0183	0.0840	-0.0275	0.0155	-1.766	0.038

Obs	Dependent Variable	Predicted Value	Std Error Mean Predict	95% CL Mean		95% CL Predict		Residual	Std Error Residual	Student Residual	Cook's D
70	-0.0023	0.0051	0.0076	-0.0101	0.0203	-0.0303	0.0405	-0.0074	0.0141	-0.528	0.016
71	0.0656	0.0477	0.0030	0.0417	0.0536	0.0152	0.0802	0.0180	0.0157	1.142	0.009
72	0.0182	0.0439	0.0046	0.0347	0.0531	0.0107	0.0771	-0.0257	0.0153	-1.674	0.050
73	0.0628	0.0575	0.0038	0.0500	0.0650	0.0247	0.0903	0.0054	0.0156	0.343	0.001

Sum of Residuals	0
Sum of Squared Residuals	0.01744
Predicted Residual SS (PRESS)	0.02074

Best regression between CAGR of GDP_PPPPC for Cluster5 and CAGR's of 12 pillars plus PPPC_Initial

The REG Procedure
Model: MODEL1
Dependent Variable: cagrppppc

Number of Observations Read	24
Number of Observations Used	24

Analysis of Variance					
Source	**DF**	**Sum of Squares**	**Mean Square**	**F Value**	**Pr > F**
Model	6	0.00484	0.00080647	27.35	<.0001
Error	17	0.00050132	0.00002949		
Corrected Total	23	0.00534			

Root MSE	0.00543	**R-Square**	0.9061
Dependent Mean	0.02042	**Adj R-Sq**	0.8730
Coeff Var	26.59342		

Parameter Estimates						
Variable	**Label**	**DF**	**Parameter Estimate**	**Standard Error**	**t Value**	**Pr > |t|**
Intercept	Intercept	**1**	0.04277	0.00347	12.33	<.0001
cagrp02		**1**	0.32581	0.09238	3.53	0.0026
cagrp03		**1**	0.22761	0.04674	4.87	0.0001
cagrp07		**1**	-0.36740	0.14078	-2.61	0.0183
cagrp09		**1**	-0.28976	0.12074	-2.40	0.0281
cagrp10		**1**	0.78388	0.08469	9.26	<.0001
PPPPC_07	PPPPC_07	**1**	-0.00408	0.00084434	-4.83	0.0002

Best regression between CAGR of GDP_PPPPC for Cluster5 and CAGR's of 12 pillars plus PPPC_Initial

The REG Procedure
Model: MODEL1
Dependent Variable: cagrppppc

Obs	Dependent Variable	Predicted Value	Std Error Mean Predict	95% CL Mean		95% CL Predict		Residual	Std Error Residual	Student Residual	Cook's D
1	0.0193	0.0176	0.0014	0.0146	0.0205	0.0057	0.0294	0.0018	0.00524	0.337	0.001
2	0.0119	0.0083	0.0028	0.0024	0.0143	-0.0046	0.0213	0.0035	0.0046	0.763	0.031
3	0.0161	0.0152	0.0017	0.0117	0.0187	0.0032	0.0272	0.0009	0.0052	0.181	0.000
4	0.0385	0.0405	0.0051	0.0296	0.0513	0.0247	0.0563	-0.0020	0.0017	-1.135	1.600
5	0.0064	0.0118	0.0025	0.0066	0.0170	-0.0008	0.0244	-0.0054	0.0049	-1.119	0.046
6	0.0091	0.0131	0.0019	0.0092	0.0171	0.0010	0.0253	-0.0040	0.0051	-0.786	0.012
7	0.0116	0.0096	0.0028	0.0037	0.0155	-0.0033	0.0225	0.0020	0.0047	0.423	0.009
8	0.0246	0.0220	0.0025	0.0168	0.0272	0.0094	0.0346	0.0026	0.0049	0.542	0.011
9	0.0032	-0.0022	0.0030	-0.0086	0.004175	-0.0153	0.0109	0.0054	0.0045	1.194	0.091
10	-0.0003	-0.0015	0.0043	-0.0106	0.007661	-0.0161	0.0132	0.0012	0.0033	0.363	0.033
11	0.0293	0.0332	0.0030	0.0269	0.0395	0.0201	0.0463	-0.0039	0.0045	-0.867	0.047
12	0.0173	0.0170	0.0030	0.0108	0.0232	0.0040	0.0300	0.0003	0.0046	0.073	0.000
13	0.0419	0.0404	0.0026	0.0350	0.0458	0.0278	0.0531	0.0015	0.0048	0.303	0.004
14	-0.0008	-0.0050	0.0044	-0.0143	0.004253	-0.0198	0.0097	0.0043	0.0032	1.348	0.501
15	0.0428	0.0370	0.0028	0.0312	0.0429	0.0242	0.0499	0.0057	0.0047	1.226	0.077
16	0.0127	0.0181	0.0021	0.0136	0.0226	0.0058	0.0304	-0.0055	0.0050	-1.092	0.031
17	0.0131	0.0203	0.0020	0.0161	0.0246	0.0081	0.0325	-0.0072	0.0050	-1.427	0.047
18	0.0551	0.0551	0.0050	0.0445	0.0656	0.0395	0.0707	-0.0000	0.0021	-0.018	0.000
19	0.0366	0.0324	0.0020	0.0283	0.0366	0.0203	0.0446	0.0041	0.0051	0.816	0.015
20	0.0215	0.0222	0.0022	0.0176	0.0267	0.0098	0.0345	-0.0006	0.0050	-0.124	0.000
21	0.0164	0.0206	0.0020	0.0165	0.0248	0.0084	0.0328	-0.0042	0.0051	-0.837	0.015
22	0.0419	0.0317	0.0023	0.0269	0.0366	0.0193	0.0442	0.0101	0.0050	2.059	0.130
23	0.0061	0.0164	0.0021	0.0120	0.0208	0.0041	0.0286	-0.0103	0.0050	-2.051	0.104

