Institutions and Economic Growth in Comparative Perspectives

K S Prime

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Institutions and Economic Growth in Comparative Perspectives

Karla Simone Prime

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ABSTRACT

Differences in cross-country economic performance have been attributed to differences in the quantity and quality of capital and labour stocks over time and space and cross-country differences in the productivity of these factors. Furthermore, institutional infrastructures have been considered deep determinants of the allocation and productivity of the factors of production. Despite the persistently low economic performance of middle- and low-income economies, there is a paucity of research into the dynamics of the relationship between institutions, productivity and economic performance in middle- and low-income economies. There is much research on these relationships among advanced and OECD economies, but no clear perspective of the dynamics of these relationships in middle- and low-income economies. This thesis extends the discussion of the relationship between institutions as deep determinants, productivity and the factors of production and their influence on long-run economic performance in middle- and low-income economies.

This thesis takes a positivist-deductivist approach. A representative sample of 17 developing economies for which relevant data is publicly available is used to test for the fixed and random effect of institutions and productivity on long-run economic performance. Using growth-accounting, this thesis decomposes aggregate output to calculate national levels of productivity, measured as TFP. Then using factor analysis, publicly available data is used to calculate an aggregate institutional index and four institutional factors. Using fixed and random effects models, this thesis tests for the influence of the aggregate institutional index and four institutional factors on levels of TFP, capital and labour stock.

There is evidence that in the long run, levels of TFP drive how efficiently and intensely the factors of input are converted in the production process in the sample of 17 developing economies. The results suggest that cross-country differences in economic performance amongst these developing economies may be due to differences in TFP. Further that in the long run, institutions indirectly affect economic performance in these 17 developing economies through their direct influence on levels of TFP. Levels of TFP are directly influenced by the quality of national institutions, thereby impacting the efficiency and intensity of converting labour and capital stocks in the production process.

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LIST OF ACRONYMS

2SLS	2 Stage Least Squares
BGD	Bangladesh
BWA	Botswana
EFW	Economic Freedom of the World Index
EGY	Arab Republic of Egypt
FA	Factor Analysis
FE	Fixed Effects Estimation
GDP	Gross Domestic Product
GFK	Gross Fixed Capital Formation
GHA	Ghana
GMM	Generalised Method of Moments
ICRG	International Country Risk Guide
IND	India
INST	Aggregate Institutional Index Calculated in this thesis
IPD	Institutional Profiles Database
JAM	Jamaica
KEN	Kenya
LKA	Sri Lanka
MC	Market-Creating Institutions
ML	Market-Legitimising Institutions
MR	Market-Regulating Institutions
MS	Market-Stabilising Institutions
MUS	Mauritius
MWI	Malawi
MYS	Malaysia
NGA	Nigeria
OECD	Organisation for Economic Co-operation and Development
OLS	Ordinary Least Squares
PAK	Pakistan
PMG	Pooled Mean Group
PWT	Penn World Tables
R&D	Research and Development
RE	Random Effects Estimation
SLE	Sierra Leone
TFP	Total Factor Productivity
TZA	Tanzania
WDI	World Bank's Development Indicators
WEF	World Economic Forum
WGI	World Governance Indicators
ZMB	Zambia
ZWE	Zimbabwe

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DECLARATION

I declare that the work contained in this thesis has not been submitted for any other award and that it is all my own work. I also confirm that this work fully acknowledges opinions, ideas and contributions from the work of others.

Any ethical clearance for the research presented in this thesis has been approved. Approval has been sought and granted by the Faculty Ethics Committee on 4th July, 2017.

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Name: Karla Simone Prime

Signature:

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CHAPTER 1 INTRODUCTION

1.1 Background to this research

Burgeoning literature seeks to investigate the extent to which the quality and rate of economic performance in middle- and low-income economies is determined by either productivity or their institutional infrastructure. They entertain the hypothesis that cross-country differences in economic performance tends to be dependent on differences in labour productivity and the productivity of capital. Productivity is accounted for by total factor productivity ("TFP") (Solow, 1957). Although research has been conducted on the association between productivity and economic performance, there is still little agreement on the association between the deeper determinants and productivity. In the argument on the importance of the deeper determinants that have been identified, the institutional hypothesis argues that institutions are a more robust explanation than geography and trade openness, of national decisions behind the accumulation of capital and labour stocks and investment in productivity (Akobeng, 2016; Bennett & Nikolaev, 2016; Góes, 2016; Guerriero, 2016; Schein, 2016; Aguiar, Costa, & Silva, 2017; Mullings, 2017). Institutions are defined as the formal rules and informal norms that form the infrastructure of social relationships within the economic system. The purpose of this research is to investigate the association amongst capital, labour, productivity, institutions and economic performance in middle- and low-income economies.

The literature agrees that institutions and productivity are multidimensional. It is dangerous to make a categorical claim that rich economies have better quality institutions than economies in the developing world (Chang, 2011). Institutional quality is generally exemplified as the rules, regulations, laws and policies that influence economic incentives to invest in technology, physical capital and human capital (Savoia & Sen, 2016). For the most part literature that explores the influence of institutions on economic performance suggest that for the most part, differences in institutional quality explains cross-country differences in per capita income. They agree that institutions matter for the level and rate of economic performance of economies. There is cogent empirical groundwork for the hypothesis that institutions, rather than luck, geography or culture cause cross-country differences in incomes per capita (Acemoglu, 2009). However, there are fewer studies that have investigated this association in developing (middle- and low-income) economies.

Developing economies in this study include middle and low income economies as defined by the World Bank for 2018 fiscal year; i) middle income are those economies with a GNI per capita between $1,006 and $12,235; and ii) low income economies are those with a GNI per capita of $1,005 or less. Integral to explaining the influence of institutions on economic performance is identifying the mechanisms through which it impacts levels and rates of production and output.

Neoclassical economic growth theory assumes that labour and the product markets are perfectly competitive (Solow, 1956). Invariably economic growth varies across economies not only because of differences in the quantity and quality of the factors of production over time and space, but also differences in how these factors of production are combined to produce goods and services. The quantity and quality of the labour supply may be reliant on educational attainment of workers, working preferences and demographics. Physical capital may be dependent on investment growth and the rate of depreciation. Levels of output depend on the level of competition within the product and resource markets and barriers to investment can reduce the efficiency with which capital is used (Barrell, Holland, & Liadze, 2010). Similarly, an economies level of integration with the global economy can affect access to technology, innovation, new processes and impact the aggregate rate of economic growth (Barrell et al., 2010). Research on the contribution of capital and nation specific factors on economic growth in many developing countries have yielded results that undoubtedly differ from the related research and empirical results in relation to economically developed countries, for example the United States. For example, the calculations for seven leading Latin American economies for the period from 1960 to 1996 suggest that the accumulation of capital significantly accounts for a larger portion of their economic development compared to other factors, including the complex concept of technological change (Alfaro, Kalemh-Ozcan, & Volosovych, 2008; Abad, 2013; Abad & van Zanden, 2016).

Capital itself, has been identified as a significant factor for the economic growth in underdeveloped economies. National levels of productivity growth have usually be considered important for increasing levels of production in developed economies. Yet the influence of global productivity factors cannot be ignored when examining the cause of higher rates of economic growth. Alternatively, the World Bank has unequivocally confirmed that the increase of the factors of production,

particularly capital accumulation, have an increasingly significant influence on economic growth in developing economies. The accumulation of capital has been identified as far more important for economic growth in economically less developed economies as it is for economic growth in economically developed economies.

With so many potential factors that can impact an economies' ability to not only accumulate but distribute and efficiently use its factors of production, there have been several empirical studies that have investigated the efficiency of production and drivers of productivity. However, many of these studies focus on developed economies and there is a paucity of studies that have specifically focused on what has hindered economic growth in developing economies. There is little empirical consensus on what is most important for increasing levels of productivity in developing economies, whether investment in the labour force, or increased investment in physical capital, or investment in new processes for the efficient combination of both towards higher levels of output.

Traditional growth accounting exercises are grounded on an aggregate production function and expressed in growth rates. The results of a growth accounting exercise will depend on how the production function is specified (Dreher, Méon, & Schneider, 2014). Growth accounting estimates an economies' output as a function of their factors of production and compares these estimates with actual output figures. The difference between the estimates and actual output figures provides the levels of total factor productivity ('TFP'), or the Solow residual (Solow, 1962b). The vast majority of empirical literature examining cross-country economic growth comparison use the Cobb-Douglas production function. Dreher et al. (2014) contend that the Cobb-Douglas production function provides a good comparative for cross-country economic growth accounting. This neoclassical approach will be used in this thesis to decompose the long-run output by differences in factors of production and productivity.

Decomposition of the aggregate output in this manner enables the comparison of experiences amongst different economies. This can help provide a framework for allocating changes within an economies' observed output into the contributions from changes in its factors of production. Neoclassicism assumes that for any given combination of factors of production a shift in the production frontier is brought about by improvements in productivity or efficiency. By treating the factors

of production as substitutionary and not complementary, neoclassical fundamental presumptions and assumptions are based on the notion of equilibrium and marginalism (Havik et al., 2014). The standard neoclassical model assumes that the output-capital ratio is an endogenous variable. This would mean that as the levels of capital increase, so should the productivity of labour. However, developing economies are principally characterised as capital-scarce, but low-cost labour abundant. This raises the question of whether neoclassical assumptions can be applied to developing economies.

Different economies face different constraints to achieving economic growth, based on their political and economic institutions, which can affect the efficiency of their production processes. Institutions impact economic actor's decisions to invest in either productive activities or divert resources away from production to protection and security. The competitive structure of efficient markets can only result in economic actors making optimal decisions if the institutional infrastructure can provide a means to reduce the cost of transactions and make up for an imbalance of information availability to parties in exchange transactions. Any shift in incentives or resources can quickly lead to a shift in the behaviour of economic actors. Where transaction costs are significant, market institutions can provide incentives for actors to acquire essential information that will lead them to engage in productive activities. By implications, institutions should be designed to achieve efficient outcomes, but are they sufficient to play an independent role in economic outcomes?

Institutions can become the building blocks of social, political and economic life. The inclinations, competence, proficiency and basic characters of individual actors within the economy may be conditioned by institutional structures. When choices are being made, institutions can constrain the possible outcomes. The differences in cross-country economic outcomes suggests that there may be some disparity in the quality of institutions that have been adopted by economies at different levels of development. The analysis of the role of institutions in explaining cross-country variations in economic growth must now be extended to address the question of '*which institutions matter'* for economic growth. The classification of institutions under broad socio-political categories, can cloud the different channels through which institutions can impact output levels (Das & Quirk, 2016). Rodrik, Subramanian, and Trebbi (2004) and Rodrik (2005) add another dimension to the measurement spectrum by conceptualising their taxonomy on the basis of '*the*

cumulative outcome of past policy actions' (p.156). This definition does bring into question how they measure institutions in their investigation. There can be a blurred line between policy and institution and often in empirical research no explicit distinction is made between the two (Voigt, 2013).

This chapter is organised as follows:

Section 1.2 discusses the relevance of this research topic and the aims and objectives of this thesis.

Section 1.3 outlines the thesis structure.

1.2 Research aims and objectives

The principal aim of this thesis is to build upon the understanding of the association between productivity, institutions and national output in developing economies. To achieve this aim, this thesis will:

1) Investigate whether differences in levels of national output of a sample of 17 developing economies is associated with different levels of productivity;
2) Investigate whether different levels of national output in a sample of 17 developing economies is associated with different categories of institutions.

This thesis will try to understand the persistently low economic performance of developing economies. More particularly, it will try to understand why developing economies have been unable to maximise the combination of the factors of production to attain higher levels of productivity and the role of their institutional infrastructure to support productive activities. This thesis will achieve this through the conceptual framework predicated upon the neoclassical economic growth theory as set out in Section 2.3.

The decomposition of output using the Cobb-Douglas production function is to highlight how efficiently developing economies combine their factors of production. This will provide some measure of the productivity of capital and labour in developing economies. This will provide some understanding of how developing economies may optimally choose from a menu of methods of production dependent

on the endowment of its labour force and access to physical and financial capital. Discerning the determinants of aggregate economic performance is critical in explaining how to increase levels of productivity and output in middle- and low-income economies. While the endogenous economic schools of thought put the focus on investments in accumulating skills, knowledge and technical progress, exogenous economic schools of thought focus on the consequence of the accumulation of capital and labour stocks.

These processes of accumulation occur within the resource markets. The resource market is where firms, governments and individuals meet to engage in mutually beneficial exchanges (Ostrom, 2010). Within these resource markets, economic decisions are guided by aggregate interactions amongst these economic actors. The markets facilitate trade (Kranton, 1996). Economic agents in search of trading partners in the resource market, may be subject to information asymmetry, where they either do not have information or have limited information about other economic agents within the market. As these markets emerge spontaneously or are deliberately constructed based on human interaction, to enable exchange of goods and services, they require some measure of structure or regulation to ensure that asymmetry of information does not adversely affect trading partners' decisions.

There has been an absence of empirical consensus on how productivity affects economic performance of developing economies. The disparity in empirical results occur partially because of disparity in variables used to calculate productivity and the definition of productivity. Growth of productive capacity is driven by conditions that either improve the quality of outputs or the efficacy of the conversion of the factors of production in the production process (Syverson, 2011). This thesis augments the existing literature by providing further evidence of the role of productivity, specifically in developing economies. Some empirical studies have focused only on investment in research and development ("R&D") as a measure of productivity (Griliches, 1980, 1987; Comin, 2004; Lipsey & Carlaw, 2004; Cameron, Proudman, & Redding, 2005; Coe, Helpman, & Hoffmaister, 2009; Samimi & Alerasoul, 2009; Criscuolo, Squicciarini, & Lehtoranta, 2010; Teixeira & Fortuna, 2010; Hu, Yang, & Chen, 2014; Gomleksiz, Sahbaz, & Mercan, 2017). Other studies focus on improving the quality of labour, through investment in acquiring skills and knowledge (Easterly & Levine, 2001; Yamarik, 2011; Chatzimichael & Tzouvelekas, 2014; Jones, 2014; Pelinescu, 2015; Yilmazer & Cinar, 2015; Angelopoulos, Malley,

& Philippopoulos, 2017; Benos, Mylonidis, & Zotou, 2017; Sequeira, Santos, & Ferreira-Lopes, 2017; Kocourek & Nedomlelova, 2018). This thesis will rely on the exogenous neoclassical economic school of thought to determine the effect of productivity on economic performance. Neoclassical growth models make two assumptions about productivity: i) ideas are a public good; and ii) growth in ideas is exogenous (Solow, 1957). It juxtaposes productivity as any component of increasing productive capacity that is not otherwise explained by capital and labour, for example technological progress.

This thesis will extend the analyses of the inclination, intensity and productivity of the resource market, to the influence of institutions as a deeper determinant of the structure and efficiency of the market, towards increasing levels of productivity and national output. Well-functioning markets are critical for the allocative efficiency of capital and labour stocks towards their most productive uses. This thesis will argue that institutions are the most robust mechanism for solving the problem of inefficient markets arising from costly and imperfect information between economic agents within the market. This thesis will evaluate the influence of institutions on capital and labour stocks and productivity in selected developing economies. The institutional infrastructure may influence economic actors' decisions to invest in more capital or labour stocks. Similarly, the institutional infrastructure may influence the choice of methods of production to make optimal use of the factors of production. Institutions can affect the quality of the labour force, from unskilled to skilled workers; incentives to invest in more efficient capital; and incentives to invest in more efficient processes.

Levels of competition within the economy, quality and access to education and levels of integration into the global economy may be determined by the quality of institutions and the opportunities that institutions can create. Institutions are integral in the interaction between the government and firms within the economy, ensuring public-private collaboration that is in the best interest of the economy. Without the appropriate institutional infrastructure, progress on the efficient allocation and use of the factors of production cannot be easy; for example, the quality of the labour force, the structure of the resource and product markets. Existing literature agrees that institutions play an essential role for economic growth, but do not agree on the mechanism through which institutions encourage productive

activities or the category of institutions that matter the most, particularly for developing economies.

This thesis will augment the existing literature on the interaction between endogenous institutions and economic growth in developing economies by using alternative estimation methods. Empirical studies by La Porta, Lopez-de-Silanes, Shliefer, and Vishny (1998); La Porta, Lopez-De-Silanes, Shleifer, and Vishny (1999); La Porta (2007), Acemoglu, Johnson, and Robinson (2001); Acemoglu and Johnson (2005); Acemoglu (2006), Beck, Demirguc-Kunt, and Levine (2003) and Rajan and Zingales (2003) are most similar to this work. However, for the most part, these studies have used reduced-form models to focus on the role of institutions in influencing economic performance in developed economies. Much of the extant empirical literature on the interaction between institutions and economic performance emphasise the role of property rights and contract enforcement in generating incentives for investment in the market. This thesis will evaluate the mechanism through which different categories of institutions influence sustained, long run economic growth in middle- and low-income economies, using fixed and random effects estimation models to assess whether the effect of institutions is fixed or random amongst the sample of developing economies.

This thesis is intended to add to the existing literature, by developing a framework for understanding how developing economies can make knowledgeable decisions about practices and policies to improve their economic performance, through improving their institutional infrastructure. The World Economic Forum has measured competitiveness for almost 35 years and has persistently found that economies that have ‘strong’ institutions traditionally appear at the top of the Global Competitiveness Index (World Economic Forum, 2018). For example, Nordic countries such as Finland, Denmark and Norway have been ranked as generally higher quality institutions and persistently achieve higher levels of economic performance (World Economic Forum, 2018). Increasing awareness of the influence of institutions on levels of productivity and accumulation of the factors of production contribute to the burgeoning literature in this area. Unfortunately, many of these studies have focused on OECD or advanced economies. There are few empirical studies that have considered this relationship in the developing world. This thesis is intended to contribute to filling the gap in the understanding of the relationship between institutions, productivity and economic performance in selected developing

economies. The developing economies selected for this study are chosen on the basis of the availability of data for all variables included in the model.

This research is particularly relevant to practitioners and policy makers as it focuses attention on the influence of institutions on; i) decisions to invest in either accumulation of capital or labour; ii) decisions to invest in those skills, knowledge or technology that increase levels of productivity; or iii) the ease of access to technology or knowledge that can contribute to increased levels of productivity.

1.3 Structure of the thesis

The remainder of this thesis is divided into five chapters (Figure 1.1: Thesis structure). Chapter 2 of this thesis presents a review of the core literature on the relevance of economic growth and the determinants of economic growth; proximate and deep determinants. It places this thesis within the neoclassical economic growth theory. It identifies the core presumptions and assumptions of the neoclassical economic growth theory, distinguishing it from other exogenous economic growth theories and endogenous economic growth theories. Section 2.2 starts the chapter with a discussion of the concepts of the resource and product markets and the interaction of the scarce resources for producing output within an economy. Section 2.3 provides a brief survey of the exogenous and endogenous economic growth theories and their basic assumptions and presumptions. Sections 2.4 provides an overview of the theoretical perspectives on decomposing economic growth. Sections 2.5 introduces the proximate determinants of economic growth and the concept of productivity and Section 2.6 introduces the theory of ‘deep’ or ‘fundamental’ determinants of economic growth; including, geography, integration with the global economy, luck and culture and institutions.

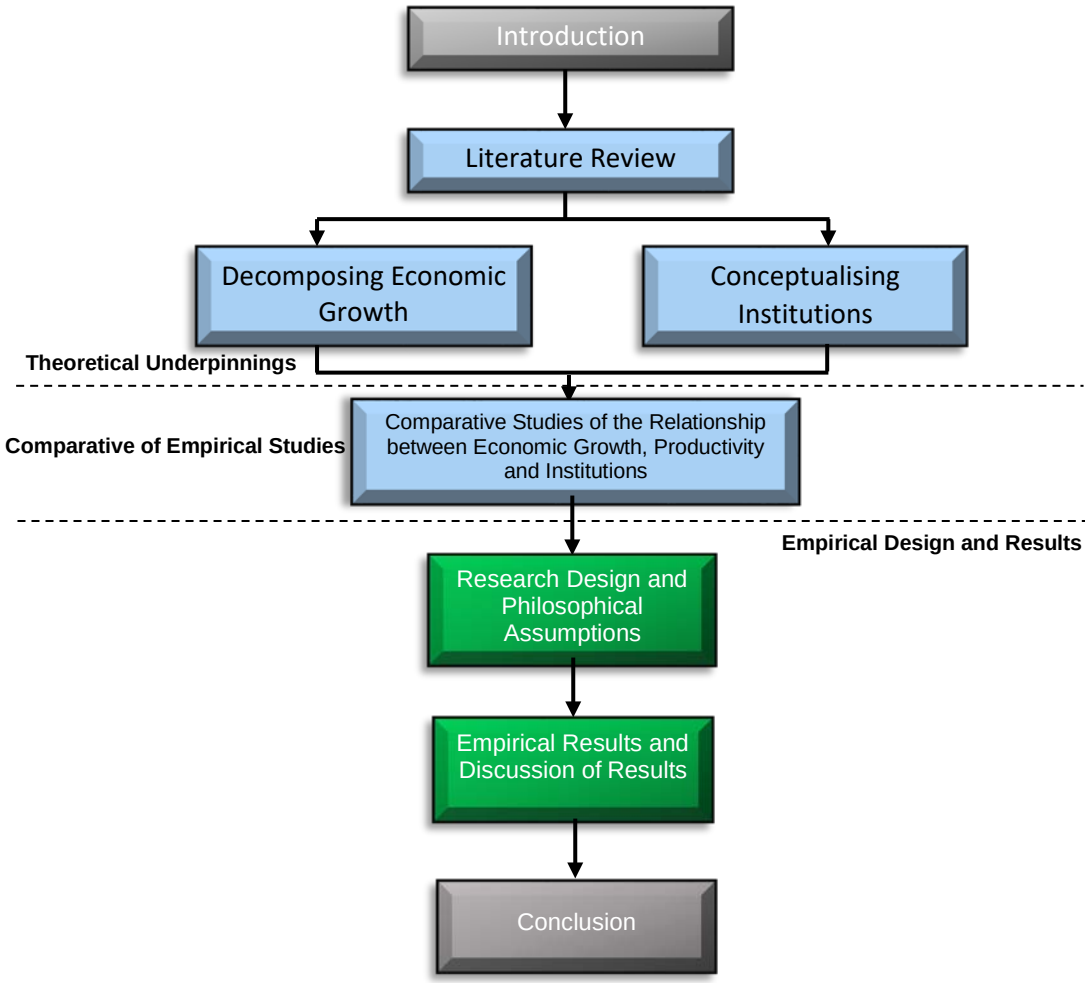
Chapter 3 explores the theoretical concepts that underpin the definition and categorisation of institutions and their relationship with the factors of production, productivity and long-run economic performance. It will begin with an assessment of the theoretical approaches to defining and categorising institutions in sections 3.2, 3.2 and 3.4. It will then survey the extant theoretical literature that relates to the further categorisation of political and economic institutions in section 3.5. The review of the theoretical literature presented in Chapter 2 and Chapter 3 is meant to

provide an overview of the theoretical origins of economic growth theory and the theoretical underpinnings of conceptualising institutions as fundamental determinants of economic growth. This literature review will form the basis of the review of comparative empirical studies of the relationship between economic growth, productivity and institutions that will be presented in Chapter 4, which will be used to address the gaps in the extant literature to build upon the understanding of the relation between institutions, productivity and economic growth in selected developing economies.

Chapter 4 sets out a review of comparative empirical studies that explore the relationship between economic growth, productivity and institutions. The conceptual framework in this study is predicated upon the neoclassical economic growth theory, upon which the research design and philosophical assumptions of this thesis will be based. This conceptual framework presented in section 4.4 provides the foundation for the analysis of the results of the empirical investigation undertaken in this thesis. Chapter 4 ends by presenting the research questions that will be addressed in this thesis to achieve the research aims and objectives.

Chapter 5 discusses the research philosophy and research design used in this thesis. Chapter 5 highlights the research hypotheses which will be tested to answer the research questions identified in Chapter 4. This chapter will also present the research design of this study and explains preliminary data analysis and diagnostic tests. Chapter 5 will also discuss the data and collection issues, ending with a description of the sample of economies that will be used to examine the relation between institutions, productivity and economic performance in developing economies.

Figure 1.1: Thesis structure



Chapter 6 presents the empirical results of estimations of the models identified in Chapter 4. Chapter 6 will also discuss the results of robustness checks undertaken to confirm the appropriateness of the base regression estimations. Chapter 7 will discuss the results of these estimations in the context of the conceptual framework set out in Chapter 4. Each discussion in Chapter 7, addresses how the empirical results of this thesis contribute to existing knowledge and extant relevant literature.