Obs	Dependent Variable	Predicted Value	Std Error Mean Predict	95% CL Mean		95% CL Predict		Residual	Std Error Residual	Student Residual	Cook's D
24	0.0158	0.0161	0.0030	0.0099	0.0224	0.0031	0.0292	-0.0003	0.0045	-0.072	0.000

Sum of Residuals	0
Sum of Squared Residuals	0.00050132
Predicted Residual SS (PRESS)	0.00126

Appendix 8: CAGRs of twelve competitiveness variables, initial PPPPC-GDP (07) and CAGR in PPPPC-GDP (07-13), arranged by five WEF segments

		179	*180*	*181*	*182*	*183*	*184*	*185*	*186*	*187*	*188*	*189*	*190*
		WEF segment variables: country CAGR scores for twelve competitiveness pillars (2007-2013)											
Country	WEF Stage of development (average over 2007-2013)	pillar 1	pillar 2	pillar 3	pillar 4	pillar 5	pillar 6	pillar 7	pillar 8	pillar 9	pillar 10	pillar 11	pillar 12
Burundi	1	-2.13%	0.66%	4.22%	2.68%	-1.44%	1.83%	-0.98%	-3.02%	2.16%	-5.20%	-0.74%	-1.25%
Ethiopia	1	2.18%	3.13%	-1.93%	4.70%	2.20%	1.60%	0.17%	-0.17%	2.32%	-0.94%	1.40%	1.74%
Nepal	1	0.71%	-0.24%	0.52%	-0.23%	1.45%	0.14%	0.49%	0.79%	1.65%	-2.70%	-0.19%	-0.90%
Madagascar	1	-1.88%	-0.33%	4.04%	-0.83%	0.79%	1.60%	0.65%	-2.38%	1.64%	-2.91%	0.00%	-0.42%
Mozambique	1	1.01%	0.67%	-1.73%	0.45%	0.46%	2.18%	-1.11%	-0.96%	4.22%	-3.37%	1.00%	0.04%
Uganda	1	1.41%	0.02%	-2.60%	3.88%	0.61%	1.23%	0.40%	2.99%	1.77%	-1.59%	0.60%	-0.59%
Tanzania	1	-1.38%	-3.11%	-0.79%	3.98%	1.46%	-0.11%	0.84%	-0.39%	1.62%	0.99%	0.36%	-0.20%
Burkina Faso	1	-0.58%	1.01%	1.38%	0.85%	0.43%	0.43%	0.92%	-1.86%	1.06%	-1.57%	-1.10%	-1.17%
Zimbabwe	1	1.90%	-2.11%	3.58%	0.18%	-0.56%	1.66%	-0.48%	-1.18%	3.13%	-9.00%	-0.73%	-1.66%
Mali	1	-1.90%	4.51%	1.08%	0.05%	2.05%	1.30%	-0.45%	0.84%	4.73%	-1.84%	0.77%	0.10%
Tajikistan	1	2.42%	1.18%	-1.49%	0.16%	4.48%	2.42%	1.66%	1.56%	4.17%	-1.74%	3.63%	2.32%
Bangladesh	1	1.97%	-0.65%	-2.23%	-0.14%	1.98%	0.90%	-0.89%	-2.16%	3.76%	-1.17%	0.36%	-1.27%
Cambodia	1	3.59%	4.09%	1.88%	1.26%	4.73%	1.80%	0.07%	8.27%	6.43%	-2.28%	3.12%	3.82%
Benin	1	1.30%	3.38%	0.00%	-0.21%	2.00%	0.31%	2.66%	-0.77%	4.45%	-1.08%	0.21%	1.35%
Kyrgyz Republic	1	1.04%	2.78%	-0.32%	-1.45%	0.77%	1.29%	0.38%	0.60%	4.89%	-1.56%	-0.24%	-2.36%
Chad	1	1.45%	4.26%	1.93%	-2.78%	3.37%	2.42%	1.67%	0.00%	2.87%	2.83%	2.13%	3.93%
Kenya	1	1.10%	4.29%	-4.53%	-0.47%	0.61%	0.42%	1.64%	0.39%	3.61%	-0.84%	0.16%	0.09%
Vietnam	1	-0.05%	4.20%	-3.95%	-0.04%	1.82%	0.71%	0.30%	1.31%	4.27%	-0.58%	-0.51%	-0.56%
Lesotho	1	-0.60%	3.75%	-4.70%	-4.66%	-0.15%	2.27%	0.03%	-0.94%	1.84%	-5.46%	1.05%	-0.25%
Mauritania	1	-2.40%	7.43%	6.40%	-2.82%	-0.84%	1.25%	-1.98%	-1.65%	0.76%	-4.60%	0.07%	0.77%

Pakistan	1	-0.49%	-2.38%	-6.47%	0.43%	1.11%	-0.75%	-0.23%	-0.98%	2.26%	-0.52%	-0.48%	-0.41%
Zambia	1	1.58%	4.32%	6.64%	1.48%	4.21%	5.82%	-0.21%	0.74%	3.10%	0.02%	5.52%	5.88%
India	1	-2.22%	1.03%	-1.18%	-0.64%	-1.10%	-1.49%	1.40%	0.48%	1.38%	0.12%	-2.21%	-2.05%
Nicaragua	1	1.32%	4.17%	1.18%	-0.57%	1.10%	1.52%	0.52%	0.10%	3.97%	-3.08%	1.28%	0.81%
Cameroon	1	1.60%	4.92%	-1.11%	2.17%	2.14%	2.62%	2.69%	1.56%	2.50%	-1.62%	1.35%	1.46%
Nigeria	1	-0.01%	-1.01%	1.38%	-1.79%	2.20%	0.09%	1.50%	-0.71%	3.73%	1.76%	0.42%	-0.70%
Bolivia	1	2.75%	5.73%	2.33%	-2.09%	1.80%	1.25%	-0.69%	0.82%	3.53%	0.29%	3.31%	4.57%
Mongolia	1	1.56%	5.27%	-0.44%	-0.23%	0.72%	1.63%	1.05%	-1.40%	7.97%	0.57%	1.88%	0.47%
Honduras	1	1.77%	2.05%	-0.22%	-1.18%	2.07%	2.92%	-1.97%	3.31%	5.94%	-0.99%	1.91%	1.70%
Philippines	1	1.28%	3.23%	2.40%	-0.78%	1.83%	-0.30%	0.70%	2.20%	3.41%	-1.27%	0.37%	0.01%
Timor-Leste	1	2.78%	4.01%	0.95%	-0.97%	0.85%	3.28%	1.75%	-2.56%	2.87%	32.85%	1.37%	2.01%
Sri Lanka	1	3.87%	6.60%	-1.59%	0.16%	2.99%	0.83%	1.87%	1.78%	5.21%	-1.14%	3.13%	0.67%
Egypt	Transition 1/2	-2.03%	0.34%	-2.24%	-2.09%	-2.11%	-0.83%	-0.82%	2.05%	3.89%	0.11%	-0.63%	-1.03%
Guyana	Transition 1/2	3.62%	4.94%	5.21%	-1.72%	6.72%	1.64%	2.27%	1.93%	6.74%	-3.18%	3.33%	4.04%
Paraguay	Transition 1/2	3.08%	4.32%	3.24%	-2.79%	2.23%	3.87%	2.05%	3.19%	6.13%	-1.49%	2.68%	2.33%
Indonesia	Transition 1/2	0.48%	4.91%	2.85%	0.86%	1.71%	-1.45%	-1.88%	-0.71%	4.14%	-0.44%	-0.11%	0.58%
Azerbaijan	Transition 1/2	1.81%	2.08%	2.46%	-0.87%	1.83%	2.08%	1.17%	-0.93%	7.05%	-1.13%	0.60%	0.93%
Botswana	Transition 1/2	1.13%	-0.15%	-3.34%	1.02%	0.99%	1.67%	0.14%	-1.22%	1.25%	0.20%	0.80%	0.92%
Venezuela	Transition 1/2	-0.47%	-0.25%	-5.60%	-1.70%	2.78%	-3.41%	-3.30%	-1.87%	2.16%	1.31%	-1.58%	-2.56%
Kuwait	Transition 1/2	-0.89%	0.16%	0.07%	-1.83%	-0.86%	-0.88%	-2.69%	-3.09%	1.69%	3.09%	-1.89%	-0.78%
Georgia	Transition 1/2	2.94%	9.22%	0.37%	0.01%	1.40%	1.81%	1.59%	0.29%	8.05%	-1.25%	1.98%	-0.77%
Morocco	Transition 1/2	1.59%	3.88%	-0.27%	-1.31%	0.38%	1.57%	2.18%	2.46%	4.60%	-0.70%	0.67%	-0.69%
Guatemala	Transition 1/2	1.30%	4.68%	-0.43%	-0.59%	3.32%	2.41%	2.07%	4.16%	4.78%	-0.94%	1.67%	1.38%
Armenia	Transition 1/2	2.57%	5.58%	-1.36%	-0.76%	3.28%	2.02%	0.47%	2.81%	5.25%	-1.85%	1.63%	-0.81%
Ukraine	Transition 1/2	-0.03%	4.60%	-0.98%	0.41%	2.07%	0.31%	0.90%	-2.55%	6.07%	-0.91%	-0.12%	-0.12%
Kazakhstan	Transition 1/2	1.65%	4.08%	0.48%	-0.92%	0.70%	-0.13%	0.14%	-3.08%	6.38%	0.14%	-0.77%	-1.20%
Algeria	Transition 1/2	-5.28%	1.47%	-2.31%	-2.12%	0.18%	-3.31%	-3.81%	-4.05%	1.86%	-0.18%	-3.58%	-5.64%
China	2	2.82%	3.03%	-0.62%	1.24%	2.87%	0.58%	1.25%	6.04%	3.15%	0.05%	1.03%	1.55%