Chapter 8 concludes this thesis and highlights the potential contributions to practice and policy from the empirical results. It will also address the limitations to this study, suggesting how these limitations and potential contributions give rise to

areas for further research on the relationship between institutions, productivity and economic performance in developing economies.

CHAPTER 2 DECOMPOSING ECONOMIC GROWTH

2.1 Introduction

This chapter presents an overview of the theoretical origins of economic growth as a preface to the forthcoming chapters. This chapter discusses the theoretical perspectives of the concept of economic performance and identifies the mechanisms that economic theory suggests economic growth is derived. Measuring economic performance provides a 'barometer' of whether an economy is expanding, contracting or stagnant. Section 2.2 briefly introduces the concept of the market structure of the economy within which economic actors exchange goods, services and information. Section 2.3 traces the development of the exogenous and endogenous theories of economic growth. This is followed by section 2.4 which outlines in brief the various theoretical perspectives on the decomposition of economic growth. The theoretical origins of the theories of economic growth are outlined in brief to provide the background for the discussion of the relationship between economic growth and its determinants; productivity, capital and labour might be better understood. This Chapter will help provide a background of how the extant literature has defined the relationship between capital, labour and productivity as proximate determinants of economic growth.

The decomposition of economic growth provides a starting point for the exploration of the possible differences in economic growth, contraction or stagnation amongst economies of different levels of development. There is a large body of literature on the mechanisms through which productivity influences economic growth though this literature tends to lack consensus on how to measure productivity or its relationship with capital and labour. This Chapter will explore this theoretical discussion from both the exogenous and endogenous economic growth perspectives.

While economic growth theories typically identify technological progress with productivity, the two are distinct concepts. More specifically, technological progress contributes to productivity change. Productivity is a measure of the real output of capital and labour. Productivity change, is therefore a measure over time of the growth (or not) of the real output of capital or labour. This Chapter will survey the theoretical origins of the relationship between technological progress and productivity. While technological progress and productivity may on the surface

appear theoretically distinct, they are often linked. Their relationship is complex and may be difficult to measure. Notwithstanding the large body of literature on both technological progress and productivity, there remains little 'conventional wisdom' on either the nature or the magnitude of their association. This chapter will explore how both the exogenous and endogenous economic growth theories suggest that technological progress and productivity are related.

This chapter will conclude in Section 2.5 with a review and assessment of the extant literature that has explored the relationship between productivity, capital and labour and their association with economic growth. This summary will provide support for the conceptual framework used in this thesis.

2.2 Markets and the factors of production

This section will briefly provide a distinction between centrally planned markets, where government agencies choose what gets produced, to free markets, where the choice of what gets produced is compelled by supply and demand and competitive markets, where firms compete to provide the goods and services that consumers want and need. This section will then assess the role of markets within the economy.

In planned or command economies, governments own the factors that go into the production process, the major factors required to produce goods and services. Marx (1887) defined these factors of production as land, labour and capital. Alternatively, in free or market economies, individuals own the factors of production, governments take a more hands off or *laissez faire* approach to production and trade. Free markets are characterised by the deregulation of the economy and cutting taxes, particularly corporate taxes to increase production of goods and services (Lucas Jr., 1990; Say, Reprint 1971).

Modern market economies are neither entirely free markets nor planned markets, instead, there is usually some extent of government involvement. At one extreme is North Korea, with a planned economy where production is entirely controlled by the government. On the other extreme are economies like New Zealand that have private property, few regulations and few taxes. In the middle is

the rest of the world. Most modern economies are competitive market economies, with characteristics of both free markets and varying degrees of government intervention.

Competitive market economies are based on the premise of allowing; i) private firms to produce and sell the output of their production; ii) households to sell their scarce resources (limited supply of land, labour and capital, through savings of money) to firms; and iii) governments intercede in certain areas of the economy, for example, providing public services (health, education, waste management) and the regulation of private business (e.g. protecting private property and reducing the risk of monopolistic behaviour). Competitive market economies, allow private ownership of property and the operation of factor markets, in which the firms, households and governments can trade and exchange products and resources.

Factor markets are where firms, businesses and governments meet to engage in mutually beneficial exchange of the scarce resources and output of production with each other. In a market economy, there are two fundamental types of markets that must exist for mutually beneficial exchange to occur: i) resource or factor markets – where households and firms engage and exchange the scarce resources; and ii) product markets – that benefit both firms and households. Competitive markets are constructed as a results of a myriad of transactions between economic actors. Ostrom (2010) argues that the market is the optimal structure for the production and exchange of private goods. Within the market, economic decisions are guided by the aggregate interactions of economic actors, individuals, businesses and government. Competitive markets facilitate trade (Kranton, 1996), including the trade of the factors of production. Markets either emerge spontaneously or are deliberately constructed based on human interaction, to enable the exchange of goods and services. Consequently, markets are where the factors of production are traded

The competitive market system includes both the search for other traders and access to the resources required for the production process (Kranton, 1996). In competitive markets, economic agents search for trading partners and may not have information or have limited information about the other economic agents within the market. In the market there are either ‘buyers’ who demand a factor of production, good or service and ‘sellers’ who own and supply these factors, goods or services.

The interaction between these economic actors within the market determines prices and contribute to the self-organised coordination of productive activity (Lie, 1997). Well-functioning competitive markets play a critical role in economic activity, in particular the allocation of the factors of production to the most efficient uses (Schmidt, 2018). From this perspective, the market is the system for disentangling the economic problem of scarce resources.

2.3 Theoretical origins of economic growth

Economic growth is about the increase in the market-value of the goods and services produced by an economy over time. Different theories of economic growth would stress alternative determinants of economic growth. From mercantilism stressing the accumulation of gold and running a trade surplus; to the classical theory propagated by Adam Smith that placed emphasis on the role of increasing economies of scale (specialisation); to the neoclassical theory based on supply-side factors such as the productivity of labour and the size of the workforce; then the endogenous theory that emphasises the influence of human capital and the rate of technological progress to Keynesian demand-side theory that argues that aggregate demand plays a role in influencing economic growth. Economic theories are constantly being proven, disproven and revised.

While economics is not an exact science, the various economic theories aim to arrive at conclusions about human nature. Economic theories reflect different attitudes about human nature, which is likely to change over time. This section will examine the evolution of some of these theories to provide an understanding of how they explain long-run economic growth. The theories that will be discussed in this Chapter have been divided amongst exogenous and endogenous economic ideologies. Endogenous economic growth theories such as the AK model, predominantly consider that the main determinants of economic performance are formed inside the economy. Conversely, exogenous economic growth theories such as the Solow model, consider that economic performance is the result of influences from outside the economy, rather than internal factors.

The originator of modern economics, Scottish philosopher Adam Smith's publication 'The Wealth of Nations', was an organised analysis about production,

markets and economic theory and was exceptionally influential (Smith, 1776). He popularised the notion that a person pursuing their self-interests could ultimately benefit the common good and promoted the idea of free trade. At the time of his writing many economies had many expensive taxes that preserved the paramountcy of domestic manufacturers at the expense of international trade. A generation later, Ricardo (1815) broadened Smith's idea by advancing what is now referred to as the 'theory of comparative advantage'. The notion that two people or economies could both gain from trade, even if one of them could produce more of everything. Ricardo suggests that when both economies produce goods or services that they are best at and then trade those goods and services, everyone benefits (Ricardo, 1815). The field of economics has continued to grow since Smith and Ricardo, advancing ideas of private property and free markets.

2.3.1 The theoretical origins of endogenous economic growth

This section will examine the theoretical assumptions of the endogenous economic growth theories relating to production of national output. By 1962 economists had begun work on new schools of economic thought that treated the steady-state rate of economic growth as itself endogenous and determined within the economy. Endogenous economic growth models favour the replacement of exogenous unexplained technological progress with determinants of growth that are explicit in the model. Omitting technological change, the endogenous economic growth theory placed emphasis on indefinite investment in human capital that they suggested had a spill over effect on the economy by reducing the diminishing return of capital accumulation. This section will examine what endogenous theorist suggest are the underlying determinant of sustainable economic growth.

Endogenous economic growth theories, are predicated on endogenous technological progress and argue that investments in the accumulation of capital and labour stocks does not adequately explain cross-country differences in economic growth. Technological progress is defined by endogenous growth theorists as technological advancement that incorporates skills and knowledge that make workers productive (Lucas Jr., 1988; Kurz & Salvadori, 2001) or the skills and knowledge embedded in workers. Technical progress is derived from the stock of knowledge in the research sector of the economy (Romer, 1990a). The market price

of knowledge is assumed to be zero, the knowledge market is presumed to not provide rewards to investors who incur the cost of research and development ('R&D') necessary to increase the stock of skills and knowledge.

In its broadest sense, technological change or progress is the rate at which innovation and diffusion of knowledge are introduced and adopted within the economy. Endogenous growth theorists explain differences in economic growth by examining national choices to invest in R&D, emphasising that innovation and technological progress increase the rate of economic growth in the long-run (Romer, 1986). The choice of investing in R&D and education is what makes technological progress endogenous, in that the decision arises within the economy system. With technology being considered endogenous, it can be more easily reallocated within the knowledge market to achieve faster technological progress. Adding more resources to R&D contributes to more rapid accumulation of knowledge and skills. The level of national production can be influenced not only by its own research efforts, but by its capacity to access and import knowledge from abroad (Griliches, 1987).

This is in vast contrast to the exogenous economic growth theory that suggests that technological progress could also be achieved through new processes and the adoption of new capital equipment that is unrelated to the explicit growth of innovation or R&D. From the exogenous economic growth theory point of view, there is often no clear distinction between a new process and a new product. Yet, from either perspective, technological change contributes to increased productivity by increasing the real output of either capital or labour. The conceptual problem associated with this conceptualisation of technology is its measurement. It is difficult to conceive of a single measure that could accurately measure or reflect the complex and heterogeneous nature of technological progress. This is where both the endogenous and exogenous economic growth theories differ in the identification of a reasonable proxy of measure.

Romer (1994) posited that there is a functional association between technology and the other factors of production, written simply as:

$$Y = AK \tag{1}$$

Where (Y) represents total output, (K) is a composite measure of both physical and human capital (Barro & Sala-i-Martin, 2004) and (A) represents the

stock of ‘non-rivalous’ and ‘non-excludable’ ideas in the research sector of the economy and knowledge accessed from abroad (Jones, 1997). These AK models as they have become to be known, such as equation (1) simplify the analysis of economic performance to focus on capital. The AK model is the simplest endogenous model that provides a constant-savings rate of endogenous growth and assumes a constant, exogenous, saving rate. It models technological progress with a single parameter A. This model assumes that the production function does not exhibit diminishing returns to scale. This has sometimes been considered a direct extension of the exogenous Solow (1957) production function model.

Exogenous economic growth models assume that the accumulation of capital is exogenous rather than responsive to economic incentives within the national economic system. However, to the extent that technology, and thereby productivity is embodied in capital inputs alone, can give rise to potential identification problems. Specifically, it can become difficult to discern empirically the contribution of ‘conventional’ factor or other ‘non-conventional’ factors (for example R&D or technological spill overs) separately from the contribution of technological progress. That is, it may be difficult to empirically separate the productivity effects of increases in scale and scope of the production process from the effects of implementing and exploiting new technologies, holding scale and scope constant.

However for the endogenous AK model, unlike the neoclassical theory, economic growth is not determined by the exogenous savings rate. Instead importance is placed on the production of new technologies and their positive spill over effect on capital accumulation. In a knowledge-based economy there would be no diminishing returns to capital, if there is robust investment in technology and people. As such, growth in productivity in the AK model are determined by differences in investment in R&D and education. The suggestion that economic growth could be generated from within the economic system as a direct result of internal processes and decisions to invest in R&D and education makes the endogenous economic growth theory endogenous.

This is in direct contrast with the exogenous economic growth model which does not allow for economic actors to decide how much skills, knowledge or technological progress they will accumulate based on the rate of return to, for example, investment in R&D. This simplistic AK endogenous economic growth

model presumes that each additional year of education adds the same proportional amount to how much output a worker can produce, making worker productivity an exponential function of technological progress, more specifically a function of education and investment in R&D (Romer, 1990a; Angelopoulos et al., 2017).

Endogenous economic growth theories contend that continued economic growth is dependent on existing technology or investment in education and R&D and the speed of the innovation process. Endogenous growth models maintain that the accumulation of knowledge is an endogenous process driven by demand for innovation, created within the economic system, to increase how much output each worker can produce.

2.3.2 The theoretical origins of exogenous growth

This section will provide a brief survey of the exogenous theories of economic growth from the classical theory, to the Harrod-Domar growth model and the neoclassical model. Principally, exogenous economic growth theories differ from the endogenous economic growth theories in that the exogenous models require forces outside the economic system, outside of capital, investment and population growth to generate and sustain economic growth. Conversely the endogenous economic growth theories suggest that economic growth could continue indefinitely on the basis of already available factors such as existing technology or investment in education. Classicism attaches great importance to the role of physical capital accumulation for economic growth. Roy Harrod (1939) and Evsey Domar (1946) independently advanced economic growth models that arrived at the same basic underlying assumption, based on the Kenynesian saving-investment model that explains economic growth in terms of the level of savings and the increased productive capacity through investment in labour-saving capital. More recently, neoclassical growth models focus on increasing how much output workers can produce, through either increasing the size of the work force or improving the efficiency with which they use capital.

Classicists Adam Smith and David Ricardo contended that economic growth is determined by production (Piętak, 2014). Smith opined that the economy could only grow if productive capacity, which he contends depends on the division of labour and capital accumulation, was allowed to thrive. The division of labour would

arise from the extent of capital accumulatoin and gradual expansion of the product market (Smith, 1776). Ricardo (1817) opined that the accumulation of capital would depend on the productivity of labour. Harrod and Domar emphasise that investment through capital accumulation was the only contributor to economic growth (Van den Berg, 2013). Increased producitive capacity increases the demand for labour in the resource market, to utilise the labour-saving equipment, generating increased levels of ouput. Classical economist argue that economic growth is driven by growth in investment in accumulation of the factors of production and improvement of productive capacity (Piętak, 2014).

Laterly, neoclassicism alternatively considered labour the primary factor of production. Solow (1957) provided a growth accounting framework that explains economic growth in relation to the growth of productivity and efficiency measured as the residual term (the Solow residual) within the Cobb-Douglas production function. The 'unexplained' productivity residual in the Cobb-Douglas production function is not presumed to be only comprised of technological change. This residual has even been criticised as potentially reflecting biases in the measurement of capital and labour. In the Cobb-Douglas production function capital is assumed to have decreasing marginal product characteristics and each new addition increases output by less than the previous addition. The neoclassical economic growth model relies on continued increases in the productive capacity of labour, through either increasing the size of the work force or improving the efficiency with which they use capital. Fare, Grosskopf, Norris, and Zhang (1994) suggested that production capacity could be decomposed into variations in efficiency (catching up) and advances in technology (innovation). In the neoclassical economic growth model, technology is used to put capital and labour to work.

Neoclassicism includes technological progress in its model, as does the endogenous economic growth theories, but their underlying assumptions of technological progress differ. Instead, neoclassicism argues that technology is not embedded in skills or labour. Neoclassicism exogenises technological progress and considers that it is brought about by incentives from outside the economic process (Solow, 1957); in part from investmet in R&D determined independently of any demand for new innovation created within the economic system and in part embodied in new capital. Neoclassicism suggests that new processes that require the adotion of new capital equipment could also be considered technological

progress. This type of technological progress increases productivity by increasing the real output of either capital or labour. This is in contrast to the endogenous economic growth theories that suggest that the choice to invest in R&D is in response to demand for new innovation created within the economic system arising from the decision to invest in skills knowledge or technological progress.

Economies at the technology frontiers are better able to convert ideas into new goods and services. Abramovitz (1986) suggests that economies at the technology frontier have the capacity to absorb technology embodied in each vintage stock of capital, while economies that are further from the technology frontier, will be unable to even absorb the technology in new capital stock. New capital can embody the frontier of knowledge, but unless an economy is able to efficiently absorb or distribute this embodied knowledge, they will be unable to take advantage of the potential to 'catch-up' with the technology leaders. Abramovitz (1986) also suggests that the quality of education, the character of industrial, commercial and financial organisations also have an impact on an economies' ability to fully exploit the power of existing or new technology.

Solow (1956) contends that long-run economic growth could only be sustained through unending advances in technology in order to mitigate the consequences of diminishing returns to labour and capital that could in due course result in ceasing economic growth. In the neoclassical economic growth model, productivity is defined as '*total factor productivity*' ('TFP') (Kendrick, 1956). Solow's model makes two assumptions about TFP: i) ideas are a public good; ii) growth in ideas is exogenous. Neoclassical growth models juxtapose TFP as an amorphous '*black box*' that comprises a number of hard-to-measure components of productivity not otherwise accounted for by physical capital and labour, including technological progress (Easterly & Levine, 2001), this includes technological progress. As such, TFP is not solely technological progress (Hofman, Aravena, & Friedman, 2017). Capital and worker hours can be improved by the quality of labour, thereby raising output, the unmeasured quality improvements show up as TFP growth in the neoclassical economic growth model (Easterly & Levine, 2001). Similarly unmeasured advancements in the quality of capital show up as TFP growth in the neoclassical economic growth model (Easterly & Levine, 2001).

The determinants of productivity growth are factors which either enhances the quality of outputs or the efficiency with which factors of production are converted into outputs (Solow, 1956; Syverson, 2011). Technological change is only one of several potential 'non-conventional' factors that can increase the productivity of real output. For the neoclassical economic growth theory, productivity change does not have to be associated solely with increases in technological change. Cross-country variances in the rate of growth of TFP are the result of differences in the efficiency with which factor of production are combined in the production process (Comin, 2010).

Exogenous economic growth models differ from endogenous economic growth models in that the exogenous model depends upon elements other than capital investment and a growing labour force in the resource market, for an economy to continually grow. TFP is the common measure of productivity in the neoclassical growth model. Increased efficiency contributes to increased output from production.

2.4 Theoretical perspectives on the decomposition of economic growth

This section briefly sets out three theoretical approaches commonly used to measure aggregate economic growth represented as gross domestic product ('GDP'). The most widely used measure of economic activity is gross domestic product ('GDP'). GDP is the estimation of total production of new goods and services (or product) of the domestic economy within a given year. Macroeconomic performance is about the 'aggregate and macro outcomes' of production of goods and services within an economy (Acemoglu, 2012). Aggregate measures such as; the value added to national income levels by each additional new output, of a good or service produced, exclusive of the cost of production; income derived by residents or citizens of the country; consumption of goods and services within the economy; and savings as a measure of the total income not consumed but saved, are all composite values that calculate the result of economic activity from different perspectives. These aggregate components provide a means of measuring an economy's size.

GDP reflects the circular flow of money, goods, services and exchanges within the economy between households and firms in the product and resource markets. GDP provides a measure of recorded transactions within the economy, but does not record activities that are not carried out within the economic market. Economic growth indicates a positive percentage change in total GDP from one year to another (Boeh-Ocansey & Appiah-Adu, 2015). Growth suggests that a national economy is experiencing long-run expansion of productive potential. Expansion of the economies' productive capacity reflects changes in levels of output of new goods and services; real increases in output are beneficial for the percentage change to be considered 'growth'. As a measure of output, GDP can also be used to measure levels of output per worker and efficiency within the economy.

As an aggregate measure, GDP is based on three distinctive elements: gross versus net, domestic versus national, product versus income and current or constant. GDP can be estimated from three theoretical approaches: i) demand side; ii) income; or iii) supply side (Higgs, 2013). The demand side estimates GDP in terms of final expenditure on consumption, observing what is happening across different types of spending. The supply side estimates GDP in terms of the value added by each new good or service produced, which is the sum of the output from production factors. The income approach measures the income earned by households for different factors of production.

2.4.1 Theoretical approaches to measuring GDP

This section further investigates the three theoretical approaches to measuring GDP. Theoretically all three approaches to measuring GDP should equal the same amount, with national output (supply) equalling national expenditure (aggregate demand) equalling national income. Each market transaction that enters the measurement of GDP implies that there must be both a buyer and a seller. Measuring GDP from the supply side provides a measure of the productive capacity of the sellers within the market. Measuring GDP by aggregate demand provides a measure of the appetite and capacity for spending and consumption within the markets. While the income approach to measuring GDP provides a measure of the wages, rents, interest, profits and other income earned from the production of goods

and services within the market. The choice of method for measuring GDP will depend on the perspective from which economic performance is being viewed, whether from the perspective of its productive capacity, demand for good and services or income earned from production.

GDP from the demand side is calculated based on the sum of spending on consuming final goods and services by domestic private consumers (C) (consumption by individuals), domestic investors (I) (investment by businesses), domestic government spending (G) at all levels, and the monetary worth of exported goods and services (X) less the value of imported goods and services (M) (Higgs, 2013). The basic demand side equation, that divides expenditure, is:

$$GDP = C + I + G + (X - M) \tag{2}$$

Secondly, the income approach to measuring GDP equates total output to the income earned by residents or citizens of the country from the resource market (Higgs, 2013). The main types of income that are included in the equation are: i) employee compensation; ii) interest earned; iii) rental income less landlord expenses; iv) royalties earned from the use of intellectual property and natural resources, written as:

$$GDP = NY + IBT + CCA + NFP \tag{3}$$

Where (NY) is national income, (IBT) is indirect business taxes, (CCA) is capital utilisation (consumption) allowance and capital devaluation (depreciation) and (NFP) is factor payments to the rest of the world after deducting expenses.

Equations (2) and (3) illustrate estimation of GDP from the perspective of how businesses, households, the government and foreigners interact within the four key markets: i) goods and services; ii) resources; iii) loanable funds; and iv) foreign exchange markets. While equation (2) measures GDP in terms of the monetary worth of additional goods and services made in the product market. Value added can also be viewed as the elements that comprise income in the resource market. While the expenditure or demand side approach estimates total output based on the total money spent; the income technique to measuring GDP equates total output to the income earned (wages, rents, interest and profits) by households selling their scarce factors in the resource market. Both the demand and income approaches to measuring GDP disguise the structure and relative efficiency of production that underlies total expenditure and income (Landefeld, Seskin, & Fraumeni, 2008).

Conversely, the supply-side neoclassical Cobb-Douglas production function provides a means of measuring; i) changes in the amount of labour and capital used to produce output; and ii) the relationship between labour and capital in the production process (Cobb & Douglas, 1928). The Cobb-Douglas production function takes account of the durability of capital inputs, such as machines, buildings, equipment and labour (Dosi & Grazzi, 2009). In the long-run this formula examines productive capacity, versus just output capacity. Changes in productive capacity of this production function tend to move gradually year to year, as the factors that influence it move in long-run cycles.

2.4.2 The determinants of economic growth

Discerning the drivers of aggregate economic performance is critical in explaining how levels of productivity and output increase. This section will analyse the categories of determinants of economic growth and briefly identify the implications of these determinants for economic growth. The neoclassical theory of economic growth suggests that economic growth is the result of the accumulation of capital and labour stocks. Endogenous economic schools of thought suggest that economic growth is the result of technological progress. Focusing solely on the factors of production denies an understanding of what determines the accumulation and productivity of these factors.

In their 1973 book, North and Thomas referred to labour, capital and productivity growth as proximate factors of economic growth, more particularly the '*evidence of growth'* and not the true causes of growth (North and Thomas, 1973, cited in Acemoglu, Johnson, & Robinson, 2004, p. 1). Although an empirically straightforward way to decompose the observable evidence of economic performance, accumulation and productivity are indicators of performance and not explanations of what motivates accumulation or productivity (Acemoglu et al., 2004). The '*deep*' determinants of economic growth help to explain what compels a country's decision to invest in either technology, labour, capital, skills or knowledge and why those decisions have different outcomes for different countries (Keller & Shiue, 2013).

There have been several suggestions made as to the fundamental or deeper reasons why different countries and economic agents make the decisions they

make regarding productivity. For example, i) Hall and Jones (1999), Acemoglu et al. (2004), Hu et al. (2014) and Bayraktar and Moreno-Dodson (2015) emphasise the critical role of institutions and government policies; ii) Edwards (1998) and Dollar and Kraay (2003) emphasise the role of trade openness; and Rodrik et al. (2004) and Deliktas and Balcilar (2005) have emphasised the role of natural resources and geography.