Jordan	2	-0.48%	0.23%	-1.27%	-0.95%	0.79%	0.31%	-0.10%	-0.88%	4.01%	-1.50%	1.21%	0.33%
El Salvador	2	-3.55%	-0.46%	-3.12%	-1.20%	0.12%	-0.72%	-2.62%	-0.91%	1.89%	-1.22%	-0.88%	-1.32%
Jamaica	2	-0.08%	0.14%	-4.31%	-2.69%	0.98%	-0.73%	-0.24%	-0.65%	0.10%	-0.69%	-0.74%	-1.31%
Ecuador	2	2.28%	4.89%	-1.03%	0.09%	4.64%	2.08%	-0.58%	1.77%	6.33%	0.94%	1.14%	2.38%
Albania	2	3.51%	11.43%	-2.23%	-1.27%	5.40%	3.79%	1.39%	-2.39%	6.71%	-1.10%	1.07%	3.94%
Peru	2	1.30%	5.48%	2.95%	-1.41%	1.69%	1.60%	2.07%	2.12%	3.39%	0.52%	-0.32%	-0.45%
Bosnia and Herzegovina	2	2.97%	7.58%	-2.75%	-1.85%	3.87%	1.81%	-0.54%	-3.76%	8.99%	-1.48%	1.11%	2.49%
Thailand	2	-2.16%	-0.25%	0.23%	-0.78%	-0.23%	-0.58%	-2.47%	-0.06%	-0.16%	-0.64%	-0.40%	-1.91%
Macedonia FYR	2	3.49%	4.80%	-0.99%	-1.55%	0.88%	3.02%	1.56%	0.22%	7.44%	-1.78%	0.31%	-0.93%
Namibia	2	0.68%	-0.22%	-4.03%	-1.19%	-0.10%	0.73%	-0.32%	0.40%	2.88%	-2.26%	0.38%	0.99%
Dominican Republic	2	0.70%	0.14%	-2.34%	-0.50%	2.65%	1.31%	0.03%	1.84%	3.60%	-1.04%	1.06%	0.78%
Colombia	2	-1.38%	3.02%	1.36%	-1.23%	1.68%	0.15%	-0.11%	0.34%	3.95%	-0.30%	-0.64%	-0.23%
Bulgaria	2	1.76%	4.41%	0.15%	-0.35%	1.15%	1.79%	1.64%	-0.71%	6.74%	-1.24%	1.05%	-0.10%
South Africa	2	-0.43%	-1.23%	-1.88%	-3.49%	-0.97%	-0.22%	-0.42%	1.72%	2.94%	-0.83%	-0.94%	-1.18%
Panama	2	1.15%	4.24%	0.61%	-1.59%	1.93%	1.42%	0.65%	-0.03%	8.32%	0.96%	0.28%	2.33%
Costa Rica	2	0.81%	5.85%	3.10%	-0.67%	2.63%	0.11%	-0.74%	-0.72%	4.92%	-1.60%	0.40%	0.25%
Mauritius	2	1.71%	1.38%	0.53%	-0.60%	1.55%	1.17%	1.73%	-0.85%	3.42%	-1.82%	0.28%	-0.98%
Malaysia	2	-0.79%	-0.80%	-0.41%	-0.45%	0.14%	-0.30%	-0.26%	-0.38%	0.44%	0.48%	-0.20%	-0.12%
Romania	2	0.07%	2.89%	1.34%	-0.92%	0.73%	-0.74%	0.02%	0.34%	3.76%	-0.63%	-2.15%	-0.83%
Qatar	2	2.05%	4.19%	0.64%	-0.90%	2.82%	2.98%	1.07%	-0.19%	5.94%	6.31%	5.29%	6.27%
Argentina	2	-1.13%	1.16%	-2.67%	-1.17%	0.71%	-2.29%	-0.74%	-0.36%	4.32%	-0.09%	-1.08%	-0.73%
Brazil	2	1.95%	4.03%	4.15%	-1.75%	0.74%	0.50%	1.94%	1.82%	5.54%	0.18%	0.17%	-0.40%
Mexico	2	0.10%	2.14%	0.51%	-1.75%	0.93%	0.32%	0.54%	2.18%	3.03%	0.23%	0.68%	0.90%
Uruguay	Transition 2/3	1.32%	3.68%	2.77%	0.26%	2.59%	1.74%	-2.65%	2.42%	6.97%	-0.78%	0.71%	0.97%
Turkey	Transition 2/3	0.29%	4.24%	2.10%	-0.07%	0.46%	0.32%	1.21%	3.07%	4.69%	0.37%	-0.29%	0.14%
Russian Federation	Transition 2/3	0.82%	5.56%	1.12%	-0.11%	1.10%	-0.94%	-0.81%	-1.39%	6.32%	0.54%	-1.68%	-1.72%
Chile	Transition 2/3	0.57%	0.27%	0.31%	-1.04%	1.02%	-0.72%	-0.64%	-0.30%	2.28%	0.12%	-1.24%	0.23%
Poland	Transition 2/3	2.05%	2.86%	-1.71%	-1.12%	0.64%	0.52%	0.17%	1.92%	5.43%	0.21%	0.12%	-0.87%

Lithuania	Transition 2/3	0.93%	2.70%	-3.38%	-0.38%	0.71%	-0.08%	-0.05%	-1.99%	4.74%	-1.14%	-0.58%	0.76%
Latvia	Transition 2/3	0.23%	1.07%	-1.20%	-0.30%	-0.39%	-0.19%	0.71%	-1.49%	3.39%	-1.90%	-0.91%	0.91%
Croatia	Transition 2/3	-0.42%	3.78%	-0.53%	-0.52%	1.07%	-0.59%	-1.02%	-0.86%	5.04%	-1.24%	-2.07%	-0.78%
Hungary	Transition 2/3	-2.17%	2.22%	2.17%	-0.94%	-0.69%	-0.56%	-0.87%	-2.04%	1.84%	-0.99%	-2.69%	-0.51%
Barbados	Transition 2/3	0.22%	2.82%	-4.41%	-0.56%	0.95%	0.55%	0.79%	-2.03%	3.58%	-2.17%	1.43%	1.34%
Estonia	Transition 2/3	0.95%	1.39%	0.38%	-0.11%	-0.17%	-0.93%	1.26%	-0.90%	0.77%	-1.99%	-0.70%	1.07%
Trinidad and Tobago	Transition 2/3	0.81%	5.33%	1.97%	-0.26%	1.83%	-0.06%	-0.91%	-2.47%	5.07%	-0.79%	-0.68%	-0.89%
Bahrain	Transition 2/3	3.45%	3.35%	-1.69%	-0.48%	3.97%	2.11%	3.25%	-1.53%	3.42%	0.19%	1.63%	3.48%
Slovak Republic	Transition 2/3	-2.38%	2.13%	-1.76%	0.25%	0.19%	-0.83%	-1.95%	-1.78%	1.31%	-0.66%	-0.74%	-2.31%
Taiwan China	Transition 2/3	1.00%	1.15%	-0.71%	-0.80%	-0.19%	-0.18%	-0.13%	1.81%	0.25%	-0.02%	-0.84%	-1.23%
Czech Republic	3	-0.98%	1.44%	-0.73%	-0.46%	-0.27%	-0.58%	-1.12%	-0.40%	2.45%	-0.17%	-1.26%	-0.69%
Malta	3	0.11%	4.09%	-1.03%	0.18%	2.24%	0.59%	1.45%	-0.69%	2.78%	-2.16%	1.27%	2.13%
Korea Rep.	3	-1.22%	2.16%	0.03%	0.61%	0.53%	-0.26%	-0.19%	-1.49%	0.85%	0.40%	-0.16%	0.64%
Portugal	3	-2.24%	2.19%	-3.78%	-0.97%	1.26%	-0.70%	-1.34%	-4.17%	4.29%	-0.79%	-0.24%	0.71%
Slovenia	3	-0.85%	2.03%	-2.13%	-0.50%	0.38%	-0.67%	-0.83%	-5.16%	2.53%	-0.99%	-1.61%	1.04%
Israel	3	-0.13%	0.21%	-0.64%	-1.92%	-1.30%	-1.96%	-1.11%	-2.15%	-0.99%	-0.57%	-0.39%	0.54%
Greece	3	-4.05%	1.22%	-9.41%	-0.56%	0.73%	-1.46%	-0.33%	-4.34%	5.70%	-0.91%	-1.62%	-1.82%
Cyprus	3	0.00%	0.79%	-4.68%	0.00%	1.69%	-0.03%	1.59%	-1.36%	4.29%	-1.61%	-0.21%	0.61%
Hong Kong SAR	3	0.33%	1.29%	0.10%	0.20%	0.98%	-1.06%	0.17%	-1.01%	1.81%	0.27%	-0.59%	0.34%
New Zealand	3	0.95%	1.44%	-2.73%	-0.48%	0.81%	-0.64%	-0.03%	-1.72%	2.52%	-1.04%	-0.37%	1.18%
Spain	3	-0.52%	1.90%	-4.79%	-0.81%	0.77%	-1.09%	-0.12%	-3.58%	3.55%	-0.20%	-1.13%	0.63%
Japan	3	0.41%	-0.68%	-3.70%	0.52%	-0.35%	-0.74%	-1.01%	-0.68%	1.76%	-0.01%	-0.14%	-0.76%
Italy	3	-0.81%	4.42%	-1.76%	-0.51%	0.39%	-0.05%	0.78%	-1.69%	1.68%	-0.29%	0.18%	1.32%
Singapore	3	0.41%	0.39%	0.57%	1.62%	1.38%	-0.54%	0.45%	-0.52%	1.59%	1.77%	-0.18%	1.32%
Germany	3	-1.12%	-0.56%	1.74%	0.71%	1.33%	-1.26%	0.57%	-2.55%	2.46%	0.06%	-0.78%	0.16%
France	3	-0.75%	-0.46%	-1.44%	-0.57%	-1.26%	-2.16%	1.36%	-0.06%	3.00%	-0.12%	-1.61%	0.40%
Canada	3	1.38%	-0.39%	-1.77%	0.05%	0.14%	-0.69%	0.76%	-1.13%	0.94%	-0.13%	-1.05%	-0.43%
Belgium	3	0.45%	0.31%	-1.04%	1.41%	0.72%	-0.18%	2.02%	-1.57%	2.83%	-0.36%	-0.55%	1.74%