Examination of the performance of the factors of production cannot answer the question why simply changing either investment strategies or opening economies to trade, reducing taxation rates or increased government spending, may not be sufficient to increase a country's rate of output. For example, calculating the contribution of human capital through skills and knowledge accumulation to increase productive capacity, does not provide an explanation of why an economy would choose or not choose to invest in skills and knowledge accumulation. The findings of empirical studies that favour productivity over factor accumulation as integral to explaining cross-country variations in economic growth and economic growth rates, reinforces the need to better discern the deep determinants of economic performance.

2.5 Theoretical perspectives on the proximate determinants of economic growth

The main factors of production identified by the economic growth theories are capital (K) and labour (L). Labour represents the inputs related to the work force and hours worked. Capital refers to all physical capital. In any economy, there is a finite availability of these factors of production (capital and labour). The distribution of these resources on the resource market, underpin the context of the production process and what takes place within the production market. The demand for any factor input is assumed to be made by profit-maximising firms, who choose the optimal quantity and quality of the factor input, taking account of its price, potential substitutes and the value of the output being produced. The production process requires economic actors to make choices on the most efficient allocation of resources to produce the output that would yield the most benefit. TFP is the process by which the allocative and productive efficiency of these factor inputs can be increased to maximise their utility. For example, the labour force cannot utilise

capital without a *formula* or *blueprint* of how to do it. TFP is the knowledge or technology of how to maximise the utility of the capital (Dosi & Grazzi, 2009). As technology, knowledge and skills improve over time within the resource market, it makes the production process more efficient. This section will briefly outline the main factor of production and their role in determining the level of production, towards achieving economic growth.

2.5.1 Implications of labour accumulation as a proximate determinant of economic growth

In any economy, there is a finite availability of labour. The finite availability of this resource can limit the potential for economic growth in any economy (Hansen & Prescott, 2002). Endogenous growth theories suggest that the labour market features a great deal of heterogeneity (Urne, 2014). Endogenous growth theories acknowledge that workers have different characteristics, ability, skills and preferences for different types of jobs. Accordingly, endogenous growth theories suggest that free labour markets are imperfect (Botero, Djankov, La Porta, Lopez-de-Silanes, & Shleifer, 2004). In the resource market, there are substantial information asymmetries between the firm purchasing labour and the worker, selling their labour. Labour is exchanged in the resource market for wages. A firm can have several information advantages including knowledge about the extent and quality of work available. Whilst the worker has very little access to this information and may have few opportunities to discover further information until after accepting the offered work.

Alternatively, exogenous theories of economic growth suggest that labour and its supply are usually determined outside the economic system (McCrystal, 2009) and that the labour market is perfectly competitive (Solow, 1956, 1994; Ten Raa & Mohnen, 2002). Neoclassicism assumes that labour stocks grow at an exogenous rate in accordance with population growth (Solow, 1962a, 1974). As the population size grows independent of economic activity in the labour market, the size of the potential labour force increases. Exogenous assumptions ignore the potential impact of the potential heterogeneity of the labour force or external shocks to the quality and quantity of the workforce, such as access to quality health care or the mobility of the workforce.

2.5.2 Implications of capital accumulation as a proximate determinant of economic growth

Capital is an aggregate comprised of several elements including durable; i) equipment; ii) fixed plant; iii) intangibles such as intellectual property. More particularly, for some purposes, capital may also include natural resource such as mineral deposits and arable land' (McFadden, 2008). Capital accumulation is the result of exchange within the resource market to allocate resources to the production of output. There are two factors that can affect the levels of capital stock within an economy: i) investment; and (ii) depreciation. Investment increases capital stock through expenditure on new land, plant or equipment in the resource market, or repairing or replacing existing plant or equipment (Kataoka, 2013). Alternatively, depreciation reduces capital stock through the cost of wear and tear on old capital caused by aging and use (Schündeln, 2013). The rate of capital accumulation is equal to investment minus depreciation.

An investment in capital today, is meant to augment future output (Barrell et al., 2010). Capital accumulation or amassing investments in capital, can increase the productive capacity of labour. Labour per hour can become more efficient as the quantity of capital in the form of equipment or buildings increases (Shackleton, 2013). As workers have access to more equipment to make the production process more efficient, they can become more productive per hour, for the same level of workers. From the neoclassical growth theory perspective, this means that growth in levels of output are equal to the growth in labour productivity. For neoclassicism capital accumulation is a means of increasing technological progress and thereby increasing the efficiency of the labour force.

2.5.3 Implication of productivity as a proximate determinant of economic

While capital and labour are directly used in the production of goods and services, TFP is the measure of the productive efficiency with labour and capital are combined to produce output. Neoclassical growth theorists have included technological progress in their definition of TFP (Solow, 1957; Dosi & Grazzi, 2009; Bacovic & Lipovina-Bozovic, 2010). While endogenous growth theories do not specifically define skills and knowledge as TFP, endogenous growth theorists

consider endogenous labour augmenting, skills and knowledge as measures of the efficiency of labour.

Human capital in the endogenous growth model represents the skill and knowledge embodied in workers (Romer, 1990b). Human capital is the expandable and self-generating stock of skills and knowledge accumulated by workers through education, learning by doing and self-improvement. Endogenous growth theories suggests that workers can become more efficient as a result of their ability, training and skill (Lucas Jr., 1988). Human capital is the result of investment in education and in the endogenous economic growth model, long-run economic growth can be achieved through increased levels of human capital, even in the absence of exogenous technological progress. As such endogenous productivity of human capital can be an ambiguous contributor to economic growth as it does not distinguish the complementarity of labour and technology within the economic growth model.

Alternatively, exogenous economic growth models suggest that productivity may be derived indirectly from the resource market contained in capital investments (Sveikuskas, 1981), or directly through investment in technology, education, training or R&D (Criscuolo et al., 2010). The inclusion of technological progress in exogenous growth theories, frees the model to consider that the growth rate of output relies on exogenous labour-augmenting improvements in technology. This model assumes that all economies that use similar technology, should have converging rates of productivity growth (Solow, 1994). Knowledge or technological progress is presumed to be independent of either capital or labour and a non-rival good that is free for use by all businesses within the economy. TFP occurs multiplicatively, augmenting the productivity of labour. The productivity of labour in the neoclassical model is dependent of several factors, the amount of capital employed and activities such as education, health and the provision of public goods. All these activities are aggregated within the education and health sector of the resource markets and represented within TFP.

2.6 Theoretical perspectives on the fundamental and 'deep' determinants of economic growth

To understand cross-country disparities in economic performance there is a need to understand the determinants of productivity and factor accumulation. This has given rise to literature on the deeper determinants of productivity, such as the extent of integration with world markets (trade), geographical characteristics, differences in culture, luck and the quality of a country's institutions. This section aims to provide a brief overview of this literature, emphasising the basic arguments that lie behind these propositions. Deep determinants can be used to examine why, when faced with multiple equilibria, countries with otherwise identical characteristics, make different choices with far-ranging consequences (Bennett & Nikolaev, 2016). Examination of the fundamental determinants of economic performance helps identify the uncertainty of outcomes and elements of heterogeneity amongst economies that, all other variables being equal, would drive what would appear to be incongruous choices.

2.6.1 Theoretical perspectives on luck and culture as fundamental determinants of economic growth

The luck hypothesis is proposed as an explanation for divergent paths of economic performance among countries that are '*on the surface*' similar (Acemoglu et al., 2004). It has been suggested that luck explains why countries that seemingly share a common culture or religion perform differently (Bennett & Nikolaev, 2016). The cultural hypothesis focuses on the relationship between national beliefs, preferences, values and the choices for *inter alia* preferences to save over consume, willingness to accumulate capital or labour stocks or invest in skills or knowledge. The cultural hypothesis suggests that culture will directly affect differences in preferences that can influence a societies' choice regarding acquisition of wealth and consumption (Diamond, 1997). Culture can affect individuals' willingness to engage in different activities such as the trade-off between work and leisure or to trade off consumption today versus saving for a later date. Secondly, it can affect the levels of trust and cooperation within society, which may be important foundations for productivity-enhancing activities. Despite all this, it is

difficult to reconcile how luck or culture could fully explain the role of productivity or factor accumulation towards increasing levels of output.

2.6.2 Theoretical perspectives on integration with world markets (trade openness) as a fundamental determinant of economic growth

Rodrik et al. (2004) included the consequences of international trade of goods, services, capital and possibly labour as a deep determinant of productivity. Rodrik (2003) considered trade as a partly endogenous factor as it is partly determined by income levels and partly by geography (distance from markets and institutions) (Winters & Masters, 2013). Some academics argue that economies that are more integrated with the world markets tend to grow at a more rapid rate than closed economies (Wang, Liu, & Wei, 2004). The three means through which openness can influence economic growth rates identified by Grossman and Helpman (1991) are: i) the international transference of ideas; ii) the flow of goods within the international product markets; and iii) movement of capital.

Through the international transference of ideas, trade openness could have an impact on the existing stock of knowledge. International trade improves the process of knowledge and technology spill-overs from developed to developing countries through activities such as licensing, trade of goods and services or foreign direct investment (Wang et al., 2004). As developing countries import final manufactured products from developed countries, producers from developing countries cumulatively get familiarised with technological advancements that contribute to increased labour productivity. From this perspective, trade openness can strengthen the ability of developing economies to access training for its labour force, including knowledge of new management practices and organisational arrangements. If trade is hindered, productivity may be lower than in those countries that are open to trade.

However integration can only be achieved through the appropriate institutional framework, including trade policy such as lower tariffs and non-tariff barriers to trade, that make it possible to become more integrated in the international markets. Rodriguez and Rodrik (2001) found no evidence of a significant association between trade openness and economic growth rates. There are strong arguments in the literature that trade openness provides only a minimal

explanation for economic growth, through increased net trade. It does not provide an explanation of why or how economies decide to accumulate the factors of production or how economies increase levels of productivity.

2.6.3 Theoretical perspectives on geography as a fundamental determinant of economic growth

Geography refers to the advantages or disadvantages created by a country's physical location, natural resources and climate. The consequences of geographic location or endowments on long-run economic performance can be multifaceted. Human health, population growth, food productivity, resource endowment and the mobility of factors of production are all geographic characteristics that may affect long-run economic performance (Bloch & Tang, 2004). Hall and Jones (1999) found a positive relationship between the absolute value of latitude and per capita income. Gallup, Sachs, and Mellinger (1999) found evidence that tropical climates have negative effects on human health and agricultural productivity, resulting in lower levels of per capita income. A countries' initial geographic factors directly impact its' ability to sustain life and economic activity on the basis of the suitability of land and the ecosystem (Dao & Dávila, 2013).

Geography provides a greater explanation of productivity and factor accumulation than luck, culture or integration. For example, land may be habitable, but because of its location, or ecosystem, a country is unable to tap into its natural resources, including its labour force, with its current technology. Alternatively, the climate or levels of health care could influence the availability and access to workers, hindering potential growth of labour stocks. Geography could also impact an economies' ability to integrate within world markets: landlocked economies may find it costlier to export; the climate may inhibit the production of goods suitable for export. Geographic factor endowments influence production through constraining the accumulation of physical and human capital and make productivity more costly or difficult to access. Consequently, it would make sense that a country or region would specialise in a form of production for which it had a comparative advantage, as a result of its innate factor endowments (Chor, 2010). However, geographic characteristics are insufficient to explain why economies are not taking advantage of

their comparative advantages towards increasing levels of output and national income.

2.6.4 Theoretical perspectives on institutions as fundamental determinants of economic growth

The institutional hypothesis argues that the geography influences economic performance through its '*long-lasting impact on institutions*' (Easterly & Levine, 2003, p. 6). Economic outcomes are complex and inexplicable in a purely geographic context. Factor endowments cannot explain the initial emergence of property rights that created and entrenched rights of ownership on physical capital, land and technology. In this context institutions are different from organisations as the former determines the constraints and environment within which the latter emerges, develops and functions (Leftwich & Sen, 2011). This distinction is important as organisations (such as firms, banks, and regulatory agencies) are goal-oriented economic actors that are both prompted and compelled by institutions and are executors of institutional norms.

Institutions arose as a means of regulating the distribution and accumulation of factor endowments, motivated by the intention to protect legal rights and economic opportunities available within the economy (Engerman & Sokoloff, 1997). National institutional infrastructure can also have an impact on levels of integration by either facilitating or hindering international trade (Lauridsen, 2012). Institutions can also evolve over time as a result of culture or luck, through decisions made within the society (Petrakos, Arvanitidis, & Pavleas, 2007). Institutions defined as '*humanly devised constraints that limit and define'* choices of individuals (North, 1994) may arise as a solution to collective problems or choices taken by businesses. Consequently, institutions can seemingly account for luck and cultural preferences, choices to integrate with world markets, and the impact of geographic endowments.

Both formal and informal institutions can be initiated, monitored, enacted and enforced by formal organisations acting in a possessory role. Acemoglu and Robinson (2012) argue that institutions influence economic agents' incentives to invest in the factors of production or adopt better technology that could have boosted productivity. Specifically, North (1990) contends that national institutional

frameworks directly impact economic outcomes through the development of a structure within which individuals make decisions about whether or not and in what form they participate in the resource and product markets. The more complex the resource or product markets becomes, the greater the need for society to develop institutions that would regulate them and rights to private property within the markets.

2.7 Summary

This chapter presented some of the theoretical origins of the theories of economic growth, the theoretical approaches to decomposing and measuring economic growth and the theoretical discourse on the role of the proximate and fundamental determinants of economic growth. The extant theory that explores the source of economic growth centres around two basic explanations rooted in: factor accumulation and productivity. Both the endogenous and exogenous economic growth theories can be used to explain and decompose economic growth and its constituent components.

Some would argue that endogenous economic growth theories focus more on efficiency of capital from endogenous technological change. Others would argue that exogenous economic growth theories focus on explaining increased output from factor accumulation and exogenous TFP. However, the endogenous and exogenous theories of economic growth are not logically irreconcilable. They both contend that the production process requires economic actors to make choices in the resource markets on the allocation of finite factors to make the goods and services that would yield the most benefit in the product market. They also both contend that trade and access to capital, labour, skills, knowledge and R&D in the resource market are critical to driving productivity and as a result, increasing levels of output and economic growth. They diverge in terms of where these drivers are determined; endogenous growth theorists argue that the drivers of productivity originate within the economy in response to demand for the factors of production to produce more output; exogenous growth theorists alternatively argue that the drivers of productivity originate outside the economy independent of demand or levels of output.

The proximate determinants of growth are the primary focus of the neoclassical model of economic growth. This provides a conceptually straightforward decomposition of the sources of economic growth. The proximate determinants of economic growth are of course influenced, by a host of various indirect determinants. Neoclassicism does not completely ignore these deeper determinants of output, but measures them indirectly as the aggregate exogenous measure of TFP. Neoclassicism judges the extent to which TFP alters the proximate determinants, and then calculates the effect of these changes on output. This has resulted in the development of increasing empirical research into the deep determinants of factor accumulation, productivity and economic performance, which will be explored in Chapter 4.

Beyond the theories of economic growth explored in this Chapter there are other more broad-ranging concepts of economic growth, including considering sustainable or balanced economic growth or development of wellbeing, which are closer to measuring welfare objectives and may be more complicated and harder to quantify. However, these concepts are beyond the scope of this thesis. This study focuses on how economic growth may be used as a barometer of the economic activity within an economy. This study will contend that the stage of development of a country's economy is critical for comparing economic performance between countries. In particular the importance of measuring economic growth provides an understanding of how national economies distribute and use their scare resources.

In managing the economy, governments aim to achieve: i) full employment of labour; ii) stability of prices; iii) sustainable economic growth; iv) equilibrium of balance of payments; and v) distribution of income. Economic growth can lead to increased employment, contributing to increased national revenue from taxes and increased consumption of goods and services. Increased employment, could lead to increased government spending to provide public goods and increased consumption could encourage increased spending, while reducing savings.

Economic growth is the measure of an economy's continual improvement in its productive capacity to meet the demand for goods and services, leading to increased and improved production of goods and services (Syverson, 2011). Measured in the long-run, economic growth is structural in nature, in terms of the reallocation of productive resources among different sectors within the economy

(Stern, 1991; Gabardo, Pereima, & Einloft, 2017). The nature of the structural change is the continual shift of factor inputs to production from lower to higher productivity sectors, which contributes to increasing production and efficiency within the economy. Economic growth suggests that there has been allocative and productive efficiency of factor inputs in the resource markets towards their most efficient uses in the production markets.

Increased supply of goods and services can be achieved through: i) increasing the level of output of human effort (labour); ii) increasing the effectiveness of capital stocks such as buildings, machinery and tools and intermediate products used in the production of consumer goods and services; iii) how efficiently an economy utilises its labour and capital stocks; and v) the strength and changes to the national labour force and the pace of investment in accumulating capital stock. Depending on whether supply side or demand side driven growth is occurring there are different implications for economic actors and investors and their decisions to invest in accumulating factors of production, expanding production or otherwise. Ultimately, assessing economic growth can help economic actors and investors understand what is happening in both the resource and product markets.

CHAPTER 3 CONCEPTUALISING INSTITUTIONS

3.1 Introduction

Chapter 2 investigated the theoretical origins of economic growth and how these theories suggest that economic growth could be measured and decomposed. Chapter 2 also introduced the concept of the fundamental determinants of economic growth. This Chapter 3 will review the theoretical underpinnings of the concept of institutions as a fundamental determinant of economic growth and their relationship with the proximate determinants of economic growth. This Chapter will begin with a brief assessment of the theoretical approaches to defining institutions in Sections 3.2 and 3.3. This Chapter will then discuss the theoretical approaches to categorising institutions in Sections 3.4 and 3.5. The exposition of these theoretical underpinnings will provide the background for the further discussion of the relationship between economic growth, productivity and institutions in Chapter 4.

The theoretical approaches surveyed in this Chapter suggest that as a fundamental determinant of economic growth, institutions may have a role in shaping incentives and constraints for the accumulation of labour and capital within the resource and product markets and the choice to invest in technological progress. This Chapter will briefly identify some of the theoretical mechanisms suggested for these relationships. This Chapter will conclude with an assessment of how institutions are theoretically perceived and highlight the mechanisms through which the theory suggests institutions act as fundamental determinants of economic growth. This summary will provide support for the discussion in Chapter 4 which will establish the conceptual framework that will be used for this study.

3.2 Theoretical approaches to defining institutions

Institutions are multifaceted and defined by social scientists in many ways from several different contexts, from political, evolutionary to historical. The common theme in defining institutions has been the importance of institutions for decision-making and ensuring stability and certainty, rendering collective action feasible. To understand how institutions, accomplish these roles within the economy, it is necessary to identify a clear definition that will help with their identification, categorisation and analysis. This section will briefly outline some of theoretical

definitions of institutions, including the distinction between the rational choice and historical definition of institutions and the new institutional economics and neoclassical definitions of institutions.

3.2.1 Rational choice and historical approaches of defining institutions

Institutions are the infrastructure of social relationships; institutions are a collective from the perspective of historically accumulated systems of rights, duties and obligations at work in the present. Institutions set the framework of prevalent social rules that bring order to social interaction. This section will briefly assess the theoretical constructs of the rational and historical definitions of institutions. As societies develop structures that determine the distribution of resources and rules for social order, they slowly develop into the institutions that contain the tacit and explicit knowledge of the rules by which the society will operate. Institutions condition the control, expansion and liberation of individual action of social and economic actors within any society, economy or community.

From the historical perspective, institutions are the norms of behaviour that were enforced through '*social sanction'* (Nelson & Sampat, 2001). Historical institutionalist defined institutions from the context of their persistence and posit that formal institutions that create, enforce and apply laws matter most (Amenta & Ramsey, 2010). Rational choice institutionalism borrowed from rational choice economics and focus on how individuals use institutions to maximise their interests (Weingast, 2002), defining institutions in the context of their role in constraining individual behaviour. Institutions are viewed by rational theorists, in terms of the outcome of self-enforcing behaviour that confirms associated beliefs and regenerates associated norms (Greif, 2006). From the rational choice perspective, institutions make it possible for economic agents to make decisions during informational failure occurring when one party to an economic transaction enjoys greater fundamental knowledge than the other party to the transaction ('*information asymmetry'*).

Together the historical and rational perspectives provide units of analysis to explain the relevance of the origin of the institutional environment. The past, encapsulates institutional elements, the current institutional framework reflects the impact of these past institutional elements. The current national institutional

framework becomes embodied in individual preferences and establishes beliefs about what would be expected, normative and socially accepted behaviour in the economy, society or community.

3.2.2 New institutional economics and neoclassical approaches of institutions

Considered a heterodox school of economic thought, as its theoretical underpinnings are beyond the mainstream or orthodox schools of economic thought, new institutional theorists ('NIE') such as Coase (1937), Alchian and Demsetz (1973), Williamson (2000), Greif (2006) and Aoki (2011) adopt a rational choice approach and define institutions in terms of their embedded behavioural attributes. NIE emphasises the emergence of institutions to provide structure to exchange interactions. Conversely, neoclassical theorists do not explicitly consider institutions, when examining the process of exchange interactions within the economy. Neoclassical theorists such as Smith (1776), Swan (1956), Solow (1957), North (1991) and Dequech (2013) acknowledged the capacity of institutions to increase the allocative efficiency of the factors of production, but take for granted their existence within the economic system.

The neoclassical approach to defining institutions is based on the assumption that rational economic actors make decisions to maximise their opportunities and future benefits and argue that economic outcomes are the result of individual choice (North, 2016). Conversely, NIE theorists defined institutions primarily based on collective behavioural regularities, including instincts and habits. For NIE, individual choice is motivated by the collective acceptance of the expected behaviour and habits of individuals within the society. Conversely, neoclassicism focuses on individual choice driven by the desire to maximise outcomes and benefits, rather than considering the expected norms of behaviour. Hayek succinctly encapsulated the neoclassical approach to institutions when he stated that institutions arise '*spontaneously as by-products of individual choices, rather than deliberately through collective action*' (cited in Huggins, 2013, p. 5).

The neoclassical approach to defining institutions considers the potential for informational asymmetry and asserts that economic actors understand the contexts in which they operate and make choices based not just in rationality, but on the

assessment of appropriateness, their objectives and the opportunities and sanctions they face. The NIE approach to defining institutions tends to concentrate on the emergence and evolution of institutions. Like the neoclassical approach, the NIE perspective also placing emphasis on self-interested rational agents. The lines of demarcation between the neoclassical and NIE approach to defining institutions are hazy at best. The difference in their approaches are how they consider institutions function within the economic system. While neoclassicism takes institutions for granted, as part of the 'black box' of TFP, NIE argue that institutions can be specifically identified within the economic system. More particularly, NIE contend that institutions are one of the fundamental determinants of economic performance that influences the performance and productivity of the factors of production.

3.3 Theoretical definitions of institutions

The definition of institutions has been through several theoretical iterations. From being defined as a shared set of rules, to settled habits of thought and more recently as human devised constraints that limit and define individual choice and social rules that structure social interaction. In estimating the role of institutions in the process of decision making within the markets and ensuring stability and certainty, it has been suggested that institutions render collective action feasible. Inherent in their role in the decision-making process, institutions become the infrastructure of social relationships. Within the resource and product markets there will be instances of informational asymmetry. This section will survey how the extant theory considers that institutions contribute to the basic and stable systems that govern the incentives of economic agents and coordinate their activities within the markets, mitigating against potential market failures or inefficiency arising from information asymmetries.

3.3.1 What are institutions?

Institutions become the constituent components of social and political life within the economy. The preferences, capabilities and basic self-identities of economic agents are habituated to the institutional structures within the economy. An economy's institutional environment sets the framework of prevalent social rules that not only structure social relationships (North, 1989) but exchange within the resource and

product markets (Leite, Silva, & Afonso, 2014). Although institutions are varied in form and content they can be defined and classified based on their effect on transactions and exchanges within the markets. Their primary effect is to provide predictability of behaviour of economic actors (individuals, firms and governments), thereby encouraging economic agents to contract amongst each other (Nelson & Sampat, 2001). Institutions condition the control, expansion and liberation of individual action of economic actors. Within the product and resource markets, institutions set the 'rules of the game' by codifying, constraining, prescribing and sanctioning habits, customs, instincts and systems of operation within the economy (North, 1990, p. 3).

Institutions as 'rules of the game' set the framework within which economic actors interact within the markets and despite informational asymmetries, build upon their 'mutually shared and legitimate expectations'. These include concepts such as language, money, legal systems, systems of weights and measures, traffic conventions, corporate governance and firms. The existence of institutions influences the behaviour of economic actors within the economy; they can influence greater participation, by creating an environment that provides incentives to invest and protection of private property (Leite et al., 2014). Exchange within the markets are facilitated by institutions that mitigate against potential hazards of trade (including weak property rights protection), establish governance structures that reduce costs, encourage capital formation and capital mobility, permits risks to be priced and shared and otherwise facilitates coordination of resources within the economy (Leite et al., 2014). As a form of governance within the markets, institutions determine the efficiency *inter alia* with which economic relationships such as contracts, employment, supply or credit are implemented.

3.3.2 Defining institutions as formal rules or informal norms

This section will assess the literature that defines institutions as either 'formal' rules or 'informal' norms of behaviour. Institutions are endogenous and not generated by themselves or capable of existing without external support, they are incapable of accomplishing much on their own. Institutions gain their structure, form and force from within the economic system. Institutions are legitimised and adhered to, based on their outcomes and their ability to be enforced. The process of legitimising

institutions requires individual and collective agency by economic actors and governments voluntarily permitting their actions and decisions to be constrained by the form and force of the institutions. This section will briefly examine the literature that suggests that the contrast between institutions as formal rules and informal norms is critical to the role of institutions within the economic system.

Institutions are specified in formal terms such as constitutions, statute, common laws and contracts (Carey, 2000). Ostrom (1986) asserted that rules are not only formal precepts, but are known, used and legitimised because of explicit collective efforts to achieve order and predictability. Formal rules encompass instances of regulatory precepts, such as whether it is illegal to sleep in public. Breaches can be easily and explicitly identified and the community to which they apply can be easily defined (Williamson, 2000). Institutions as formal rules, arise to fill gaps in the market; they provide structure to exchange in an environment of asymmetrical information (North, 2016).

Conversely, informal norms of behaviour, customary practices, conventions and traditions, (Hall, 1992) are '*deep', 'slow-moving'* institutions based in culture and ideologies, subject to shifts in collective values and beliefs. Rather than being explicit and easily identified, informal norms form part of the tacit knowledge of a community, society or economic system (Dequech, 2013). It is more challenging to identify and quantify informal norms of behaviour, as they do not show up in formal terms. They become observable through the regularity of behaviour (Tauheed, 2013).

While formal rules may provide a series of distinct and potentially overlapping, yet predicable and stable patterns for interaction, informal norms provide efficacy to the formal rules. Together they form the institutional arrangements that are determined by interests and ideologies within a society. As governance structures, institutions determine the efficiency with which economic relationships *inter alia* such as contracts of employment, for supply or for credit are implemented.

3.4 Theoretical approaches to categorising institutions

This section will then investigate the extant literature on the categorisation of institutions. The investigation of the role of institutions in economic performance has often used broad and inadequate definitions of institutions. In less formal terms, institutions have been considered the rules of the game within a society directed at shaping the incentives for exchange transactions. Though in most cases it is accepted, this broad definition focuses primarily on the obstacles that are confronted when examining institutions, namely the failure to clearly specify which institutions are being addressed in relation of the range of possible categories of institutions. Some research has questioned the flawed approach of not recognising the endogeneity of institutions and that it is necessary to unbundle institutions into easy to understand categories.

Some studies simply capture an economies' institutional environment as a composite of institutions. This oversimplification clusters varying categories of institutions into one compound measure, making it difficult to draw material inferences from the empirical results. Given this ambiguity, it is worth exploring the various broad categorisations used in empirical studies. Roland (2004) identified two approaches to classifying institutions: the functional approach and the macrosystemic approach. This section will briefly outline these two approaches. Table (3.1) summarises the categorisations of institutions from either the macrosystemic or functional approach.

3.4.1 The Macrosystemic approach to categorising institutions

This approach categorises institutions along of range of general rules (for example, political, legal, social institutions), to specific rules (for example, electoral rules, rules affecting legislative bargaining). This perspective focuses on a comparative analysis of the outcome or effect of institutions. This approach tends to focus primarily on the political rules that constrain government action or self-enforce government choice (Persson & Tabellini, 2003). It uses game theory to determine the relevance of different political rules, including the choice of polity.

An examination of the extant literature reveals various categorisations of institutions. This section will now explore the implication of adopting the

macrosystemic approach to categorising institutions. ‘Good’, ‘bad’ and ‘weak’ are used by scholars in reference to their description of the efficiency of institutions within the economic system (Acemoglu, 2006; Aisen & Veiga, 2013; Tebaldi & Elmslie, 2013; Adams-Kane & Lim, 2016; Afonso & Jalles, 2016). Acemoglu and Robinson (2012) devised the terms ‘inclusive’ and ‘extractive’ to describe whether institutional frameworks encourage economic activity, technological development and knowledge creation and the diffusion of political power.

3.4.1.1 Institutions categorised as ‘good’, ‘bad’ or ‘weak’

Adopting a macrosystemic approach, it can be logically concluded that ‘*good*’ institutions are efficient institutions that cause better decision making and fill the gap of information asymmetry. When institutions are ‘*good*’, moral values and beliefs enhance cooperation among individuals within the society. Efficient institutions define the constraints within which individuals can carry out their activities; they enable transactions at a lower cost (Bhaumik & Dimova, 2014). ‘*Good*’ institutions are characterised by their ability to *inter alia*: i) ensure protection of private property rights and enforcement of contracts; and ii) filling the gaps of information asymmetry through providing opportunities to invest and retain control of the return on those investments, control of inflation and open exchange of currency (Diamond, 2012).

Using the same macrosystemic logic, it can be argued that institutions are categorised as either ‘*bad*’, ‘*weak*’ or ‘inefficient’ where rules are absent, suboptimal or poorly enforced. ‘*Weak*’ connotes failure (Acemoglu & Robinson, 2012). There have been empirical studies that suggest that ‘*weak*’, ‘*poor*’ or ‘*bad*’ institutions are the result of colonial and legal origins (Acemoglu et al., 2001; Glaeser, La Porta, Lopez-de-Silanes, & Shleifer, 2004), ethnolinguistic fractionalisation (Easterly & Levine, 1997), resource endowments (Sachs & Warner, 2001; Collier, 2010) and religious homogeneity (Glaeser, Scheinkman, & Shleifer, 2003). Alternatively, where rules do exist, they may also be counterproductive or impose excessive controls, also resulting in bad or weak institutions (Diamond, 2012).

Neither term is the absolute opposite of the other. Furthermore, ‘good’, ‘efficient’, ‘inefficient’, ‘weak’, ‘bad’ or ‘poor’ can only apply to *ex post* analysis of outcomes. The dichotomy between good, efficient, bad, weak, inefficient is by no means rigid and inherently depends on a subjective assessment of the resulting

outcomes of economic actions. This raises questions of what specific form institutions should take, to be good, bad, efficient, inefficient or weak and whether these would differ across economies based on their level of development, initial conditions or levels of investment in factor accumulation. Table (3.1) identifies empirical studies that categorise institutions as ‘good’; ‘efficient’; ‘inefficient’; ‘weak’; ‘bad’ or ‘poor’.

3.4.1.2 Institutions categorised as either ‘inclusive’ or ‘extractive’

Acemoglu and Robinson (2012) building upon the work of Engerman and Sokoloff (1997) also adopted a macrosystemic approach and identified a new categorisation to explain the difference between institutions that favoured inequality and those that favour the accumulation of wealth. Engerman and Sokoloff (1997) and Acemoglu and Robinson (2012) agree that ‘*extractive*’ institutional systems serve individual interests, rather than the economy as a whole, and inhibit economic opportunities. Extractive and inclusive institutions can only persist within a framework of certain types of political institutions (Acemoglu & Robinson, 2008; Acemoglu, Ticchi, & Vindigni, 2011). Extractive political institutions consolidate political power in the hands of a few, without constraints, checks and balances and give rise to extractive economic institutions. Likewise, inclusive political institutions allow expansive participation; impose restrictions, and constraints on politicians, producing inclusive economic institutions.

Acemoglu and Robinson (2010) opine that extractive institutions are the result of European colonialization. The colonization strategy determined the character of the rules established in individual colonies (Acemoglu & Robinson, 2008). These implanted rules ignored the pre-existing informal norms and ideologies of these societies. Geography dictated the settlement strategy that would eventually give rise to the institutional frameworks imposed by the coloniser. Acemoglu and Robinson (2008) maintain that these artificially imposed rules resulted in institutional frameworks that gave rise to structural inequality that supported accumulation of wealth, as opposed to accumulation of factors of production and inhibited efficiency within the economic system.

However, the distinction between extractive and inclusive remains arbitrary. Neither term is the opposite of the other. The opposite of inclusive is exclusive,

while the opposite of extractive is insertion. These classifications are axiomatic, derived from observing actual outcomes that define them based on whether the economies were failing or not - '*extractive*' institutions fail and '*inclusive'* institutions do not. There is no sense of what should be '*inclusive*' relative to '*extractive'* from one society to another, other than exploring their historical context. However, factual examples do not support this distinction. There are examples of economies like China, Chile (1973 to 1990) and Taiwan with '*non-inclusive*' political institutions that are exhibiting strong economic growth. Table (3.1) identifies empirical studies that categorise institutions as either extractive or inclusive.

3.4.2 The functional approach to categorising institutions

Roland (2004) suggests that the functional approach categorises institutions by their ability to meet the needs of efficient contracting and investing. In other words, specific institutions correspond to a particular need to regulate interactions within the economy (for example, writing contracts; enforce contracts; secure investment; supply of public goods and infrastructure by the government and so on). This approach provides a very straightforward framework to think about how institutions perform a range of functions within the economic system. The functional approach to categorising institutions inevitably subsumes the macrosystemic approach as it categorises political institutions on the premise of their function within the economy, rather than their effect on outcomes. The functional approach to categorising institutions prioritises function over effect and argues that an institutions' function, will determine its effect.

The two macrosystemic categorisations explored in Sections 3.4.1.1 and 3.4.1.2, acknowledge that the economic system has both political institutions that constrain the executive and allocate power and economic institutions that allocates resources, set the parameters for exchange and transactions within the economic system. The literature also agrees that there is an interrelationship between political institutions and economic institutions. Institutions have been categorised as either 'political' or 'economic' in reference to the specific societal function that they perform within the system (North, 1992; Weingast, 1995; North, 2003; Wiggans & Davis, 2006; Leite et al., 2014). Economic institutions stimulate economic growth only when political institutions create effective restraint on the behaviour of power-

holders, to prevent their monopolisation of the market through rent seeking. This section will examine the extant literature that adopt a functional approach to categorising institutions as either political or economic based on their role within the economy.

3.4.2.1 Institutions categorised as either political and economic

Economic institutions organise economic activity (Leite et al., 2014). They construct incentives for actors to take part in the economy and in particular prompts investments in physical and human capital and technology, and the management of production (Acemoglu et al., 2004). Economic institutions achieve this through setting rules and expectations of behaviour amongst economic actors. By setting these rules of behaviour, they can reduce uncertainty and risk in economic exchanges Rodrik (2000). Different economic institutions will tend to lead to different distribution of resources, which can give rise to conflict amongst groups and individuals regarding the choice of economic institutions.

Politics and political institutions determine what economic institutions a country will have. The choice of institutions is the direct result of the collective action of individuals within the society that hold the political power (Davis, 2010). The administration of political power amongst different groups or social classes is a primary driver of the choice and structure of economic institutions. The state should be strong and stable enough to be able to provide public goods and establish governance enhancing economic institutions, such as legal protection of private property (Besley & Persson, 2010). The central feature of a secure political system is that it is '*credibly committed*' to safeguard markets, through self-enforced limited political preference (Weingast, 1995).

The distribution of political institutions can constrain the executive and influence the allocation of resources, while reflecting the underlying collective informal norms and ideologies of power relationships within the society and economy. Economic institutions are not self-emerging, but arise endogenously through the operation of political institutions. The literature agrees that both economic institutions and political institutions that can effectively constrain the executive and allocate resources, while protecting private property rights and enforce contracts matter for economic growth.

Table 3.1: Approached to categorisation of institutions in empirical studies

Categorisation of Institutions	Key Arguments	Studies
Good institutions Efficient institutions	These types of institutions are those structures and systems that are most likely to increase economic growth. Ethnic homogeneity should result in good institutions and pro-growth policies. Good institutions aid efficiency and reduce uncertainty in exchange transactions.	Aisen & Veiga (2013), Tebaldi & Elmslie (2013), Adams-Kane & Lim (2016), Afonso & Jalles (2016)
Weak institutions Inferior institutions Inefficient institutions	Institutions may be weak where rules are not present, negligible or poorly enforced. Economies with inferior institutions will invest less in knowledge and technology and be less innovative. Institutions that do not maximise economic growth potential are weak, inferior or inefficient.	Aaron (2000), Farole, Rodríguez-Pose, and Storper (2010), Diamond (2012)
Extractive and inclusive institutions	Extractive institutions have persisted from colonisation. Extractive institutions do not provide protection of private property or allow for restraint and balances against government expropriation of private property.	Acemoglu et al. (2001), Acemoglu and Robinson (2012), d'Agostino and Scarlato (2012) Abad and van Zanden (2016), Schein (2016), Rocha Menocal (2017)
Political institutions	Political institutions restrain public officials and are critical to positive economic growth. Economic institutions have a greater impact on economic growth where political institutions are strong.	Knack and Keefer (1995), Hall and Jones (1999), Rodrik (1999); Acemoglu et al. (2001), Glaeser et al. (2004), Angeles (2010), d'Agostino and Scarlato (2012) Siddiqui and Ahmed (2013)
Economic institutions	Economic institutions are derived from political institutions. Economic institutions protect property rights and enforcing contracts. Economic institutions determine economic actors' incentives to invest in factor accumulation and trade within the economic system.	Rodrik et al. (2004), Acemoglu and Johnson (2005), Law and Habibullah (2006) Haggard and Tiede (2011), Farhadi, Islam, and Moslehi (2015)

3.5 The role of political and economic institutions within the economic system

That institutions are critical for economic performance has been conclusively proven. Despite this consensus, the earlier sections highlight the mixed empirical results about the category of institutions and the nature of institutions that are important for economic performance. It could be argued that the oversimplified categorisation of institutions as either political or economic may fail to support a meaningful interpretation of earlier empirical studies. It is acknowledge that there are many features of the function of institutions that are yet to be appropriately categorised. However, in the absence of conclusive theoretical approaches the categorisation as political or economic provides a credible foundation for a clearer classification of the myriad function of institutions within the economic system to either create or deepen markets. This is pertinent for the investigation of the role of institutions within the economy. The following section of this Chapter will examine literature that further classifies different political and economic institutions based on their function in either creating or deepening the resource and product markets in support of factor accumulation and productivity.

3.5.1 Market-creating political and economic institutions

Market-creating institutions create complete and contingent resource and product markets. Market creating institutions encapsulate the extent to which existing institutions for conflict resolution bolster the emergence or growth of markets where economic actors feel confident that they can engage in mutually beneficial economic activities. Market-creating institutions will tend to reduce transactions costs, encouraging higher volume of transactions, factor accumulation and investment in skills, knowledge and R&D in the resource market. Likewise, social conflict institutions create a level playing field and enhance internal security (Rodrik, 2000).

In the absence of market-creating institutions, markets for exchange of goods and services would not exist or would perform poorly (Voigt & Gutmann, 2013). Market-creating institutions allow economic actors to interact, transact and make goods and services in the knowledge that their economic profit will be within their control (Das & Quirk, 2016). The market-creating effect encourages trust and cooperation amongst economic actors, businesses and the state and support the

emergence or growth of markets. They include those political and economic institutions that protect the individual and their property and enforce contracts.

3.5.2 Market-deepening political and economic institutions

Market-deepening institutions create efficiency within the resource and product markets. They include those regulatory political and economic institutions that mitigate against market failures, agency problems and establish arrangements for corporate governance and accountability of policy makers. These include institutions of macroeconomic stabilisation, which reduce uncertainty in the capital and labour markets and encourage sustainable extensive economic growth, through increased accumulation of capital and labour. Lauridsen (2012) contends that political and economic institutions that enhance the efficiency of public policy and mitigate against the risk of anti-competitive behaviour, free-riding and rent-seeking by corporate actors can deepen labour and capital markets, for example, economic institutions that regulate taxation, trade and investment.

Market-deepening institutions emphasise that economic actors are imperfectly coordinated by the market alone and that economising on transaction costs is the key to successful economic performance. Making markets more efficient involves economic institutions that reduce the costs of transactions, support the mechanisms for securing property rights and political institutions that enforce bureaucratic procedures and increase the credibility of government decision-making. Market efficiency mitigates informational asymmetry (Wang, Zhou, & Chen, 2011). Market efficiency contributes to providing incentives for increased investments and volume of contracting (Ugur, 2010). Political and economic institutions that have a market deepening function reduce the incidence of macroeconomic volatility and the likelihood of economies suffering from resource misallocation and distortions. By curbing, legal, political and bureaucratic rents, market-deepening institutions reduce the cost of enforcing property rights and increase the benefits to be derived from market creating institutions (Siddiqui & Ahmed, 2013).

3.5.3 Rodrik's categorisation of market-deepening and market-creating institutions

Rodrik (2000) examined the functioning of economic and political institutions in aligning the incentives of economic actors. He developed a taxonomy of institutions that identified four key functions of institutions within the economy; i) market-creating; ii) market-regulating; iii) market-stabilising; and iv) market-legitimising. Rodrik's taxonomy specifies a useful structure for examining the different mechanisms through which different categories of political and economic institutions can affect long-run economic performance. Rodrik (2000) envisaged that both political and economic institutions that perform these key functions within the economy protect against market coordination failure.

Each of these categories of institutions is related to a need within the market. For example, any type of market exchange will presuppose the existence of property rights and some form of contract enforcement. Using Rodrik's taxonomy, political and economic institutions can be more specifically categorised in terms of their function as either creating or deepening the market. Market-creating and market-legitimising institutions refer to those political and economic institutions that are instrumental for economic exchange, regulating interaction, transactions and exchanges amongst economic actors and the state (Rodrik, 2005). While market-regulating and market-stabilising political and economic institutions contribute to the deepening of markets (Ugur, 2010).

Though not strictly market creating, market-legitimising institutions support the creation of markets through regulating social conflict and creating a level playing field within the economy. Market-legitimising institutions reduce potential market coordination failure by redistributing and managing social conflict, providing social protection and insurance in the event of shock (Rodrik, 2005). Conflicts increase the risk and costs of transactions and diverts resources from accumulation, diminishing productivity. Institutions that regulate conflict management can mitigate against opportunistic behaviour aimed at amassing a disproportionate share of resources (Siddiqui & Ahmed, 2013). Institutions that provide social insurance and social protection, like unemployment benefits, government pensions, public health care, reduce social divisions and distributional gaps that arise along lines of wealth, ethnic identity and geography within the market.

Market-regulating institutions mitigate against fraudulent and anti-competitive behaviour by economic actors. Market-regulating political and economic institutions are those rules and norms that are enforced in response to situations of market failure and are aimed at sustaining economic growth over the long-run (Rodrik, 2005). Regulatory institutions coordinate conduct in goods, services, labour, asset and financial markets. For example, employment regulations regarding working hours and hiring and firing practices regulate the labour markets, increasing the efficiency of the labour markets, deepening their operation and mitigating against market failure and agency problems. Market-regulating institutions contribute to providing economic actors with incentives to investment and increase the volume of contracting and reduce the incidence of externalities and market failures. These institutions reduce the cost of enforcing market-creating institutions and increase the benefits to be derived from market-creating institutions by ensuring that they are more evenly distributed within the economy (Siddiqui & Ahmed, 2013).

Economies are not self-stabilising (Rodrik, 2000). Market-stabilising institutions are those institutions that enable markets to develop resilience against shocks, reduce inflationary pressure, minimise macroeconomic volatility and avert financial crisis (Rodrik, 2005). Market-stabilising political and economic institutions stabilise the functions of the market, they include monetary policies designed to regulate the size and extent of growth of the money supply, which affects the stability of interest rates. Market-stabilising institutions reduce uncertainty and encourage investment and long-run productivity by protecting the market against external shocks (Bhattacharyya, 2009). This category of political and economic institutions provides a system within the market that enables investors to divest themselves of risks.

3.6 Summary

The way institutions are categorised is important for interpreting their effects. Categorisations as '*good'* or '*weak*', '*extractive'* or '*inclusive*', '*efficient' or 'inefficient'* may be artificial and axiomatic, providing no real indication of the quality of institutions, but providing a description of the effect of their outcomes. These axiomatic and parsimonious categorisations of institutions have resulted in the call for the use of much more robust techniques for identifying and quantifying

institutions in the investigation of the role of institutions on economic performance. The only distinction that has withstood empirical and theoretical scrutiny is between political and economic institutions. The categorisation of institutions as either political or economic has provided the most useful unit of analysis to explain the relationship amongst informal norms and formal rules, accumulation of capital and labour, productivity and economic growth.

While some studies categorise institutions based on their outcome or effect of institutions, others categorise institutions by the function they perform within the economy. This latter approach, provides a more straightforward framework within which to examine the influence of institutions within the economy, which prioritises function over effect. The functional categorisation of institutions as either political or economic acknowledges the complexity of the role of institutions as either creating or deepening the resource and produce markets. Yet the simplistic categorisation of institutions as merely political and economic has proven insufficient to elucidate the relationship between institutions and the economic system. This has led to the further functional categorisation of political or economic institutions as either market-creating or market-deepening. This functional categorisation has been taken a step further by Rodrik (2000) who developed a taxonomy of institutions based on four key functions; market-creating, market-regulating, market-stabilising and market-legitimising. While this taxonomy provides a useful method with which to examine the different mechanisms through which different categories of political and economic institutions can affect long-run economic growth, there has been no consensus on the relationship between these categories of institutions and the proximate determinants or productivity.

Market-regulating and market-stabilising institutions reduce uncertainty in the market and encourage sustainable economic growth, thereby having a market-deepening effect in the economic system. Markets that are more efficient reduce the impact of externalities and market failures and reduce macroeconomic unpredicabiilty. Market-deepening institutions support the function of market-creating and market-legitimising institutions, such as, supporting the enforcement of property rights.

Market-creating and market-legitimising institutions not only create the markets within the economic system, but also provide social insurance and support systems for risk sharing. By legitimising the market, they ensure social cohesion and stability, reducing social conflict that can potentially divert resources from productive activities. These institutions could contribute to the reduction of transaction costs, security of private property and enforcement of bureaucratic procedures that increase market participation and investment in factor accumulation, skills, knowledge and R&D.

The combined effect of market-creating and market-deepening institutions is to encourage and support economic actors and economic decision-making to engage in mutually beneficial activities through interaction and conclusion of contracts. They enable economic actors to achieve higher overall returns on a given capacity of contracting by decreasing transaction costs. The combined effect of these institutions underpins the incentive for investing in factor accumulation and productivity.

The theoretical case for the significance of institutions for economic growth, is that they matter as determinants of the costs and benefits of undertaking growth-enhancing activities, such as the accumulating physical and human capital or participating in international trade. If that is indeed the case, then these factors should be only intermediary channels through which institutions are associated with economic growth and they should not be controlled for in estimations aimed at examining the overall effect of institutions on economic growth. In other words, physical and human capital and trade openness are the outcomes of the institutional infrastructure and their inclusion would include some of the growth effects that should ultimately be ascribed to institutions.

CHAPTER 4 COMPARATIVE STUDIES OF THE RELATIONSHIP BETWEEN ECONOMIC GROWTH, PRODUCTIVITY AND INSTITUTIONS

4.1 Introduction

The conceptual framework for this thesis is based upon the relationship amongst the proximate determinants, productivity and institutions as fundamental determinants of economic growth. The theory surveyed in Chapter 2 has highlighted the origins of endogenous and exogenous economic growth theoretical perspectives of the role of the proximate determinants of economic growth. Both theories suggest that economic growth is driven in part by the impact of technological advancements on the efficient allocation and use of the factors of production. They both agree that skills, knowledge and R&D contribute to the relative efficiency and productivity of labour and capital. This functional relationship occurs within the resource markets. The exogenous neoclassicism theory further posits that investment in capital in the resource market contributes to the relative productivity of labour. One of the constituent assumptions of the neoclassical economic growth theory, propounded by Solow (1994) is that economies that use similar technology, should have converging rates of productivity. This assumption is predicated on the further assumption that knowledge and technology are independent of capital and labour and are non-rival goods that are free for use by all businesses within an economy.