Australia	3	-0.88%	0.36%	-0.69%	0.16%	0.44%	-1.66%	-0.84%	-1.55%	1.24%	-0.01%	-0.68%	1.13%
Austria	3	-1.45%	0.71%	-0.27%	0.02%	0.04%	-1.35%	0.80%	-0.93%	2.17%	-0.25%	-0.25%	1.80%
United Kingdom	3	-0.27%	1.45%	-4.61%	-0.36%	0.03%	-1.23%	0.02%	-3.54%	1.67%	-0.13%	-0.60%	1.31%
United States	3	-1.64%	-0.93%	-3.30%	-0.39%	-0.23%	-2.11%	-1.29%	-2.34%	1.20%	0.21%	-1.37%	-0.92%
Finland	3	0.01%	-0.58%	-0.40%	0.42%	0.15%	-1.11%	1.05%	0.12%	1.27%	-0.63%	-0.39%	0.84%
Netherlands	3	0.40%	0.81%	-1.55%	0.30%	0.61%	-0.14%	1.26%	-1.76%	1.30%	0.11%	0.21%	1.94%
Sweden	3	0.73%	0.36%	0.89%	-1.20%	-0.44%	-0.26%	1.23%	-0.01%	1.10%	-0.09%	-0.17%	0.91%
Denmark	3	-1.94%	-1.02%	-1.56%	-1.88%	-1.16%	-1.31%	-0.71%	-3.03%	1.52%	-0.91%	-0.57%	0.44%
United Arab Emirates	3	1.73%	2.04%	0.59%	1.15%	3.20%	1.51%	1.67%	1.02%	3.72%	0.59%	1.72%	3.91%
Ireland	3	-0.19%	4.10%	-8.72%	0.21%	-0.08%	-0.75%	0.49%	-8.02%	3.72%	-0.96%	-0.24%	0.94%
Switzerland	3	0.05%	0.06%	1.56%	0.42%	0.78%	0.09%	0.92%	0.32%	1.30%	-0.20%	0.21%	0.72%
Iceland	3	-2.40%	0.96%	-5.15%	-0.76%	-0.10%	-2.16%	-1.23%	-6.11%	0.72%	-2.88%	-1.29%	0.64%
Norway	3	-0.15%	0.38%	0.99%	-1.13%	-0.03%	-0.83%	0.04%	-0.12%	1.44%	-0.03%	-0.15%	1.96%
Luxembourg	3	0.40%	1.31%	0.35%	0.31%	1.16%	-0.32%	0.07%	-2.45%	2.75%	-1.46%	-0.35%	2.64%