Chapter 2 has highlighted that there is a lack of consensus on how to quantify productivity. While the endogenous growth theories endogenise productivity, measured as the level of technological progress, exogenous growth theorists consider that productivity occurs outside the economic system and can be quantified by TFP measured as anything that contributes to economic performance that is not otherwise accounted for as capital or labour. It is within the context of this lack of consensus that the extant literature has failed to provide a consistent measure of productivity. This lack of consensus and consistency on the quantification of productivity has led to different assumptions on the corresponding importance of productivity for economic growth of economies with different levels of national income.

Section 4.2 surveys the extant empirical literature that adopts an exogenous approach to decomposing economic growth. For sustained long-run economic growth, there must be a measure of productivity that supports the efficient allocation and deployment of the proximate determinants of economic growth within the resource and product markets. This survey will explore the continued empirical disagreement on how productivity should be measured and disagreement on the relative importance of accumulation of capital and labour versus productivity.

This research will suggest that the neoclassical model of economic growth provides a consistent theoretical grounding for the focus on the proximate determinants of economic growth. Solow's inclusion of the residual TFP in the simple Cobb-Douglas production function, expands the basic neoclassical model of economic growth to take account of those deeper determinants that can influence the productivity of capital and labour. This has given rise to burgeoning literature that has attempted to quantify those deeper determinants of the productivity of capital and labour.

The theory explored in Chapter 3 tend to agree that there may be an association between political and economic institutions and economic growth. More recent literature suggests that institutions win out as a more fundamental deep determinant of economic growth. The extant literature has identified that institutions can override the impact of geography, luck or culture and trade openness. In fact, some of the empirical literature would suggest that geography and trade openness have a relation to levels of economic growth, in the presence of appropriate institutional infrastructure (Easterly & Levine, 2001; Lauridsen, 2012). This suggestion puts the focus on the critical role that institutions can play in influencing decisions within the resource market and resultant levels of productivity. As resource markets develop, either spontaneously or are deliberately constructed, they require institutional frameworks that protect against the diversion of free trade of goods and services within the resource market, by either predation, high costs of exchange or information asymmetries.

Chapter 3 examined some of the issues in the theoretical definition of institutions. Chapter 3 highlighted that the underlying assumption is that institutions are those endogenous building blocks of social and political exchange within the economy. Institutions as either formal rules or informal norms provide the set of

rules that constrain, prescribe or sanction trade within the resource and product market. In this context, institutions provide the basis for the efficiency of economic relationships such as contracts, employment relationships, supply of goods or services or the provision of credit. Yet with the consensus on the role of institutions within the economy, there remains a lack of agreement on how they should be categorised.

The remainder of this Chapter 4 is presented as follows. Section 4.2 considers the extant literature that have examined productivity, accumulation of capital and labour as proximate determinants of economic growth. Section 4.3 presents a survey of the empirical literature that explores the association amongst institutions, productivity, accumulation of capital and labour. Section 4.4 summarises the literature surveyed in this Chapter and establishes the conceptual framework within which the empirical work of this study will be conducted.

4.2 Comparative empirical studies of the proximate determinants for economic growth

This section surveys the extant empirical literature that investigates the association between productivity and the factors of production and their association with differences in national income of economies of varying degrees of economic development. This section considers how the extant literature has examined the proximate determinants of economic growth from two perspectives: i) accumulation of the factors of production; and ii) increased levels of productivity. Table (4.1) provides a summary of empirical studies from 2012, which are discussed in this section.

Table 4.1: Comparative empirical studies decomposing long-run economic growth

Theoretical approach	Study	Key arguments
Productivity	Lee, J.W. and Hong, K. (2012) Eberhardt, M. and Teal F. (2013) Manuelli, R.E. and Seshardri, A. (2014) Bergeaud, A., Cette, G. and Lecat, R. (2017) Yalcinkaya, O., Huseyni, I. and Celik, A.K (2017)	• TFP accounts for at least three-quarters of the variation in the growth of labour productivity. • Environmental variables have an important role in cross-country differences in technical efficiency. • Policies can influence TFP – relevant ones are those that support innovation and foster greater productivity benefits from technology shocks. • Output per worker is highly responsive to changes in TFP
Factor accumulation	Rao, B.B. & Hassan, G.M. (2012) Turner, C., Tamura, R. and Mulholland, S.E. (2013) Hofman, A., Aravena, C. and Friedman, J. (2017) Aguiar, D., Costa, L. and Silva, E. (2017) Eichengreen, B., Park, D. and Shin, K (2018)	• Economic growth is primarily due to factor accumulation. TFP only makes a small, but positive contribution to the growth rate. • Capital plays a key role in GDP growth. • The productivity of labour grows through capital accumulation.

Ideally the association between economic growth and the proximate determinants and their productivity is assessed using quantitative methods. Dependant on whether the researcher adopts an endogenous or exogenous approach to decomposing economic growth in order to assess this relationship, there could be disparity in the proxies used for either capital, labour or productivity. Since all three; capital, labour and productivity, operate interdependently and simultaneously, it can be difficult to isolate the distinct association of any one with economic growth. Section 4.2.1 will survey the empirical studies that assess the relationship between productivity and economic growth from both the endogenous and exogenous economic growth theory perspectives.

4.2.1 Comparative empirical studies on the relationship between productivity and economic growth

It would be incorrect to associate productivity with only technological progress (Hofman et al., 2017). Instead it is a measure of the change in the production function at a given level of capital and labour. It quantifies the rate of change of the production function over and above what can be explained by capital and labour. The production process requires economic actors to make choices on the allocation of the finite factors of production to produce the goods and services that would yield the most benefit. Increased efficiency contributes to increased output from production (Auerbach & Gorondnichenko, 2012). In particular, TFP is the amorphous '*black-box*' that comprises a number of hard-to-measure components of productivity that are not otherwise accounted for by capital and labour, including technological progress (Easterly & Levine, 2001).

The early study by Hall and Jones (1999) assumed that labour was homogenous and that along a balanced growth path, the capital-output ratio is proportionate to the rate of investment in their examination of the determinants of cross-country variations in the Solow residual. Hall and Jones (1999) also argued that an economies' capital-labour ratio will rise because of the increase in productivity. They conducted a levels growth accounting exercise for 127 economies of varying degrees of economic development. They examined the influence of productivity on output per worker and found that in the long-run, high levels of output per worker are the result of higher investment rates in both physical and human capital, to increase levels of productivity. Their results would suggest that there is a positive covariance association among capital, labour and productivity. Contrary to the simple Cobb-Douglas production function, Hall and Jones (1999) did not assume that workers with different educational achievements or skill levels were perfect substitutes. Instead, their model specifically isolates the level of workforce skill and education in their measure of endogenous human capital.

In the simple Cobb-Douglas production function, differences in educational achievements or skill levels may show up in TFP and not the measure of the labour force. Whereas including human capital in the production function introduces a labour-augmenting Harrod-neutral where the relative factor shares are constant at

any capital-output ratio. This endongeous approach may cast doubt on the empirical robustness of the relationship between productivity and in particular, the real output of labour, making it near impossible to isolate the productivity of labour as opposed to the productivity of capital. This would contribute to Hall and Jones (1999) findings that economies have higher levels of output arising from higher levels of technology, when they exhibit higher rates of investment in physical capital and education with low rates of population growth.

In their investigation of the degree to which assumptions about aggregation and homogeneity matter for inferences as to the nature of cross-country technology differences, Eberhardt and Teal (2013) used sectoral value-add, labour stocks, physical capital stock and arable and permanent crop land capital stock (constructed using the investment series with perpetual inventory method). Following Abramovitz (1956) they maintained that TFP is more than technology. They argued that it is a '*measure of our ignorance'* driven by latent activities that are either difficult to measure or observe. They maintained that aggregate specifications are likely to result in misleading inferences of TFP. Their study found evidence that cross-country and sectoral differences in technological differences are important when explaining differences in output and productivity (Eberhardt & Teal, 2013).

Eberhardt and Teal (2013) results highlight the care that must be taken when designating a model for the production function taking account of TFP. As it is a '*hard-to-measure'* component of a modern production function, care must be taken that account is carefully taken of the other parameters included in the model and the potential for measurement errors that may appear in TFP. This could also have implications for whether TFP should be interpreted as Hicks-neutral or Harrod-neutral. The appropriate interpretation may depend on many factors, including whether the model treats labour and capital as substitutes or takes into account different levels of quality of labour stock or treats labour as homogenous within the economy. The implication is that how econometric analysis treats the factors of production as homogenous substitutes or heterogeneous alternatives may have a significant effect on the interpretation of the relationship between capital, labour and productivity.

Manuelli and Seshadri (2014) adopted an endogenous AK model approach and argued that changes in endogenous Harrod-neutral TFP causes endogenous

changes in all factors of production, including the stock of capital. In their re-evaluation of the role of human capital in determining the wealth of nations, they included GDP, years of schooling, public expenditure on education relative to GDP, life expectancy, total fertility rate adjusted for infant mortality, all averaged over the five year period from 2003 to 2007 (Manuelli & Seshadri, 2014). Their estimations not only take account of educational achievements of the workforce, but varying skill levels; these assumptions would impact how firms within the economy respond to the capacity of the workforce and influence incentives to invest in technology driven production or unskilled-labour intensive production.

Manuelli and Seshadri (2014) assumptions about the heterogeneity of the workforce suggests that effective human capital per worker varies substantially cross-country, yet their calculation of cross-country differences in TFP are significantly smaller than previously estimated in earlier empirical studies. Their results suggests that TFP is not only endogenous, but also results in endogenous changes in stocks of human and physical capital and only accounts for up to 35 percent of cross-country differences in output per worker (Manuelli & Seshadri, 2014). However, their model omits physical capital and only considers human capital. This could suggest that their model underestimates the measure of TFP and the potential influence of existing capital or investment in new capital on the productivity of the labour force. They also suggest that TFP is only accounted for by changes in the labour force, arising from years of schooling, development of skills, medical care and nutrition. Their estimation assumes that the productivity of capital is included in the estimation of TFP.

More recently, Yalcinkaya, Huseyni, and Celik (2017) using the growth rate of gross fixed capital formation, rather than growth rate of capital stock, found that TFP was a greater contributor to economic growth than fixed capital formation or employed labour for their sample of G-20 economies. Their econometric regression model included real GDP growth rate, employed labour growth rate and constructed TFP growth rate using the Tornqvist index. In their examination of the impact of capital, labour and TFP on real GDP per capita in G-20 countries over the period 1992 to 2014, they concluded that TFP had a greater impact on economic growth in developed economies than emerging countries (Yalcinkaya et al., 2017). Their findings support the earlier work of Caselli and Coleman (2006) who posit that

developed economies have a larger stock of skilled labour, which they are able to use more efficiently, and which incentivises these developed economies to adopt more appropriate technology-driven production methods, thereby increasing levels of output and national income. This would suggest that the opposite may persist in less developed economies, where they may be more unskilled labour abundant and relying on less efficient technology. Yalcinkaya et al. (2017) suggested that their results suggest that exogenous TFP is only a critical determinant of economic growth for economies where it has an impact on increasing the level of development. They suggest that to increase levels of GDP, the focus should be on improving the efficiency of labour through qualitative and quantitative investment in education, raising R&D expenditure and promoting corporate structures.

4.2.2 Comparative empirical studies on the relationship between the factors of production and economic growth

Economic growth can also come from adding more capital and labour inputs. Solow (1962a) argues that increased rates of capital investment can only temporarily increase economic growth rates, through an increase in the capital-labour ratio. However, the marginal product of additional units of capital may tend to suffer from diminishing returns, and the economy responds in the long-run by an increased dependence on the growth and efficiency of the workforce (Solow, 1962a). The neoclassical growth theory posits that long-run economic growth requires increased supplies of labour and higher levels of productivity of labour and capital. This section will survey those empirical studies that conversely argue that only investments in capital and labour are necessary for long-run economic growth, not the pace of productivity.

Turner, Tamura, and Mulholland (2013) found evidence most of output growth is accounted for by the accumulation of capital and labour, rather than TFP for states in the United States during 1840 to 2000. Their cross-state examination of levels of factor accumulation and efficiency of factor inputs for output growth, used per worker estimates of human capital, physical capital, land and each state's income and capital stocks. Turner et al. (2013) were basing their arguments on neoclassical perspectives, while adopting an endogenous AK model approach. They conducted an AK growth accounting approach using levels and not growth

rates to calculate TFP, like Solow, but arrived at different conclusions regarding the relative importance of TFP as a driver of output growth. Their model used a composite measure of capital (physical and human capital) to explain cross-state differences in output levels. Turner et al. (2013) maintained that their results suggest that factor accumulation is a greater contributor to economic growth rates than the mobility of capital and labour, common institutions, language, currency and trade policy. Empirical results from both Turner et al. (2013) and Yalcinkaya et al. (2017) may be misleading as their composite measure of capital, ignores the level of labour-augmenting TFP that elevates the efficiency of labour, derived from the investment in education, skills and knowledge.

More recently Aguiar et al. (2017) found evidence to suggest that differences in factor accumulation amongst OECD and emerging countries are more critical than differences in changes to TFP for explaining cross-country variations in economic performance. Their model decomposed the determinants of economic growth to estimate why some countries are richer than others (Aguiar et al., 2017). Their model included GDP per worker, human capital per worker formulated using data on the average years of schooling for the working-age population and rates or return associated with different years of education, capital stock per worker calculated by dividing capital stock at current PPPs by *inter alia* the number of workers, patents and regulations. Though it is difficult to reconcile why they have not considered the investment in skills and knowledge required to increase the productivity of labour stock. This disparate model may provide inconsistent results, both from the large number of variables and the estimation of human capital as opposed to labour stocks, without taking account of the productivity of human capital as opposed to the productivity of labour stock. Accounting for human capital and TFP may involve measurement errors as both measures may consider the heterogeneity of the labour force and the impact of investment in education, investment in training and skills acquisition.

Similarly, Hofman et al. (2017) found evidence that capital plays a critical role in GDP growth for their sample of Latin American and Caribbean economies. They found that TFP's contribution to output growth was negative and pro-cyclical, exhibiting positive characteristics only in countries with high GDP growth. They suggest that there is a positive covariance association between capital and

productivity and argue that increases in capital generates higher TFP (Hofman et al., 2017). They also argued that it is a mistake to associate TFP with only technological progress. They adopted a purely neoclassical approach and consider TFP as a measure of the changes in production over and above what can be explained by capital and labour (Hofman et al., 2017). These changes in production levels can be the result of: technical innovations, organisational or institutional changes, demand fluctuations, changes in allocation of capital and labour, scale effects and changes in the intensity of labour as well as measurement errors (Hofman et al., 2017).

The results of Hofman et al. (2017) suggest that economic performance is driven by firms expanding their maximum production possibilities through increased investment in factor accumulation. However, they do find some evidence that during a '*boom-period'* from 2003 to 2008 TFP may have been positive and statistically significantly associated with economic growth in their sample of 23 countries in the Latin American and Caribbean region. During this '*boom-period*' they found evidence that the high economic growth rates were associated with positive TFP levels, suggesting that TFP may exhibit procyclical behaviour in response to the slowly responsive capital (Hofman et al., 2017). They go further to suggest that in periods of low economic growth increased levels of 'idle' capacity will tend to show up in decreased levels of productivity in their sample. They also argue that the low economic performance of the economies in their sample, could be associated with slower accumulation and the misallocation of productive resources across firms or industries (Hofman et al., 2017).

4.3 Comparative empirical studies of relationship between institutions and economic growth

This section surveys the empirical literature that explores the relationship between institutions and the factors of production, productivity and economic performance. It will seek to identify the mechanisms through which the empirical literature suggests institutions are related to economic growth. There have been several empirical studies that explored the relationship between the quality of institutions and economic performance. These empirical studies have principally defined institutions as formal rules that constrain economic agents and governments in exchange

transactions within the economy. This section will firstly survey the literature that examines the direct association between economic growth and institutions. Secondly, it will survey empirical literature that investigates whether institutions are directly related to economic growth. Thirdly, it will survey the empirical literature that investigates whether institutions are indirectly related to economic growth.

4.3.1 How do institutions relate to economic growth?

This section will survey the empirical literature that investigates the direct association between institutions and economic growth. Several empirical studies from 1999 to present were surveyed to assess their findings on the role of institutions on long-term economic growth (Table 4.2). Glaeser et al. (2004) examining whether political institutions induce economic growth in a mix of both high-, middle- and low-income economies (as defined by the World Bank) for the period 1960 to 2000, used public data from Polity IV, World Bank Governance Indicators ('WGI'), La Porta, Lopez-de-Silanes, Pop-Eleches, and Shleifer (2004). To conduct this examination, Glaeser et al. (2004) used Ordinary Least Squares ('OLS'). They found no evidence of an association between institutions and economic growth. They argue that human capital may be a more essential cause of economic growth, particularly for poor economies. They suggest that human capital has a first order effect that shapes both institutional and productive capacity of economies. Though their conclusion, belies the influence of institutions in the decision to invest in skills and knowledge required to accumulate human capital.

Lim and Decker (2007) investigated whether economies with democratic political institutions grew faster than those economies with non-democratic political institutions. Similar to Glaeser et al. (2004), Lim and Decker (2007) conducted their investigation using public data from the Polity IV, they also used public data from Herfindahl Index of government from the World Bank and Military spending information from the World Bank's World Development Indicators ('WDI') for 128 economies, over an eighteen-year period from 1984 to 2002. Their investigation used military spending as a proxy for the level of democracy, presuming that democracies likely have lower levels of military expenditure as a proportion of government expenditure. Lim and Decker (2007) did not observe any evidence that

political institutions that primarily establish democracy are critical to achieving economic growth amongst the sample of 128 economies.

Lee and Kim (2009) examined the growth effect of institutions on 14 economies of different levels of income for the period 1965 to 2002. They used public data from Polity IV and ICRG. They found evidence that institutions and productivity matter differently for economies at different levels of income. More particularly, both political institutions that constrain the executive and productivity derived from a better-educated work force, are more decisive for low-income economies. While economic institutions are more critical for economic growth in high-income economies. Their study also suggests that political institutions that perform primarily market-regulating, market-stabilisation and market-legitimisation functions within the economy, such as those political institutions that regulate participation in politics, the impartiality and competitiveness of executive recruitment and constrain the executive.

Eicher and Leukert (2009) examined the influence of institutions on economic performance of 46 economies (OECD and non-OECD economies) over the period 1900 to 1989. To conduct this examination Eicher and Leukert (2009) also used public data on the constraints on the chief executive from Polity IV, as well as public data on chief executive recruitment regulation from the World Bank and indicators of political institutions from ICRG. They did not find a positive or significant association between political institutions and economic performance across the sample. While they did not find any evidence that political institutions directly affected national output, they did find some evidence that there is a common impact of political institutions among low-income economies. Eicher and Leukert (2009) concluded that institutions are '*three times more important in developing countries than in OECD countries*' (p. 208), suggesting that the quality and persistence of political market-regulating institutions has a greater impact on economic performance of low-income economies than on high-income economies. These political market-regulating institutions include institutions that regulate the distribution of *de jure* political power and assign power to alter economic market-creating institutions.

Haggard and Tiede (2011) examined the functional relationship between the rule of law and economic growth in 74 developing and transition non-OECD

economies over the nineteen-year period 1985 to 2004. Haggard and Tiede (2011) used several indicators to proxy institutions: (i) the index of political stability and absence of violence from PRS; (ii) contract viability and average protection against risk of expropriation from the World Bank and the number of procedures required to enforce a contract and WGO rule of law indicators; (iii) Henisz measure of political constraints; (iv) Cignarelli and Richards measure of judicial independence; (v) Transparency International corruption perception index; (vi) the Economist Intelligence Unit measure of corruption among political officials; and (vii) the World Economic Forum's rule of law measure. They argue that the rule of law is a multifaceted concept that encompasses a variety of distinct elements from the security of a person and property rights, to control of government and control against corruption (Haggard & Tiede, 2011). They found evidence that effective provision of law and order has a stronger effect on the volatility of economic growth in developing economies. They did not observe a 'tight' correlation among other elements of the rule of law among developing economies. Haggard and Tiede (2011) assert that this suggests that previous inferences about the effect of property rights protection on economic growth in developing economies may not be warranted. On this premise they argue that the elements of the rule of law '*hang together in very different ways in advanced industrial and developing countries'* (Haggard & Tiede, 2011, p. 677).

de Crombrugghe and Farla (2012) testing for the relationship between cross-country variations in institutional characteristics, income levels and rates of growth, examined 122 countries. Their panel included twenty-four developed countries, thirty sub-Saharan African economies, sixteen middle East and North African economies, eighteen Latin American and Caribbean economies, seventeen central Asian and European economies and eighteen developing economies in Asia over a fourteen-year period (1993 to 2007). They used institutional data from the Institutional Profiles Database ('IPD'), 2009, which data was based on a survey conducted by the French Ministry for the Economy, Industry and Employment and the French Development Agency (de Crombrugghe & Farla, 2012). The IPD includes data on 123 economies on 367 rudimentary variables that are intended to explain the role of institutions in economic development and goes beyond measuring governance (French Development Agency & French Ministry for the Economy, 2012). This data is subjective, based on surveys and its results rely upon

the emerging views of the questionnaire respondents. It does not include external data sources. It reviews nine institutional functions: *political institutions; safety, law and order; public governance; markets' operating freedom; coordination; security of transactions and contracts; regulations and corporate governance; openness to the outside world*; and *social cohesion* (French Development Agency & French Ministry for the Economy, 2012). They observed a statistically significant association between institutions and income levels, but no evidence of an institutional influence on economic growth rates.

de Crombrugghe and Farla (2012) sought to construct a multi-dimensional perspective of cross-country differences in institutional characteristics. Using 333 elementary variables and 40,426 data points, they found evidence of a strong association between institutions and income levels, but no evidence of an association between institutions and rates of economic growth and only mixed evidence of an association between institutions and the unpredictability of economic growth (de Crombrugghe & Farla, 2012). They argue that institutions are multifaceted, which makes comparison difficult. Furthermore, that specific institutional attributes matter at varying stages of economic development. It is an '*institutionally heterogeneous world*' that is comprised of complex relationships between institutional indicators, income levels, growth rates and the unpredictability of economic growth (de Crombrugghe & Farla, 2012, p. 3).

Law, Lim, and Ismail (2013) sought to answer the question whether, institutions induce economic development or whether they develop and evolve simply as a consequence of economic growth by investigating sixty countries divided between higher, upper middle, lower middle and low income over an eighteen-year period (1990 to 2008) using data from ICRG and the WGIs. Concluding that there was a bi-directional causal association between institutions and economic development that was highly heterogeneous (Law et al., 2013). In particular, Law et al. (2013) observed that institutional quality was significantly influential in encouraging economic growth in middle income economies, but minimally responsive in promoting economic growth in high income countries. Further, that there is a causal association between economic performance and improvement of institutional quality in lower middle income and low-income economies (Law et al., 2013). It is more probable that economic growth in lower middle income and low-income economies could affect improvement in institutional

quality. Like de Crombrugghe and Farla (2012), Law et al. (2013) found that there was an association between institutions and income levels and that specific institutional characteristics matter at varying stages of economic development.

More recently Nawaz (2015) examined the impact of political institutions that ensure government stability, control corruption and the rule of law on economic growth in 56 economies of varying income levels (high- and low-income economies), over a period of 29 years (1981 to 2010). To conduct their examination, Nawaz (2015) used public data on government stability, investment profile, control over corruption, law and order, democratic accountability and bureaucracy quality from the International Country Risk Guide ('ICRG') to capture the quality of political institutions that confer political stability, administrative quality and democratic accountability. This investigation was conducted using a static panel fixed effects and a dynamic panel system GMM. The results suggest that there is a positive association between the political market-regulating institutions and long-run economic growth in high-income economies. Stable governments contribute to policy stability, which not only encourages increased participation in the economy, but makes the economy more attractive for foreign investment (Nawaz, 2015). More particularly, these results would suggest that political market-regulating institutions that ensure a stable government in high-income economies have a positive influence on long-run economic growth

Flachaire, García-Peñalosa, and Konte (2014) contend that there are particular aspects of political institutions that are particularly critical for achieving economic institutions that encourage economic growth. Where political systems are stable, the resulting economic institutions generate strong incentives for participation within the economic system, inducing economic growth. Flachaire et al. (2014) opine that the type of regime (democratic or autocratic) is irrelevant to the question of the role of political institutions in influencing economic growth. What matters most is the effectiveness of the regulatory policies implemented by a stable regime (Narayan, Narayan, & Smyth, 2011). Their results would support the suggestion that market-regulating political institutions are critical for supporting market-creation and activity within the resource market.

Fabro and Aixalá (2013) examined the impact of political institutions on economic performance in 156 economies of varying income levels (high-, middle-

and low-income) over the period 1996 to 2011. To conduct this examination, Fabro and Aixalá (2013) used public data on six aggregate governance indicators from WGI to proxy political institutions and national output figures from WDI. They found evidence that the effect of the different aspects of political institutions is different based on the economies' level of income. Their results imply that the responsiveness of economic performance to different aspects of political institutions depends on the level of the economies' income, which is based on the level of output; (i) better institutional quality fostered economic growth in upper middle-income economies; (ii) economic growth tended to result in increased institutional quality in low-income economies. Fabro and Aixalá (2013) suggest that the quality of political institutions matter at different stages of economic growth. Their study provides evidence that political market-creating institutions such as the rule of law and protection of property rights and market-regulating political institutions for corruption control are critical for influencing economic performance.

Seven of the studies surveyed found no evidence of an association between political institutions in achieving long-run economic growth. Six of the studies that found no association between political institutions and economic performance, used public data on levels of democracy from Polity IV (Glaeser et al., 2004; Lim & Decker, 2007; Bolt & Bezemer, 2009; Eicher & Leukert, 2009; Angeles, 2010; Commander & Nikoloski, 2011). This would tend to suggest that political market-regulating institutions that establish democratic regimes are not critical or sufficient on their own for economic performance. This finds support in Barro (1998) whose earlier work observed that democracy had a small association with economic growth. This does not negate the association between political market-regulating institutions and economic performance, but begins to identify the '*type*' of political market-regulating institutions that may not have an influence on economic performance.

Eleven of the studies surveyed found positive and significant evidence that political institutions are critical in determining long-run economic performance (studies have typically examined the relationship over a period of eighteen to forty-five years, using publicly available time series data). More particularly, their findings agree that political institutions that are regulatory, control for corruption, ensure effective bureaucracy, maintain the rule of law and desirable law and order matter for the rate and level of economic performance in low-income economies. These

studies used public data from ICRG and WGI. This suggests that there is a role for political market-creating and certain types of political market-regulating institution in achieving economic performance. However, these studies did not identify the mechanism through which institutions affect economic performance. The following two sections of this Chapter, shall examine how institutions may indirectly influence economic performance through the mechanisms of the factors of production and productivity.

Table 4.2: Empirical studies investigating the direct association between institutions and economic performance.

The nature of the relationship	Key arguments	Studies
There is a direct association between political institutions and economic institutions and economic performance	Institutions are statistically significant drivers of economic performance. The influence of institutions on economic performance varies according to the level of national income. Better institutional quality encourages economic growth in high- and middle-income economies; though economic growth tends to result in an improvement institutional quality in low-income economies.	Chong and Calderon (2000), Law and Habibullah (2006), Law and Bany-Ariffin (2008), Klomp and de Haan (2009), Law et al. (2013), Fabro and Aixalá (2013), Siddiqui and Ahmed (2013), Rachdi and Saidi (2015), Madsen, Raschky, and Skali (2015), Nawaz (2015), Yıldırım and Gökalp (2016), Góes (2016)
Neither political nor economic institutions directly influence economic performance	Political institutions may not affect output directly.	Lim and Decker (2007), Bolt and Bezemer (2009); Eicher and Leukert (2009), Angeles (2010), Commander and Nikoloski (2011), de Crombrugghe and Farla (2012),

4.3.2 The relationship between institutions and the factors of production

Some empirical studies that find no direct association between institutions and economic performance, suggest that institutions affect economic performance indirectly through their influence on the factors of production. These studies contend that differences in the accumulation of capital and labour stocks, amongst

economies, are driven by differences in institutional quality (Tavares & Wacziarg, 2001; Glaeser et al., 2004; Hall, Sobel, & Crowley, 2010). This section will survey literature that suggest that institutions influence economic performance indirectly through institutions' direct impact on factor accumulation. These studies have tended to focus on economic market-creating institutions, particularly those that secure private property and enforce contract rights. This section will attempt to identify the mechanism through which these studies suggest that private property protection and contract enforcement influence the accumulation of the capital and labour.

Tavares and Wacziarg (2001) found positive, though weak evidence that democratic political institutions affect economic growth by improving the conditions for accumulation of human capital, but at the expense of accumulation of physical capital. They suggest that a democratic process is more suitable for economic prosperity as it nurtures civil liberties, secure property, and contract rights. Democratic political institutions that protect private property from expropriation and theft are more probable to be growth enhancing as they protect returns on private investments, create certainty during informational asymmetry and encourage the accumulation to securing private property, rather than the diversion of resources to unproductive activities, such as paying for personal security.

Garrett and Rhine (2011) investigated the effect of economic institutions on United States ('U.S.') state employment growth for three separate periods (1980 – 1990, 1990 – 2000 and 2000 – 2005). To conduct their analysis, they used public data from Fraser Institute's, Economic Freedom of North America 2008, which provides a measure of institutions that set restrictions on free-market activity. Their results imply that a one-unit increase in economic freedom index contributed to an increase in employment growth (3.8 percent from 1980 to 1990, 4.5 percent from 1990 to 2000 and 1.4 percent from 2000 to 2005). Meaning that protection of private property and private markets operating with minimal government intervention are fundamental determinants of higher rates of employment growth. These economic institutions indirectly influence economic performance, through their direct impact on the accumulation of labour stock.

These findings were echoed in the study by Heller and Stephenson (2014) who also examined the role of economic institutions in the accumulation of labour in

50 U.S. States, over the period 1981 to 2009. Heller and Stephenson (2014) also used public data from Fraser Institute's, Economic Freedom of North America index. They found evidence that greater economic freedom, exhibited by stronger institutions that protect private property and regulate free-market activity, with minimal government intervention, are strongly related to lower unemployment rates and higher labour force participation rates and employment-population ratios.

Alternatively, Acemoglu and Johnson (2005) argue that economic institutions that protect property rights and safeguard the certainty of contracting, have a direct influence on the accumulation of physical capital through investment. Acemoglu and Johnson (2005) examined the long-run association between economic institutions and investment and financial development in 42 common law economies & 47 civil law economies. They used public data available from the World Bank, Polity IV and Djankov, Glaeser, La Porta, Lopez-de-Silanes, and Shleifer (2003) data on legal formalism. They suggest that protection of property rights ensures that there are restraints on the state, politicians and elites providing private citizens with the security essential for investment. While enforcement of contracts enables economic actors to enter into private arrangements for exchange transactions.

Similarly, Hall et al. (2010) examined the association between institutional quality and the accumulation and productivity of capital, for 96 countries for the period 1980 to 2000. They used public data from ICRG. They concluded that physical capital is responsive to economic institutions that secure property rights, ensure unbiased contract enforcement and allow market prices and profits and losses to govern economic activity (Hall et al., 2010). These results support the proposition that economies with free market institutions that protect property rights and put into effect policies that provide for free exchange on the product and resource markets will tend to experience higher levels of capital accumulation, through the reduction of uncertainty and risk.

Hall et al. (2010) argue that the productivity of capital investment and human capital investment are responsive to institutional quality. They suggest further that physical capital investment is more so than human capital investments. Their results showed that countries with certain categories of institutions are characterised by social, political and legal rules that provide secure property rights, unbiased contract enforcement and rely on market prices and profits and losses to govern economic

activity (Hall et al., 2010). They further argue that economies with 'good' institutions exhibit higher returns to investment in rent-seeking enterprise that plundered the wealth of others, through pressing for political action and exploitation of lawsuit actions.

These two alternative explanations for the effect of institutions on accumulation of labour and capital stocks do not logically contradict each other, and may both play a role (Table 4.3). The literature solidly establishes that the economic framework that provides for protection of property rights, enforcement of contracts and voluntary exchange at market-determined prices, are necessary for investment in capital and labour stocks. Economic actors will be cautious not to risk their investments where property rights are not well enforced or poorly protected and there is the risk that others may appropriate the returns on their investment. Moreover, economic institutions set the infrastructure for the exploitation of the capital market, which is important for investment in physical capital. Yet these studies do not explore the how institutions are related to the productivity of the factors of production. The following section shall examine the literature that assesses the association between economic institutions and the productivity of capital and labour, measured by TFP.

Table 4.3: Empirical studies investigating the association between institutions and the accumulation of capital stocks and labour stocks

The nature of the relationship	Key arguments	Studies
There is an association between institutions and the accumulation of capital stocks.	Economic institutions that protect private property and enforce contractual arrangements are the foundation of the capital market that is important for reducing uncertainty and risks of investing in accumulating capital.	Acemoglu and Johnson (2005), Gwartney, Holcombe, and Lawson (2006), Alfaro et al. (2008), Hall et al. (2010), Kovač and Spruk (2016)
There is an association between institutions and the accumulation of labour stocks.	Economic institutions that promote a free-market with minimal government intervention is strongly related to lower unemployment rates and higher labour force participation.	Tavares and Wacziarg (2001), Garrett and Rhine (2011), Heller and Stephenson (2014), Sonora (2014)

4.3.3 The relationship between institutions and productivity

Empirical studies on the nature of the association between institutions and economic performance must come to terms with the inescapable and yet often ambiguous nature of productivity. They must disentangle how institutions affect the technical and allocative efficiency within the economic system. This section will assess the literature that examines how institutions increase productivity through the promotion of knowledge creation and macroeconomic stabilising, supporting the productivity of capital stock and labour stocks.

Glaeser et al. (2004) investigated whether political institutions or human capital induce economic growth in low-income countries over the period 1960 to 2000. They conducted this study using public data from Policy IV, ICRG and WGI. They found evidence that human capital is a more elementary source of growth than institutions. However, their conclusion does not keep in view the role of institutions in influencing the decision to invest in accumulating skills, knowledge and R&D that convert labour stocks to human capital. Similarly, Bolt and Bezemer (2009) examined whether human capital or institutions affect long-run economic performance in 24 sub-Saharan African economies. They used public data from Polity IV. They also found confirmation that human capital explained long-run economic performance, better than the quality of institutions.

Law and Bany-Ariffin (2008) examined the causality among institutions and economic performance in 72 diverse economies with varying levels of income (high- middle- and low-income economies) over a 21-year period (1980 to 2001). To conduct their study Law and Bany-Ariffin (2008) used public data from ICRG. Law and Bany-Ariffin (2008) carried out this examination using a generalised method of moments ('GMM') estimator proposed by Arellano and Bond (1991) and pooled mean group ('PMG') estimator proposed by Pesaran, Shin, and Smith (1999). Law and Bany-Ariffin (2008) found evidence that institutions are quicker to react to economic growth in middle- and low-income economies. Further, that the state of labour-augmenting technology depended not only on exogenous technological developments, but also on the peculiar characteristics of the institutional infrastructure. They suggest that institutions that reduce the level of bureaucracy

and set restrictions on rent-seeking activities influence the productivity of labour in middle- and low-income economies.

Dias and Tebaldi (2012) investigated whether political institutions gave rise to high levels of productivity and thereby long-run economic performance in sixty-one economies (East Asia Pacific, Latin America, Middle East and North Africa, South Asia, Sub-Saharan economies, transnational and advanced economies omitted) over a forty-year period (1965 to 2005). They examined this relationship using public data from Polity IV (*a measure of democracy and autocracy and the ratio of people with post-secondary education to people with no schooling as a proxy for the influence of institutions on the accumulation of human capital*). They found evidence that those structural institutions that influence the decision to accumulate human capital have a direct association with productivity and thereby dictate an economy's rate of economic growth.

d'Agostino and Scarlato (2012) examined whether institutions contributed to the innovative process, favouring economic growth in 15 European economies over the period 1996 to 2010. To conduct their examination d'Agostino and Scarlato (2012) used public data from WGI. They found evidence that there was a positive association between institutions and innovation. They argue that the quality of political institutions could contribute to compelling incentives for knowledge diffusion and the acceptance of technological innovation, thereby directly inducing productivity. This would suggest that growth-enhancing institutions can directly increase productivity through the promotion of knowledge creation.

Hall and Jones (1999) famously stated that '*productive activities are vulnerable to predation'* (p. 95). Institutions have two main functions: i) set stable structures for human interaction (North, 1991); and (ii) fill gaps in the market (North, 2016). Hall and Jones (1999) found that productivity was higher in economies with long-standing governance structures that favoured productive activities. They assert that higher levels of productivity are driven by government anti-diversion arrangements, years open to trade; the character of the economy (statist or mixed statist/capitalist-statist or mixed/capitalist or mixed capitalist), the portion of the population that speak English, the portion of the population that speak another language and their climate (Hall & Jones, 1999). More importantly, they found evidence that suggests that economies with high levels of output had adopted

‘*favourable’* social infrastructure characterised by rules and institutions that support activities, skills acquisition, invention and technology transfer and protect the output from predation and diversion (Hall & Jones, 1999). This would suggest that economies that achieve high levels of productivity and output may have a ‘*best-fit*’ structure of institutions.

Of the literature surveyed, there is consensus that political and economic institutions can directly increase productivity through the promotion of knowledge creation, impacting the way in which levels of physical capital stock and labour stock evolve through technological advancement, thereby indirectly affecting rates of economic growth (Table 4.4). Political and economic institutions that promote the ease of doing business, the character of tertiary education and the level of patent protection are more likely to benefit skills, knowledge creation and diffusion and innovation, thereby indirectly contributing to increased levels of productivity.

Economies with institutional frameworks that promote: ease of doing business; the character of tertiary education systems; and the level of patent protection are argued to be more likely to gain from R&D efforts and international R&D spill overs (Tebaldi & Elmslie, 2013). Institutions that create efficiency through macroeconomic stabilising policies, such as stable monetary policies and fiscal policies are arguably growth-enhancing; whereas institutions that manage distribution of resources and social issues, may only indirectly affect productivity through their direct influence on accumulation and distribution of resources (Rodrik, 2005). Different institutions may result in different technologies and affect an economies ability to maximise productivity.

The character of the institutional framework can either provide incentives for productive activities that have high private and social returns or give rise to rent-seeking and non-productive enterprises that provide little benefit (Krammer, 2015). Nelson and Sampat (2001) asserted that institutions that secure private property, provide clarity and enforce contracts make certain kinds of transactions or exchanges more attractive or easy, supporting productive activities. Furthermore, that these types of ‘social technologies’ could significantly influence the way in which levels of physical and human capital per worker become more efficient through technological advancement. This would suggest that economic growth

through increased productivity is the result of the interaction between the institutional framework and the co-evolution of capital and labour.

Table 4.4: Empirical studies investigating the association between institutions and productivity

The nature of the relationship	Key arguments	Studies
There is no association between institutions and productivity	Human capital is a more fundamental source of economic growth than institutions	Glaeser et al. (2004); Bolt and Bezemer (2009)
There is an association between institutions and productivity	Variations in national levels of capital accumulation and productivity are driven by differences in institutional infrastructure. Political institutions can affect the rate of productivity growth. Political institutions can indirectly increase productivity through the promotion of skills and knowledge creation and diffusion and adoption. Those political institutions that favour increased investment in education, are important for productivity in low-income economies; political institutions that encourage investment in technology and R&D are important for productivity in high- and upper middle-income economies.	Hall and Jones (1999); Lee and Kim (2009); Hall et al. (2010); d'Agostino and Scarlato (2012); Aisen and Veiga (2013)

4.4 Summary

The extant empirical literature that explores the sources of economic growth centre around two basic explanations rooted in: factor accumulation and productivity. Both endogenous and exogenous economic growth theories can be used to explain and decompose growth of productivity and growth of output. The total output of an economy is the result of access and distribution of the proximate determinants (capital and labour stocks) and the productivity with which these determinants are allocated and deployed. This functional association can be expressed in the form of production functions where technical efficiency of productivity is distributed across economic activities. The studies examined in this Chapter 4, highlight the differences in approaches by the endogenous and exogenous growth theories in accounting for the determinants of productivity and output.

The studies highlighted in this chapter, demonstrate that there is a lack of empirical consensus on both the determinants of economic growth and explanations for cross-country variations in levels of output. Some of the empirical studies take TFP to include levels of human capital, entrepreneurial climate, level of competitiveness, technological development and innovation capabilities and corporate efficiency. Others strictly consider TFP as technological progress derived from investment in R&D and education. All studies have found evidence of a significant and positive association between TFP and economic growth, though some conclude that capital accumulation has a stronger association with output levels than TFP. These studies highlight that the inconsistency in the inclusion and omission of variables which can contribute to TFP and output can derive incongruous results. These inconsistencies in measuring TFP occur regardless of whether the studies measure TFP as exogenous or endogenous. At the same time that some empirical studies have included R&D in the neoclassical production functions, others have explored the microeconomics of technological progress from an endogenous perspective. This key findings of these divergent approaches should be highlighted here. One is that there remains substantial uncertainty on the effect of creating new technologies versus the impact of existing technologies. The other is the considerable variance among the empirical variance among the rate with which economies create and adopt technologies, particularly in advanced economies. This is partly the consequence of whether productivity is considered as purely technological progress that is proprietary or a public good in the empirical

study. More generally, the assumptions built into the simple neoclassical model could be criticised on the grounds that it considers that technological knowledge is a public good and that economic growth is an equilibrium process. This could be considered inconsistent with the mechanisms that contribute to the creation of new technology in capitalist economies. However, the endogenous conceptualisation of technological progress as proprietary negates the potential for the effect of technological spill over. More particularly the simplistic endogenous conceptualisation of productivity as only technological progress, denies the role of 'non-conventional' factors on increasing levels of productivity.

Resource reallocation could reflect and involve discrepancies between factor returns in the production functions. The neoclassical model is committed to relatively sustained full employment and macroeconomic stability. While the empirical studies remain divided on the explanation of the relationship between productivity and capital and labour, there seems no doubt that inadequate institutions are at least in part responsible for macroeconomic instability and slow productivity. Some empirical studies have concentrated on R&D spending as a determinant of productivity (Griliches, 1987). Others have focused on geography (Rodrik et al., 2004; Deliktas & Balcilar, 2005), trade openness (Edwards, 1998; Dollar & Kraay, 2003) and institutions and government policies (Hall & Jones, 1999; Acemoglu et al., 2004; Bayraktar & Moreno-Dodson, 2015). While some of the extant literature agrees that luck, culture, integration and geography are important for enhancing productivity and factor accumulation, their roles are often complex. Luck, culture, integration and geography can only provide minimal explanations for the dynamics of decisions to accumulate factors of production and investments that would make production more efficient.

Some studies surveyed highlight that institutions may matter more for economic performance of developing, middle- and low-income economies. More particularly, they present evidence that institutions are indirectly associated with economic growth, through the mechanism of their direct association with accumulation and productivity of capital and labour stocks in middle- and low-income economies. Though these arguments are not inconsistent, they have not definitively identified the category of either political or economic institutions that are relevant for the operation of these relationships. For example, Garrett and Rhine (2011) and Heller and Stephenson (2014) suggest that freer private markets with

minimal government intervention contribute to the accumulation of labour, but have not specifically identified, which category of either political or economic institutions support this.

Thus far the empirical results suggest that the association between institutions and productivity and factor accumulation is more robust than that of either trade or geography. Institutions are formed endogenously inside the economic system arising because of interaction within the economy and the need to constrain, prescribe, regulate and protect exchange within the resource and product markets. This raises the question of what is the relationship between endogenous institutions and exogenous productivity of labour and capital in the production of output towards achieving economic growth.

There has been no agreement on whether these categories of institutions are associated economic growth through; i) their direct association with levels of output; ii) their indirect association with decisions to accumulate factors of production; or ii) their indirect association with process of increasing levels of productivity. Section 4.3 highlights the lack of consensus. It provides a brief synopsis of the empirical studies that have investigated the cross-national differences in economic performance. Some studies maintain that purely political or economic market-creating or market-regulating institutions are directly associated with economic growth. Conversely others maintain that purely political or economic market-deepening institutions have a more relevant relationship with economic growth. Market-creating and market-deepening institutions are related to economic performance in different contexts.

There remains no consensus on which of these categories of institutions is most important for inducing economic growth. There is even less agreement on the mechanisms through which these institutions are related to economic growth, versus stagnation or decline. Hence this thesis will address this gap in the literature and attempt to understand the dynamics of the mechanisms through which institutions are associated with economic growth either directly or indirectly through their interaction with the continuous process of the accumulation of the factors of production or increasing levels of productivity.

The empirical studies highlighted in this section, highlight that earlier empirical work on the influence of the factors of production and productivity on

economic performance has predominantly been examined in the context of developed or high-income economies. In particular, there is room for further exploration of how developing economies access and distribute the factors of production, technology and knowledge. Some of the studies surveyed in this Chapter have demonstrated that high-income economies may be more capital- and technology-intensive, with resources allocated to industries that can benefit from a skilled labour force and incentivises economic agents to invest in the creation of new ideas. This contributes to their capacity to absorb new technology and maintain 'leadership' at the technology frontier. There are fewer studies that have specifically assessed the association of low-cost abundant unskilled labour with levels of productivity and incentives to invest in new technology. The relationship between these factors and the productivity of the labour force and levels of output are yet to be fully investigated in the context of developing economies.

Yet further, there have been few empirical studies that have sought to investigate the determinants of the instability of economic performance characterised by developing economies over the past few decades. Few studies consider how capital scarce, but skilled labour abundant developing economies can better combine their factors of production to create new ideas towards increasing levels of output and economic growth. Similarly, few studies have examined whether the neoclassical economic growth assumption that economic growth is primarily driven by the accumulation of capital is relevant for capital scarce developing economies.

There is some agreement amongst the extant literature that diverse institutional characteristics may relate differently with economic growth at varying stages of economic development. There is even some agreement that institutional infrastructure may be more significantly associated with promoting economic growth in developing economies and only minimally associated with economic growth in high-income economies. While Law and Bany-Ariffin (2008), Eicher and Leukert (2009), Haggard and Tiede (2011), de Crombrugghe and Farla (2012) and Law et al. (2013) have attempted to isolate the association between institutions and economic growth in middle- and low-income economies, there are very few other studies that focus their investigation on developing economies. It is presumed that high-income economies will have more responsive institutions that appropriately provide support for the efficient and effective functioning of their product and

resource markets, providing resilience against external shocks and volatility. Yet neither of these studies could come to a conclusive agreement on the category of institutions that is most supportive of economic growth, nor the mechanism through which institutions supports economic growth in developing economies.

This thesis will seek to address these gaps in the extant empirical knowledge. It is within these contexts highlighted in sections 1.1 and 1.1 that this thesis will seek to build upon the existing empirical understanding of the relationship between productivity, institutions and economic growth in developing economies. To that end the following chapters of this thesis will explain how this research will answer the following research questions to address these empirical gaps:

RQ1: *To investigate the relationship between differences in levels of national output of a sample of 17 selected developing economies and differences in levels of productivity.*

RQ2: *To investigate the relationship between different levels of national output in a sample of 17 selected developing economies and different categories of institutions.*

Chapter 5 will firstly present and discuss the theoretical and philosophical underpinnings of the design of this research. It will then discuss the data and empirical approaches that will be used to analyse the data.

This thesis will contribute to the existing literature by estimating the effects of institutions on economic performance in developing economies using panel regressions with fixed and random effects, using the proximate determinants of economic growth as the dependent variables and eliminating control variables that are likely to be themselves the outcome of institutions. In addition to these panel regressions, this thesis will also examine the association between productivity and economic growth also using panel regressions.

CHAPTER 5 RESEARCH DESIGN AND PHILOSOPHICAL ASSUMPTIONS

5.1 Introduction

This chapter explains the design of the thesis in conformity with a preferred philosophical paradigm. It identifies the position, values and role of the researcher as an independent researcher. The first section considers the paradigm of the formalistic-deductive framework of neoclassical economics, providing an understanding of the existing ontology, epistemology and the methodology of research used by mainstream economists. This section presents the philosophical paradigm that forms the basis of the thesis to identify the underlying assumptions of authentic truth used in this research and substantiate the choice of methodology used.

The second section supports the set of research questions and hypotheses derived from the aims and objectives identified in Chapter 1. This section will add to the perception of the research hypotheses in this thesis. The third section will justify the model and data used in this study. This research uses secondary data retrieved from publicly available sources. This study does not involve working with people. There were no ethical issues or concerns that were required to be specified. Accordingly, there is no specific section on ethical considerations in this thesis.