Relationship between CAGR of GDP_PPPPC for WEF Cluster 1 countries and CAGR's of 12 pillars plus GDPIntitial

The REG Procedure
Model: MODEL1
Dependent Variable: CAGRPPPPC CAGRPPPPC

Number of Observations Read	36
Number of Observations Used	36

Stepwise Selection: Step 1
Variable pillar10 Entered: R-Square = 0.2185 and C(p) = 1.8224

Analysis of Variance					
Source	**DF**	**Sum of Squares**	**Mean Square**	**F Value**	**Pr > F**
Model	1	0.00369	0.00369	9.51	0.0040
Error	34	0.01321	0.00038855		
Corrected Total	35	0.01690			

Variable	Parameter Estimate	Standard Error	Type II SS	F Value	Pr > F
Intercept	0.04904	0.00330	0.08564	220.42	<.0001
pillar10	0.16752	0.05434	0.00369	9.51	0.0040

All variables left in the model are significant at the 0.1000 level.
No other variable met the 0.0500 significance level for entry into the model.

Summary of Stepwise Selection									
Step	**Variable Entered**	**Variable Removed**	**Label**	**Number Vars In**	**Partial R-Square**	**Model R-Square**	**C(p)**	**F Value**	**Pr > F**
1	pillar10		pillar10	1	0.2185	0.2185	1.8224	9.51	0.0040

Relationship between CAGR of GDP_PPPPC for WEF Cluster 2 countries and CAGR's of 12 pillars plus GDPInitial

The REG Procedure
Model: MODEL1
Dependent Variable: CAGRPPPPC CAGRPPPPC

Number of Observations Read	13
Number of Observations Used	13

Stepwise Selection: Step 1
Variable Pillar01 Entered: R-Square = 0.3503 and C(p) = .

Analysis of Variance					
Source	**DF**	**Sum of Squares**	**Mean Square**	**F Value**	**Pr > F**
Model	1	0.00268	0.00268	5.93	0.0331
Error	11	0.00496	0.00045124		
Corrected Total	12	0.00764			

Variable	**Parameter Estimate**	**Standard Error**	**Type II SS**	**F Value**	**Pr > F**
Intercept	0.03170	0.00647	0.01083	24.00	0.0005
Pillar01	0.81532	0.33479	0.00268	5.93	0.0331

All variables left in the model are significant at the 0.1000 level.
No other variable met the 0.0500 significance level for entry into the model.

Summary of Stepwise Selection									
Step	**Variable Entered**	**Variable Removed**	**Label**	**Number Vars In**	**Partial R-Square**	**Model R-Square**	**C(p)**	**F Value**	**Pr > F**
1	Pillar01		Pillar01	1	0.3503	0.3503	.	5.93	0.0331

Relationship between CAGR of GDP_PPPPC for WEF Cluster 3 countries and CAGR's of 12 pillars plus GDPIntitial

The REG Procedure
Model: MODEL1
Dependent Variable: CAGRPPPPC CAGRPPPPC

Number of Observations Read	22
Number of Observations Used	22

Stepwise Selection: Step 1
Variable pillar04 Entered: R-Square = 0.2267 and C(p) = -4.3007

Analysis of Variance					
Source	**DF**	**Sum of Squares**	**Mean Square**	**F Value**	**Pr > F**
Model	1	0.00120	0.00120	5.86	0.0251
Error	20	0.00408	0.00020423		
Corrected Total	21	0.00528			

Variable	Parameter Estimate	Standard Error	Type II SS	F Value	Pr > F
Intercept	0.05179	0.00533	0.01930	94.52	<.0001
pillar04	0.86281	0.35629	0.00120	5.86	0.0251

All variables left in the model are significant at the 0.1000 level.
No other variable met the 0.0500 significance level for entry into the model.

Summary of Stepwise Selection									
Step	**Variable Entered**	**Variable Removed**	**Label**	**Number Vars In**	**Partial R-Square**	**Model R-Square**	**C(p)**	**F Value**	**Pr > F**
1	pillar04		pillar04	1	0.2267	0.2267	-4.3007	5.86	0.0251

Relationship between CAGR of GDP_PPPPC for WEF Cluster 4 countries and CAGR's of 12 pillars plus GDPIntitial

The REG Procedure
Model: MODEL1
Dependent Variable: CAGRPPPPC CAGRPPPPC

Number of Observations Read	14
Number of Observations Used	14

Stepwise Selection: Step 1
Variable pillar12 Entered: R-Square = 0.4643 and C(p) = .

Analysis of Variance					
Source	**DF**	**Sum of Squares**	**Mean Square**	**F Value**	**Pr > F**
Model	1	0.00226	0.00226	10.40	0.0073
Error	12	0.00261	0.00021737		
Corrected Total	13	0.00487			

Variable	Parameter Estimate	Standard Error	Type II SS	F Value	Pr > F
Intercept	0.02264	0.00394	0.00717	33.00	<.0001
pillar12	-0.88665	0.27492	0.00226	10.40	0.0073

Stepwise Selection: Step 2
Variable pillar08 Entered: R-Square = 0.6521 and C(p) = .