5.2 Philosophical underpinnings

Previous studies that have investigated the association between institutions and long-run economic growth have employed several different methodologies ranging from simple least squares regression to generalised method of moments. All these methods consist of an optimisation procedure drawn upon from differential calculus which focuses on variable selection. These models assume that all other things remain constant, or constitutes a mere residual which has a negligible influence on the econometric model. In order to relate theoretical claims of neoclassical presuppositions to the empirical evidence these studies have made certain assumptions about the institutions that constitute the framework of economic transactions (Mäki, 2001). Mäki (2001) argues that these assumptions are sometimes inflexible and unrealistic.

Though these studies may conflict in their respective logic they are all based in the long tradition of econometrics, understood as the measurement of quantities relevant to economic analysis, which dates back to the work of Schumpeter (1954). However, the approach adopted by the early econometricians who initiated classical economics, is very different from the methods of contemporary econometricians. For classical econometricians, the study of economic activity stems from the study of production and measuring surplus. To achieve their research aims, they used arithmetical methods to measure quantities of land and labour time employed in the production process which could be objectively observed (Ornelas Martins, 2016).

Later, neoclassical economics adopted differential calculus methods that gave rise to a new autonomous field of econometrics, focusing on how changes in one variable affects another variable, while isolating the studied variables from everything else. This soon became termed 'mainstream' economics which Kanth (1997) suggests is deliberately '*rigged*' to bring about results that support the *'status quo'* conception that '*laissez-faire produces optimal outcomes, but for the disruptive operation of the odd externality (a belated correction) here and there'* (p. 191-2). Lawson (2006) suggests that one constituent of the 'rigging' is the neoclassical stipulation that human beings are rational (optimising) atomistic entities. Secondly that the 'rigging' is achieved through the construction of theoretical models that are specified in such a way that they will ensure results that provide optimal outcomes (Lawson, 2006).

However, this simplistic generalisation may be overly conspiratorial and presumptive. In fact, neoclassicism uses a formalistic-deductive framework. It has evolved to a more complex multi-dimensional system of evolving ideas (Colander, Holt, & Rosser, 2004); though it is still embedded in mathematical deductive modelling. Consideration of these generalisations raises questions of the realism of economic assumptions and the sensitivity of economic models to empirical data and whether economics obeys the methodological standards of an empirical science. Econometric models experimentally isolate one cause from other causes, which could disturb the effect that it produces. Econometric models have been criticised as lacking realism, based on imaginary worlds rather than the real world itself.

5.2.1 Ontological underpinnings

Ontology is the study of, or a theory concerning, the basic essence and framework of a reality (Crotty, 1998). All researchers adopt an ontological stance and the use of any approach to empirical analysis carries with it certain ontological presumptions. As a form of deductivism, neoclassicism explains economic activity in terms of closed systems, positing functional relationships presupposed on '*closures of causal sequence'* (Lawson, 2006, p. 493). This often requires econometricians to depend on formulations phrased in terms of (i) isolated (ii) '*atoms*' (Keynes, 1936), to confirm that under certain given conditions (*x*) will always result in the same outcome (*y*) (Lawson, 2006). This would suggest that neoclassicism is couched in ontological presuppositions that restrict the social domain to isolated atoms that are the singular elucidating variable for social analysis. Hodgson (2011) would suggest that neoclassicism is committed to a '*model-based prediction'* (p.164).

Hodgson (2011) argues that economists have '*remained in an artificial world of much simpler models, partly to maintain the rhetoric of prediction*' (p. 164). This is supported by the increased reliance on mathematical formalism in mainstream economics, directed at yielding useful predictions. Friedman (1953) in his influential work on the ontology of economics, argues that positive economics in principle deals with '*what is'* rather than '*what ought to be'* (p. 146). This he suggests is the task of providing '*system of generali[z]ations that can be used to make correct predictions about the consequences of any change in circumstance'* (Friedman, 1953, p. 6). This would place positive economics within the realm of an 'objective' science. Neoclassicism finds credence in these presuppositions to sustain its assumption that actors occupy themselves in rational optimisation within given restraints based on rational expectations. These assumptions allow neoclassical models of markets as tending towards determinate and predictable equilibrium outcomes (Bronk, 2011).

Hodgson (2011) would suggest that the failure of predictive models is their overestimation of the importance and possibility of prediction. Sutton (2000) has argued that instead econometric models should be used as '*diagnostic*' tools to tease out systematic tendencies, identify emerging patterns and replicate the possible impact of crossing certain thresholds. Instead the goal of neoclassical econometric modelling should be to develop a theory of the unpredictability of the

world and how meaning-making unfolds despite the uncertainty of specific outcomes.

The existence of institutional frameworks is conditioned on human agency, through decision making. The sum of the human agency in the political and economic system are continually transforming, in some aspect. In this context institutional frameworks are intrinsically dynamic and their existence is the result of a process of complete change; they exist in a constant process of becoming. Fundamentally institutional frameworks are built upon the prevalence of internal social relations. This creates a structure comprised of several ontological levels that are underpinned by social structures and processes and their powers and tendencies (Bronk, 2011). Bronk (2011) suggests that these ontological levels include the physical restraints, institutional frameworks, individual understanding and action, social meaning and macro-level development. This thesis adopts a positivist-deductivist approach to aggregate these social structures in a single conceptual framework. The structured social realm emerges from human interaction, which poses epistemological challenges of how to aggregate all these factors in one theoretical or modelling framework, without stripping them of their real individual significance.

5.2.2 Epistemological underpinnings

Hoover (2001) has argued that it is an undeniable truth that the eventual reason for the study of macroeconomics is to contribute to knowledge on which to base policy about influencing outcomes, about control or attempted control. He further argues that the study of particular relationships within macroeconomics allows control of one thing to influence another, thereby identifying causality (Hoover, 2001). Granger (1980) first derived an explicit definition of '*cause*' (p. 330). More recently Hoover (2013) has elaborated on macroeconomic causality. The research objective of mainstream econometrics is formed on the positivist realm of differential calculus methods in which a given variable (or set of variables) *x* influences a given variable (or set of variables) *y*, everything else remaining constant. This is arguably not causality as it is usually understood.

These models focus on the direct effects of *x* on *y* expressed in terms of regression coefficients associated with each variable *x*, leaving other aspects as

part of a residual term. Econometric models are positivist attempts to find laws of the form 'if *x* then *y*', searching for connections between isolated parts, while ignoring other interactions that *x* and *y* may have with other entities (*z*). Positivism relies on the ontological assumption that reality exists independently from the social actors and the epistemological expectations that knowledge is meaningful only if it is based on consideration of this external reality (Easterby-Smith, Thorpe, & Jackson, 2012).

Byrne (2013) argues that it is impossible to establish 'causality' in a world that is complex and emergent. This raises practical issues. Can statistical techniques cope with large numbers of variables, in terms of assigning causal power to individual predictors in models? Byrne (2013) suggests that one way to resolve this issue is to lessen the number of attributes used in the model. Two possible approaches he suggests, are use of factor analysis and the use of cluster analysis. Regardless of the approach adopted, it is important that care is taken with the specification of the sub-set of variables used, which must be justified on the ground of theory. This thesis will use factor analysis to generate institution factors.

The emphasis on the process of econometric modelling is significant of the '*temporal order in complex causation'* (Byrne, 2013, p. 225). Tilly (1984) famously argues that '*when things happen within a sequence it affects how they happen'* (p.14). Every sophisticated social intervention is considered a 'case' and systematic observations across cases allows generalisations '*within limits*', that still permits the transmission of knowledge beyond the unique '*ideographically*' characterised instance (Byrne, 2011). The econometric model used in this study is premised on the contention that no single model can sum up all significant and relevant variables. As noted by Levine and Renelt (1992) there are many variables that have equal theoretical status that can be included in econometric models, but the interpretation of their results depends on the '*conditioning set of information*' (p. 942). Durlauf, Johnson, and Temple (2005) observed as many as 145 potential growth-improving variables used in empirical studies on the long-run economic outcomes. The researcher must exercise judgement regarding the possible models and variables to use in their analysis on the basis of theory. In this thesis variables were chosen on the premise of the supply side neoclassical theory of economic growth.

For this thesis, institutions and their quality are multidimensional and motivational for productive behaviour may be the result of many institutional characteristics. Simultaneously the economic environment is continuously changing because of either; i) institutional adjustments in the short-run or the result of reverse causality; and ii) in the long-run the result of higher growth rates. The impact of institutional quality on growth may depend on a trend; if institutional quality improves along a positive trend, higher quality institutions may be understood as a sign of improvements of institutions and economic growth. Alternatively, the opposite along a negative trend may give rise to uncertainty and indicate that the quality of institutions are declining and so are incentives for productive behaviour and as a result, economic performance. As such the empirical tests used in this thesis to test growth effects of institutional quality will allow for the multiplicity in the findings, more specifically it should:

- Acknowledge the multifaceted nature of the character of specific institutions;
- Allow for the impact of changes in economic performance to vary based on the trend in the character of institutional quality, accumulation of factors of production or productivity;
- Allow effects to vary amongst countries.

5.3 Empirical Models and Data

5.3.1 Growth accounting exercise to calculate total factor productivity (TFP)

RQ1: *To investigate the relationship between differences in levels of national output of a sample of 17 selected developing economies and differences in levels of productivity.*

From this research the following research null hypotheses will be tested:

<u>Null hypothesis 1:</u> There is no relationship between differences in TFP and differences in levels of national output in selected developing economies.

This null hypothesis assumes that efficiency in productivity measured as TFP does not contribute a larger share to national output levels than physical capital stock and labour stock in developing economies. The rejection of this hypothesis will provide

further evidence that cross-country differences in TFP has a 'large effect' on levels of output in the sample selected developing economies.

TFP is an substantial contributing factor to a large number of studies on economic growth in developed and advanced economies. Manuelli and Seshadri (2014) noted that only approximately 35 percent of difference in TFP accounts for differences in output per worker. This is in stark contrast to Solow (1957) who's empirical results suggested that the growth rate of TFP had a prevailing role in driving the growth rate of output *per capita* and Kuznets (1971) who later found that growth in productivity accounted for more than half of the growth of output *per capita.* Many of these earlier studies on the role of productivity, defined as TFP, adopted times series growth accounting approaches in either *absolute form* or *relative form*.

Absolute form approaches give TFP comparisons in terms of TFP growth rates and not TFP levels (Hall & Jones, 1999). Relative form approaches overcome the limitations of absolute form time series approaches. Relative form approaches produce TFP levels and growth rates for all years of the sample period. Jorgenson and those that have adopted the time series approach, distinguish growth in both quality and quantity of inputs, by disaggregating data on varying types of capital and labour and remittances to both. This type of data is difficult to acquire for wider samples of countries, and for developing countries. As such it is likely that such a sophisticated version of times series approach will remain limited to only developed countries.

Easterly, Levine, and Roodman (2004) have famously criticised earlier empirical work that examined the impact of aid on '*good policy environment*' for choosing variables '*without clear guidance from theory, which often means there are more plausible specifications than there are data points in the sample*' (p. 2). This criticism could also be levelled against earlier studies examining the comparative contribution of TFP to long-run economic growth, which neglect the Solow model and use *ad hoc* conditions loosely substantiated on the basis of a variety of endogenous growth models. Some specifications used to estimate the growth effects of one or other growth-enhancing variable may be spurious.

The standard Cobb-Douglas production function has three properties of technological progress; a) Hicks-neutral technical progress can be used to provide

an explanation of the main connotations of the Solow (1956) model (Rao & Hassan, 2012) that assumes the ratio of marginal product of capital to the marginal product of labour is constant for any given capital to labour ratio $Y_t = A_t(K_t^{\alpha}, L_t^{1-\alpha})$; b) Harrod-neutral technological progress that is labour-augmenting (relative factor shares are constant at any capital-output ratio) $(Y_t = K_t^{\alpha}(A_t L_t)^{1-\alpha})$; and c) Solow-neutral if technological progress is capital-augmenting (relative factor shares are constant at any labour-output ratio) $(Y_t = L_t^{1-\alpha}(A_t K_t)^{\alpha})$ (Solow, 1956).

In the Cobb-Douglas equation output (Y) changes over time (t) in response to changes in physical capital (K), labour (L), (α is the elasticity of capital) and total factor productivity (A), assumed to grow exogenously from the effect of new technology and more efficient management practices. The Cobb-Douglas production function permits the decomposition of output into contribution of capital, labour and TFP. Harrod-neutral labour-augmenting technological progress takes place when A increases over time, with labour becoming more productive when the corresponding level of technology is higher. When technical progress advances at a constant rate and does not rely on any other variable, it is considered exogenous.

$$Y_t = A_t K_t^{\alpha} L_t^{1-\alpha} \tag{4}$$

When technological progress is growing at a constant rate, output may be considered as technology-adjusted per worker.

5.3.1.1 Dealing with heterogeneity of cross-country fixed effects

Countries are heterogeneous and their production functions differ. Brock and Durlauf (2001) remarked that '*assumption of parameter homogeneity seems particularly inappropriate when one is studying complex heterogeneous objects such as countries'* (p. 8 & 9). Many empirical studies utilise aggregate production functions that can only offer an '*appropriate construct'* in cross-country analysis, if the economies under investigation are not largely different in sectoral structure (Eberhardt & Teal, 2013, p. 4). A single production function presumes a singular prevailing level of production technology across all economies with the same factor prices. Advanced developed economies would develop productivity-enhancing technologies that are appropriate for their own capital-labour ratios, which poorer economies may find difficult to replicate within their own capital-labour ratios (Eberhardt & Teal, 2013).

Accepting as a *stylized fact* that technology capabilities differ across economies, aggregated production technology will not yield useful results. Country relevant 'distortions' such as resource wealth, population growth rate and savings rate justify the calculation of country specific technology parameters in cross-country studies. Country-level analysis mitigates against assumptions of homogeneity that persist in aggregate constructs. The growth accounting framework used in this thesis will be based on the Solow (1956) growth model, with the assumption that TFP is unknown and exogenous. Rather than an aggregate production function for the full sample, economy specific production functions have been estimated with country specific indicators for α.

The production function assumes a common growth rate of technological progress across all firms in an economy, facing the same factor price. It assumes sectoral homogeneity (Eberhardt & Teal, 2013). Durlauf, Kourtellos, and Minkin (2001) argue that the Solow model is substantially enhanced by not assuming parameter-heterogeneity, but instead allowing for country-specific production functions. Eberhardt and Teal (2011) suggest that the model was never intended to predict homogenous specifications for all economies, but to investigate economy specific parameters. Empirical studies now consider heterogeneous panel models where parameters can differ over units. Eberhardt and Teal (2011) concur that heterogeneity is central to understanding the growth process.

Panel estimators assume that if there are similarities in the process bring about the data in different units, the efficiency of the parameter estimation can be increased by bringing together data from different units. Panel data enables the estimation of models to answer questions that cannot be otherwise answered solely with: i) time-series data; such as the effect of unobserved common factors or ii) cross-section data; such as the patterns of adaptations for change. Panels inject flexibility in how parameter heterogeneity can be defined, e.g. over time or over units (Eberhardt & Teal, 2011). In a linear model with data $(y_{it}, x_{it})t = 1, \dots, T, i = 1, \dots, N$ where x_{it} is a $k \times 1$ vector of exogenous variables. When T is small, the data has to be interpreted as a set of cross-sections and when N is small, as a set of time series. When both N and T are large there is an alternative option. The data can be treated as a set of T cross-section regressions, allowing the parameters to

diverge freely over time and independence is assumed both over time and over units.

5.3.1.2 Empirical model and data for calculating productivity

To calculate levels of TFP in selected developing economies for the period 1990 to 2014, this thesis uses official public data from the World Bank Development Indicators ('WDI') and Penn World Tables. A detailed description of the country sample is set out at Table 5.1). To generate TFP this thesis adopts the Cobb-Douglas production function. These economies have been included in this research based on the both the availability of data, economic relevance and shared historical origin. The dataset includes a mix of economies with varying population growth rates, economic growth rates and capital-labour ratios. A detailed description of the dataset used to calculate the productivity factor are provided in Table 5.2).

To estimate the extent to which neoclassical assumptions that TFP matters for labour productivity growth in the selected developing economies, this thesis will estimate country specific Cobb-Douglas production functions with a Solow residual (Solow, 1956). The production function estimation will use the theoretical framework drawn from Hall and Jones (1999). Hall and Jones (1999) use a simple Cobb-Douglas production function with the Solow residual in equation (4), to decompose GDP (constant) into factors of production and productivity. However, unlike Hall and Jones (1999) this thesis will not include human capital-augmented labour. The inclusion of human capital-augmented labour could potentially result in measurement errors as differences in educational attainment and labour force skill levels may be accounted for in both TFP and human capital-augmented labour. Instead, this thesis will use a '*simple*' Cobb-Douglas production function that only decomposes output amongst physical capital, labour and Hicks-neutral productivity. The base Cobb-Douglas production function also assumes that labour is homogenous within a country and that each unit of labour has been trained with the same number of years of education. Assumptions about how one additional year of education will influence national output will be taken account for in the measure of TFP.

Table 5.1: Sample economies: middle- and low-income

Country	Income level
Bangladesh	Lower Middle
Botswana	Upper Middle
Egypt	Lower Middle
Ghana	Lower Middle
India	Lower Middle
Jamaica	Upper Middle
Kenya	Lower Middle
Malawi	Low
Malaysia	Upper Middle
Mauritius	Upper Middle
Nigeria	Lower Middle
Pakistan	Lower Middle
Sierra Leone	Low
Sri Lanka	Lower Middle
Tanzania	Low
Zambia	Lower Middle
Zimbabwe	Low

Notes: For the current 2018 fiscal year, high income economies are those with a GNI per capital of $12,236 or more; upper middle-income economies are those with a GNI per capita between $3,956 and $12,235; lower middle-income economies are those with a GNI per capita between $1,006 and $3,955; and low-income economies are those with a GNI per capita of $1,005 or less in 2016. During the period under examination, some economies would have moved up and down the scale from low-income to upper-middle income and vice versa. GNI per capita is calculated using the World Bank Atlas method.

Table 5.2: Descriptive statistics of data used to calculate productivity

Variable	Description	Mean	Min	Max	N
Y	***Gross Domestic Product (GDP constant 2010 US$)***. The sum of gross value added by all national producers and any product taxes minus any subsidies not otherwise included in the value of the products. Calculated without deducting for depreciation of fabricated assets or for depletion and degradation of natural resources. Dollar figures are converted from domestic currencies using 2010 official exchange rates. *Source: (World Bank, 2017)*	127,731,971,864.31	1,297,819,715.62	2,629,542,211,700.51	510
GFK	***Gross fixed capital formation (constant 2010 US$) 1989 - 2015***. The outlays on increasing fixed assets and net changes in inventories. Fixed assets include land improvements; plant, machinery, and equipment purchases; and the construction of transportation infrastructure (such as roads and railways) and public good infrastructure (such as schools, offices, hospitals); construction of residential homes and commercial buildings; inventory of stock; and 'work in progress.' *Source: (World Bank, 2017)*	38,928,378,498.07	37,371,137.60	847,063,341,806.71	405
Missing Capital	**Capital stock at constant national prices (in mil. 2011US$) 1990 - 2015.** Capital stock for economies for which GFK was not available (Ghana, Jamaica, Malawi, Zambia and Zimbabwe). *Source: (Feenstra, Inklaar, & Timmer, 2015)*	12,283,235,429.69	4,314,299,218.75	31,234,712,500.00	130
L	***Total labour***. Comprises people ages 15 and older who meet the International Labour Organization definition of the economically active population; all people who supply labour to produce goods and services during a specified period. It includes both the employed and the unemployed. *Source: (World Bank, 2017)*	39,734,812	450,355	520,194,130	476

5.3.1.3 Calculating capital stock

Typically, capital stock data (K) will not be readily available, particularly for developing economies. Data on gross fixed capital formation (constant 2010 US$) from the WDI is used to construct a good '*proxy*' for capital stock. To create the capital stock series the perpetual inventory method has been used:

$$K_t = K_{t-1} - \delta I_{t-1} + D_t = (1-\delta)K_{t-1} + I_{t-1} \qquad (5)$$

K_{t-1} is the time *t* level of capital stock at the beginning of the previous period (1989); I_{t-1} is gross investment in the 1989, and consumption of fixed capital is represented by D_t. Equation (5) assumes geometric depreciation at a constant rate δ.

The perpetual inventory method assumes that increases in capital formation represent increases in the stock of an economy's investment in inventory (Berlemann & Wesselhoft, 2014). Further, that once an investment enters the stock of an economy's inventory, it remains there forever and perpetually provides services to the inventory owner (Berlemann & Wesselhoft, 2014). Though its value may decrease over time at the rate of depreciation, its value will never fall to zero. Depending on the availability of data, some of the time series for many of the economies in the sample date back to as early as 1960, providing a rich database for comparative empirical analysis, adopting the disequilibrium approach first adopted by Griliches (1980) and refined by de la Fuente and Doménech (2006), based on the neoclassical growth model.

de la Fuente and Doménech (2006) argue that the economy is not commonly in its long-run equilibrium, which makes it reasonable to assume that they are most of the time on their adjustment path towards equilibrium. Economies differ in asset composition and depreciation across assets, de la Fuente and Doménech (2006) argue that during this adjustment process, investment and capital accumulation will follow a systematic pattern. They propose the use of a Hodrick-Prescott-Filter to smooth the time-series of investment data, using the average of the first ten observations as a proxy for the growth rate of investment. Though using a filter like the HP-Filter, will tend to provide inefficient results at the start and endpoints of a sample, as the first observations are typically dropped, leading to a loss of information. Instead Berlemann and Wesselhoft (2014) suggest what they call a '*unified approach*' to estimate capital stock.

The unified approach combines three approaches to calculating initial capital stock. It begins at the disequilibrium approach, but does not use a filter to estimate initial investment value, calculates the growth rate of investments using an estimated parameter and uses a time-varying depreciation rate. Initial capital investment value $I_{i,t}$ is derived using an OLS regression approach to estimate time series log investment $ln(I_{i,t})$ for any country i on time t:

$$lnI_{i,t} = \alpha_i + \beta_i \cdot t + \varepsilon_{i,t} \tag{6}$$

The fitted value for period t_1, is calculated using the estimated parameters α_i and β_i, using the exponential function:

$$\ln(\widehat{I_{t1}}) = \alpha_i + \beta_i \cdot t_1 \tag{7}$$

The resulting time series of investment ranging from t_1 to T is used to calculate the initial capital stock in period t_0. The estimated parameter of β_i is used to measure the trend investment growth. Depreciation rates were used from PWT, which depending on data availability go as far back as 1960 for many of the economies in the sample.

5.3.1.4 Calculating TFP

Productivity cannot be measured directly, except through growth accounting (Solow, 1956, 1957). Growth accounting indirectly measures productivity as the residual or TFP after decomposing the growth rate of output by its inputs (labour and physical capital) (Solow, 1956, 1957). In order to decompose the proximate causes of economic output and calculate levels of productivity this thesis adopted a Solow (1957) production function model to find productivity as the residual. Applying it to panel data, symmetry between time and space are exploited and Solow's time index is replaced by country index i and time t. This will yield results that can identify the importance of factor inputs and productivity in explaining cross-country differences in levels of national output. This method provides similar results to those derived from the Cobb-Douglas production function and constant elasticities to substitution (CES) methods.

Solow concluded that:

$$\hat{y} = a\hat{k} + (1 - \alpha)\hat{h} + \hat{A} \tag{8}$$

where $y = Y/L, k = K/L$, and the hat (ˆ) indicates the log derivative with respect to the country index i. This equation proposes that the proportional increase in output per worker, $\hat{y}$ is equal to a weighted average of the proportional increase in physical capital per worker and $\hat{k}$, where the weight is capital's share (α_i) plus the proportional increase in productivity ($\hat{A}$). The measurement of capital's share of income is typically based on the assumption that firms face competitive factor markets.

Solow's approach also requires an assumption that the derivation of technology, labour, capital and the factor share are differentiable functions of the country index. Traditionally, to use this approach across economies, the economies must be ordered in a way that similar economies are next to each other. This analysis will be seeking to identify country specific productivity levels, using country-specific measures of capital and labour's share of income derived from PWT. There will be no need to order the economies in this sample. Following Hall and Jones (1996) finite differences are used in place of derivatives to solve equation (8):

$$\Delta logy_i = \bar{\alpha}_i \Delta logk_i + (1 - \bar{\alpha}_i)\Delta logl_i + \Delta logA_i \qquad (9)$$

Equation (9) calculates productivity as the residual, $\Delta logA$, the difference in productivity. The resulting (log) TFP yields not only relative productivity levels, but identifies overall factor input contributions to output. This information is used to provide a cross-country analysis of real GDP.