Analysis of Variance					
Source	**DF**	**Sum of Squares**	**Mean Square**	**F Value**	**Pr > F**
Model	2	0.00318	0.00159	10.31	0.0030
Error	11	0.00169	0.00015403		
Corrected Total	13	0.00487			

Variable	Parameter Estimate	Standard Error	Type II SS	F Value	Pr > F
Intercept	0.02616	0.00362	0.00805	52.26	<.0001

Variable	Parameter Estimate	Standard Error	Type II SS	F Value	Pr > F
pillar08	0.49067	0.20141	0.00091412	5.93	0.0330
pillar12	-0.79638	0.23437	0.00178	11.55	0.0060

All variables left in the model are significant at the 0.1000 level.
No other variable met the 0.0500 significance level for entry into the model.

Summary of Stepwise Selection									
Step	**Variable Entered**	**Variable Removed**	**Label**	**Number Vars In**	**Partial R-Square**	**Model R-Square**	**C(p)**	**F Value**	**Pr > F**
1	pillar12		pillar12	1	0.4643	0.4643	.	10.40	0.0073
2	pillar08		pillar08	2	0.1877	0.6521	.	5.93	0.0330

Relationship between CAGR of GDP_PPPPC for WEF Segment 5 countries and CAGRs of 12 pillars plus GDP Initial

The REG Procedure
Model: MODEL1
Dependent Variable: CAGRPPPPC CAGRPPPPC

Number of Observations Read	33
Number of Observations Used	33

Stepwise Selection: Step 1
Variable pillar03 Entered: R-Square = 0.4054 and C(p) = 38.6898

Analysis of Variance					
Source	**DF**	**Sum of Squares**	**Mean Square**	**F Value**	**Pr > F**
Model	1	0.00320	0.00320	21.14	<.0001
Error	31	0.00470	0.00015159		
Corrected Total	32	0.00790			

Variable	**Parameter Estimate**	**Standard Error**	**Type II SS**	**F Value**	**Pr > F**
Intercept	0.02037	0.00258	0.00945	62.32	<.0001
pillar03	0.37313	0.08116	0.00320	21.14	<.0001

Stepwise Selection: Step 2
Variable pillar10 Entered: R-Square = 0.5757 and C(p) = 21.3049

Analysis of Variance					
Source	**DF**	**Sum of Squares**	**Mean Square**	**F Value**	**Pr > F**
Model	2	0.00455	0.00227	20.35	<.0001
Error	30	0.00335	0.00011178		
Corrected Total	32	0.00790			

Variable	**Parameter Estimate**	**Standard Error**	**Type II SS**	**F Value**	**Pr > F**

Variable	Parameter Estimate	Standard Error	Type II SS	F Value	Pr > F
Intercept	0.01972	0.00222	0.00879	78.65	<.0001
pillar03	0.27685	0.07502	0.00152	13.62	0.0009
pillar10	0.48539	0.13989	0.00135	12.04	0.0016

Stepwise Selection: Step 3
Variable pillar09 Entered: R-Square = 0.6701 and C(p) = 12.5596

Analysis of Variance					
Source	**DF**	**Sum of Squares**	**Mean Square**	**F Value**	**Pr > F**
Model	3	0.00530	0.00177	19.63	<.0001
Error	29	0.00261	0.00008991		
Corrected Total	32	0.00790			

Variable	Parameter Estimate	Standard Error	Type II SS	F Value	Pr > F
Intercept	0.02729	0.00330	0.00615	68.43	<.0001
pillar03	0.15695	0.07912	0.00035384	3.94	0.0568
pillar09	-0.40753	0.14149	0.00074595	8.30	0.0074
pillar10	0.67887	0.14231	0.00205	22.75	<.0001

All variables left in the model are significant at the 0.1000 level.
No other variable met the 0.0500 significance level for entry into the model.

Summary of Stepwise Selection									
Step	**Variable Entered**	**Variable Removed**	**Label**	**Number Vars In**	**Partial R-Square**	**Model R-Square**	**C(p)**	**F Value**	**Pr > F**
1	pillar03		pillar03	1	0.4054	0.4054	38.6898	21.14	<.0001
2	pillar10		pillar10	2	0.1703	0.5757	21.3049	12.04	0.0016

Summary of Stepwise Selection									
Step	**Variable Entered**	**Variable Removed**	**Label**	**Number Vars In**	**Partial R-Square**	**Model R-Square**	**C(p)**	**F Value**	**Pr > F**
3	pillar09		pillar09	3	0.0944	0.6701	12.5596	8.30	0.0074