5.3.2 Calculating the aggregate institutional index

RQ2: *To investigate the relationship between different levels of national output in a sample of 17 selected developing economies and different categories of institutions.*

Institutions are multifaceted and encompass a range of attributes, making it difficult to undertake cross-country comparisons. de Crombrugghe and Farla (2012) suggest that it is an '*institutionally heterogeneous world*' comprised of complex relationships between institutional indicators, income levels, growth rates and growth volatility (p. 3). Different institutional attributes matter at different stages of economic development. The institutional infrastructure required to promote productivity can differ significantly from one country to another.

To avoid issues of collinearity arising from strong correlations amongst institutional indicators, this study will use factor analysis ('FA') followed by varimax rotation to isolate the underlying correlation structure (Siddiqui & Ahmed, 2013). Institutions develop endogenously and this increases the potential for contemporaneous correlation amongst any proxies used to examine institutional quality (Fabro & Aixalá, 2013). Endogeneity issues can lead to biased and inconsistent parameter estimates that make it impossible to arrive at a dependable inference of the relationship between different institutional dimensions and economic growth (Angeles, 2010). FA reduces the institutional indicators to fewer components that better explain the variance of correlation amongst all institutional indicators (Siddiqui & Ahmed, 2013).

More recently, Narayan, Narayan, and Thuraisamy (2014); Narayan, Sharma, and Thuraisamy (2015) and Siddiqui and Ahmed (2013) used principal component analysis to extract new institutional indicators from a larger sub-set of correlated institutional indices. Narayan et al. (2014); Narayan et al. (2015) used institutional indices from the ICRG to study the effect of institutional quality on stock market returns. Siddiqui and Ahmed (2013) also used institutional indicators from ICRG, but combined them with indicators from the Business Environment Intelligence ('BERI') and the World Bank World Governance Indicators ('WGI') to examine how institutional quality influences economic growth in the theoretical framework proposed by North (1990).

5.3.2.1 Data used to estimate institutional factor

To calculate the aggregate institutional index for selected developing economies, this thesis uses public data for the fifteen year period (1990 to 2014) from the Fraser Institute's *Economic Freedom of the World Index* ('EFW') computed by Gwartney, Lawson, and Hall (2016) (Table 5.3) and Appendix (A)). The EFW ranks the degree to which policies and institutions are supportive of economic freedom (Gwartney, Lawson, & Hall, 2017). The component ratings within each area are averaged to deduce ratings for each of the five areas. These five area ratings are then averaged to determine the summary rating for each country. Three of the five ratings will be used as indicators for this thesis: (i) legal system and property rights; (ii) sound money; (iii) freedom to trade internationally; and (iv) regulation of credit, labour and

business. Data for the omitted years between 1990 and 1999 were linearly interpolated.

5.3.2.2 Calculating four institutional factor indicators

To examine the influence of the different categories of institutions (market-creating, market-regulating, market-legitimising and market-stabilising) on the factors of production and productivity, this thesis has used FA to identify four institutional factor indicators. The Kaiser criterion (Kaiser, 1960) was used to determine the number of factors that would be extracted for inclusion in the estimation of the model, with a lower risk of high collinearity. The Kaiser criterion specifies that a factor is not extracted unless it significantly explains the variance of at least one variable (eigenvalue >1). Factors are latent constructs created using aggregated measured variables and so should consist of more than a single measure variable. It seems logical that meaningful factors should have eigenvalues greater than 1. For a higher explanatory power, extracted factors should together explain at least 50 percent of the total cumulative variance (Kaiser, 1960). At this stage, the FA model is not hypothesised, therefore, there is no stipulation that the factors should be uncorrelated given the fact that institutions are endogenous and interdependent, factors are likely to have some correlation.

The FA was followed by a varimax rotation. Not only were the resulting dimensions of the variables reduced, they were also orthogonal to each other, which diminishes the correlation of the individual variables in the final sample. The unrotated results would be basically impossible to construe because all the measured variables are highly correlated with the latent constructs (Yaremko, Harari, Harrison, & Lynn, 2013). A more interpretation-friendly explanation strikes a balance between having enough measured variables correlated with a factor that some measured variables disclose the hidden nature of the factor. However, not so many correlated variables that the factors cannot be differentiated from each other or are so compounded that their nature cannot be easily understood (Yaremko et al., 2013). Factors are always orthogonal consequent to extraction and remain uncorrelated if orthogonal rotation is used. The most common orthogonal rotation method is the varimax rotation method developed by Kaiser (1958). It is considered

a default method of rotation and tends to concentrate on maximising the differences between the squared pattern/structure coefficients on a factor.

Although the criteria for factor loadings cut-offs continues to be asserted in the literature (Feinstein, Fallon, Petkova, & Liebowitz, 2003; Jacka et al., 2010), Hair, Black, Babin, and Anderson (2010) (cited in Bartels, Napolitano, and Tissi (2014)) suggest that component loadings can be smaller with larger samples and larger number of variables to be analysed. However, the larger the number of components extracted, larger should be the loadings for statistical significance. Shapiro, Lasarev, and McCauley (2002) suggest a cut-off range of ≥0.4 to ≥0.6. Conversely, Comrey and Lee (2013) suggest that loadings of ≥0.30 are salient, and cut-offs between 0.30 and 0.60 are usual. In this thesis a cut-off of 0.40 coefficient loadings was used allowing each factor to explain at least 16% (that is, 0.40^2 x 100) of the variance in the respective variable. The retained components were categorised based on Rodrik (2005) categories of market-creating (*MC*), market-regulating (*MR*), market-legitimising (*ML*) and market-stabilising (*MS*) institutions.

Table 5.3: Institutional quality indicators taken from the Fraser Institute's Economic Freedom of the World Index

Area of Economic Freedom	Institutional Indicator
Legal System & Property Rights	Judicial independence Impartial courts Protection of property rights Military interference in rule of law and politics Legal enforcement of contracts Regulatory restrictions on the sale of real property Reliability of police
Sound Money	Freedom to own foreign currency bank accounts
Freedom to trade internationally	Regulatory trade barriers Black market exchange rates Foreign ownership/investment restrictions Capital controls Freedom of foreigners to visit
Credit market regulations	Credit market regulations
Labour market regulations	Hiring regulations and minimum wage Hiring and firing regulations Centralized collective bargaining Hours Regulations Mandated cost of worker dismissal Conscription
Business Regulations	Administrative requirements Starting a business Extra payments/bribes/favouritism Licensing restrictions

5.3.3 Investigating the relationship between institutions and the factors of production and productivity

From **RQ2** the following research null hypotheses will be tested using the calculated aggregate institutional index:

Null hypothesis 2: There is no relationship between national institutional infrastructure and differences in levels of investment in physical capital stock in selected developing economies;

<u>Null hypothesis 3:</u> There is no relationship between national institutional infrastructure and differences in levels of investment in labour stock in selected developing economies;

*<u>Null hypothesis 4</u>**:** There is no relationship between national institutional infrastructure and differences in levels of productivity in selected developing economies*.

These null hypotheses assume that the accumulation of capital stock and labour stock and productivity are not influenced by the institutional infrastructure and that the coefficient of the aggregate institutional index and the four institutional factors will be zero. Rejection of these null hypotheses will provide evidence of the functional relationship between institutions and decisions to invest in and accumulate physical capital and labour and productivity. Rejection of these hypotheses will provide support for the argument that institutions can enhance or hinder activities that support productive investment in the sample of selected developing economies.

Existing economic theory suggests that institutions are endogenously devised (Fabro & Aixalá, 2013). For this reason, previous studies have controlled for the fixed effects of the macroeconomic variables in their model on institutions and vice versa. Endogeneity issues can lead to biased and inconsistent parameter estimates that make it impossible to arrive at a dependable inference of the relationship between institutions and economic performance (Angeles, 2010). This thesis uses FA to reduce the correlation amongst the institution factors. Diagnostic Durbin and Wu-Hausman tests for endogeneity were conducted to assess the relationship amongst institutions and GDP per capita, capital stock, labour stock and the calculated TFP. The results of these tests suggest that the aggregate institutional index and the four institutional factors should not be treated as endogenous, but as an exogenous variable (Table 5.4).

Table 5.4: Tests of endogeneity

H_0 : variables are exogenous		
Durbin (score) chi2(1)	1.40	(p=0.24)
Wu-Hausman F(1,402)	1.39	(p=0.24)
Test of overidentification restriction:		
Hansen's J chi2(2)	8.93	(p=0.01)

The following models will be used to assess the influence of institutions on long-run economic performance of the selected developing economies:

$$K_t = \alpha + \beta Inst_{it} + X_{it-1} + D + \varepsilon \quad (10)$$

$$L_t = \alpha + \beta Inst_{it} + X_{it-1} + D + \varepsilon \quad (11)$$

$$A_t = \alpha + \beta Inst_{it} + X_{it-1} D + \varepsilon \quad (12)$$

In all estimations, the X vector consists of control variables, consisting of the logarithm of initial GDP per capita to account for conditional convergence, lagged capital and labour stocks, to take account of previous investments in capital and labour, lagged GDP per capita and lagged TFP; D are time-fixed effects and ε is the error term. Neoclassical economic growth theory predicts that the X vector in Equations (10), (11) and (12*)* should be exogenous variables that would not be highly correlated with the error terms. Based on the results of the tests for endogeneity, the institutional index and four institution factors will be treated as exogenous. This would suggest that estimations through ordinary least square regression estimation should not lead to biased coefficients.

To separate the potential effect of slightly biased results of the actual effect of institutions in a simple estimation of levels at the beginning of the period, the X vector control variables were included. These controls capture the effect of past capital investment, past increases in labour stock and past economic performance on the left side of the model. The control variables in the models are factors that are broadly used in empirical growth literature. It is known that previous investments in capital, labour and prior economic performance have some influence on current and future decisions to invest in capital, labour and TFP. The control variables on the right side of the model account for the confounding bias that may arise from omitted variable bias or measurement errors (Kennedy, 2003). As such the X factor should capture the most essential non-institutional determinants of capital, labour and TFP, while ensuring that the specification remains sufficiently parsimonious to include a diverse set of economies, in line with Berggren, Bergh, and Bjørnskov (2012). There is still a potential for spurious results due to omitted variable bias, for which 2 Stage Least-Squares ('2SLS') estimation are used to test the robustness of the simple models at equations (10), (11) and (12*)*.

These are two-way effect models that include both time- and country-fixed effects to allow the estimation of these models to identify the growth effect of institutions from changes within the economies, not from differences in levels across the cross section of economies (Rodrik, 2008b). Both national and specific changes would have occurred in different periods, influenced by the relationship between the variables (Pelinescu, 2015). The coefficient of interest throughout this thesis is β, whether its coefficient is zero ($\beta = 0$), and there is no effect of institutions on capital stock, labour stock and TFP. This thesis will use a reduce-form econometric model to determine whether differences in institutions across economies explain cross-country differences in investment in physical capital, labour and productivity.

The effect of institutions across the sample could be interpreted as either fixed or random (Kreft & de Leeuw, 1998). Using FE or RE assists the assessment of the 'within' variation of the effect of institutions on the dependent variables in equations (10), (11) and (12). Thus, the inclusion of the X factor to control for the effects across economies and time that cannot be directly measured or observed. Controlling for these unobserved and unmeasured differences removes the cross-sectional variation related to unobserved heterogeneity, such as unobserved economy specific effects (Kennedy, 2003). The remaining variation or 'within' variation can then be used to identify the relationship between β and physical capital and labour stocks and productivity. Fixed effect of institutions might be interpreted as initial levels of individual economies' production capacities with no capital investment, labour investment or productivity; each economy is allowed to have its own initial production capacity (Kennedy, 2003).

A fixed effect of institutions may be evidence that their effect is constant across the sample economies. Alternatively, a random effect may be evidence of consistency or stability of production. In a fixed effect model, the null hypothesis is that all dummy parameters (D) except for the dropped one are all zero ($H_0: \mu_1 = \cdots = \mu_{n-1} = 0$). The alternative hypothesis is that at least one dummy parameter is not zero. This hypothesis was tested by an F test, which is based on the loss of goodness-of-fit and examines the intensity with which the goodness-of-fit measures changed. The F test was highly statistically significant at the 0.01 level (p=0.0013). This null hypothesis that the coefficients for all years are jointly equal to zero is not rejected at the 0.01 level and therefore fixed-effects are needed in this case. In

examining whether there are country-specific fixed effects using the F test, all country dummy parameters were omitted for collinearity. This suggest that the correlation between the independent parameter and the country dummy parameter is such that they express a linear relationship in the model (Wooldridge, 2010). They cannot independently predict the value of the dependent variable. In other words, some of the variance in the dependent variables can be explained by both the independent parameters and country-specific parameters, which in turn reduces the statistical significance of the independent parameters of interest. Including country dummies may result in spurious p-values and reduce the significance level of the coefficient of institutions.

If levels of capital stock, labour stock or TFP fluctuate significantly, up or down, it is evidence that economic performance is not stable (or its variance component is larger than those of other economies) even when its productivity slope may remain the same across the sample economies (Wooldridge, 2010). To determine the appropriateness of either fixed or random effect estimation, the Hausman specification test will be used to compare a random effect model to its fixed counterpart. If the null hypothesis that the individual effects are uncorrelated with the other regressors is not rejected, a random effect model is favoured over a fixed effect model. More particularly in the estimation of equations (10), (11) and (12*)* if the null hypothesis is rejected (at least one time-specific intercept is not zero), it can be concluded that there is a significant fixed effect or significant increase in the goodness-of-fit in the fixed effect model

Both TFP and $INST$ contain zero values and will not be converted as logarithm (logarithm of zero is not defined) and to avoid all zero-TFP and $INST$ observations being dropped. Logarithms eliminate values of ‘zero’ and negative values. In this dataset, there are instances where variables are zero (no data) or negative. Such values will be eliminated from the estimation. The natural logarithm is being used for the other variables to increase the accuracy of the models’ estimations. This is useful in reducing heteroscedasticity, particularly as the models are testing for the relationship between variables.

5.3.4 Robustness checks using 2 stage least squares, including instrumental variables

The validity of the fixed effect and random effect estimations of equations (10), (11) and (12) depend on the assumption that institutions are exogenous and that there may be fixed or random time- or economy-specific effects. Although these presumptions are reasonable, they can be substantiated by directly controlling for potential correlation between institutions and physical capital, labour or productivity and checking whether the addition of an instrumental variable affects the base estimates. Acemoglu et al. (2001) argue for the importance of settler mortality as a determinant of current institutions. Acemoglu et al. (2001) assumed that the effect of historical instruments on the persistence of institutional quality is linear. The historical instrument is measured by the log of potential settler mortality capped at 250 per 1000 based on the uncapped settler mortality variable computed by Acemoglu et al. (2001). Including these historical instruments means that the resulting regression coefficients must be interpreted in terms of the time lag between the instrument and the contemporary measure. These historical instruments do not have a direct effect on contemporary levels of physical capital, labour or productivity and are therefore valid instruments (Acemoglu et al., 2001). The advantage of this approach is that settler mortality more than 100 years ago should have no effect on contemporary economic performance, except through their effect on institutions.

5.4 Summary

This thesis will adopt a positivist-deductivitst approach to investigate the relationship between institutions and productivity and their effect on national output in developing economies. To conduct this investigation this thesis will:

RQ1: *investigate the relationship between differences in levels of national output of a sample of 17 selected developing economies and differences in levels of productivity. .*

RQ2: *investigate the relationship between different levels of national output in a sample of 17 selected developing economies and different categories of institutions.*

To conduct these investigations, this thesis will use models framed in the neoclassical economic growth theory. Research question 1 will be investigated using Cobb-Douglas production function to calculate levels of TFP for 17 selected developing economies, using publicly available, official data from the World Bank Development Indicators and Penn World Tables. Before investigating research question 2, this thesis will calculate an aggregate institutional index using factor analysis, for the selected 17 developing economies. This factor analysis exercise will be conducted using public data from the Economic Freedom of the World Index accessed from the Freedom House. The factor analysis will also be used to generate four institutional factors.

To test for the influence of institution on the factors of production in the 17 selected developing economies, this thesis will use the aggregate institutional index and the four institutional factors and test them against capital stock calculated using data from WDI and PWT and against labour stock data collected from WDI. These tests will be conducted using either fixed effect or random effect estimation models. The influence of institutions on productivity in the 17 selected developing economies will be tested using the aggregate institutional index and the four institutional factors against the TFP calculated in the growth accounting exercise. These tests will be conducted using either fixed effect or random effect estimation models. Hausman specification tests will be conducted to determine the appropriateness of either a fixed or random effect estimation.

CHAPTER 6 EMPIRICAL RESULTS

6.1 Introduction

This Chapter presents the descriptive statistics for data used to investigate the relationship between institutions and productivity and their effect on national output in the 17 selected developing economies. This Chapter also presents empirical results of the estimation of TFP, factor analysis to calculate an aggregate institutional index and institutional factors and the various regression estimations used to investigate the relationship among institutions, the factors of production and productivity for the 17 selected developing economies.

6.2 Summary of results of growth accounting exercise to calculate TFP in selected developing economies

This section outlines the results of the calculation of TFP for 17 selected developing economies, using public data from the World Bank Development Indicators. TFP was calculated using Cobb-Douglas Production function with a Solow residual. The descriptive statistics reported in Table 6.1 shows that there is a strongly balanced panel of 442 observations for each of GDP, capital stock and labour stock for the 17 selected developing economies. Table 6.2 displays the contribution (*in logs*) of each capital, labour and TFP to national output for the selected 17 economies.

Table 6.1: Descriptive statistics of variables used to calculate TFP

Variable	Obs	Mean	Std. Dev.	Min	Max
Real GDP	442	0.04	0.05	-0.21	0.34
Capital Stock (K)	442	0.03	0.05	-0.04	0.80
Labour Stock (L)	442	0.01	0.01	-0.02	0.06

Notes: Data for GDP constant at 2010 US$ from World Bank (2017). Data for labour stock from World Bank (2017). Capital stock author's calculation using data on gross fixed capital formation (constant 2010 US$) from (World Bank, 2017) and capital depreciation rates from Feenstra et al. (2015).

Table 6.2 shows that there is an extremely weak correlation amongst GDP, capital and labour, though there is a strong correlation between GDP and TFP (column 1). Diagnostic tests of variance inflation factor (VIF) also indicate that there is moderate multicollinearity amongst the variables used to decompose national output (mean VIF 1.00). The correlation of TFP growth, aggregate capital and labour stock growth is zero. This would suggest that it is possible to uniquely estimate the fraction of output growth that is due to aggregate capital or labour stock growth and TFP growth absent any other assumptions about the correlation of output growth due to aggregate factor input growth and TFP growth. This will lend support to the argument that much of the significance of the variance of TFP growth across these selected developing economies is associated with negative TFP growth. Amongst these 17 selected developing economies the average TFP expected growth is 0 percent per year. This means that if one of the 17 economies are chosen at random with equal probability, the expected growth rate of TFP is 0 percent per year. This is hardly suggestive of technological change.

Table 6.2: Results of Pearson correlation analysis of the relationship between GDP (log), capital stock (log), labour stock (log) and TFP (log)

(In logs)	**GDP**	**Capital Stock**	**Labour Stock**
Capital Stock	0.09 (0.06)	1	
Labour Stock	0.01 (0.88)	-0.12** (0.01)	1
TFP	0.87** (0.00)	-0.01 (0.78)	-0.01 (0.80)

*Notes: 442 observations for each variable. The correlation of all data in logs. **Correlation is significant at the 0.01 level. p value in brackets.*

Table 6.2 shows that there is a statistically significant negative (at the one percent level) relationship between capital stock and labour stock (*r(440) = -0.12, p=0.01)* . The null hypothesis is not rejected at the 0.01 level. Not surprisingly, there is evidence that TFP is highly statistically positively significant at the one percent level (*r(440) = 0.87, p=0.01).* Holding all other variables constant, a unit

increase in TFP is expected to be associated with approximately an 80 percent increase in national output amongst these 17 selected developing economies.

Table 6.3: Results of least square regression of GDP, capital stock, labour stock and TFP for the period 1990 to 2015

(In logs)	GDP
Capital Stock	0.05* (2.25)
Labour stock	0.15 (0.96)
TFP	1.00*** (37.60)
Constant	0.040*** (18.11)
Obs	442
R	0.87
R^2	0.76

*Notes: Least square regression to examine whether there is a relationship between GDP and the proximate determinants of economic growth (capital stock, labour stock and TFP. All data used in the least square regression was in logs. Dependent variable GDP, independent variables are capital stock, labour stock and TFP. t statistics in parentheses. *p<0.05, **p<0.01, ***p<0.001*

Figure 6.1: Scatter plot of predicted line of the association between GDP and productivity for the period 1990 to 2015

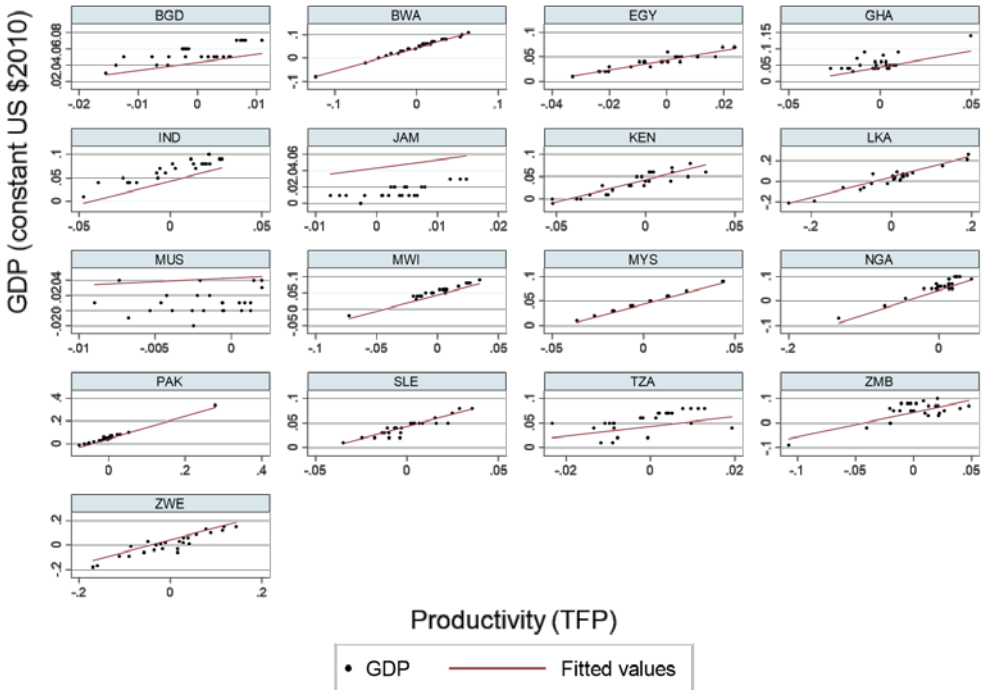


Table 6.3 displays the least squares regression results of the estimation of the relationship amongst GDP, capital stock, labour stock and TFP. The data set used to calculate TFP yields interesting results for the productivity of capital stock and labour stock in the 17 selected developing economies for the period 1990 to 2015. Not unexpectedly, there is evidence of a strong positive statistical relationship between GDP and TFP (in logs) (Figure 6.1: Scatter with predicted line of relationship between GDP and productivity). However, unexpectedly, these selected developing economies exhibit high levels of extensive growth, particularly characterised by consistently increasing levels of capital stocks (Table 6.4: Average percentage change (log) of sources of growth of 17 selected developing economies 1990 to 2015). Appendix (B) graphically portrays the decomposition of the sources of economic growth in the 17 selected developing economies.

The first column of Table 6.4 shows each economies' output growth. Unsurprisingly none of the economies have achieved more than one percentage change in economic growth over the 25-year period. Apart from Zimbabwe, Jamaica

and Malawi, the remaining 15 economies experienced nearly identical rates of economic growth over the full period. The remaining columns of Table 6.4 decompose percentage changes (*in logs*) in economic growth into contributions from capital stock, labour stock and productivity. The increase in economic growth in the 17 selected developing economies is primarily determined by changes in capital stock (column 2). TFP levels are expectedly low for all 17 selected developing economies. Nigeria, Kenya and Egypt exhibited comparatively higher percentage changes in GDP constant from 1989 to 1990 and higher percentage changes in productivity from 1989 to 1990 (Figure 6.2: Productivity and real GDP in 1990).

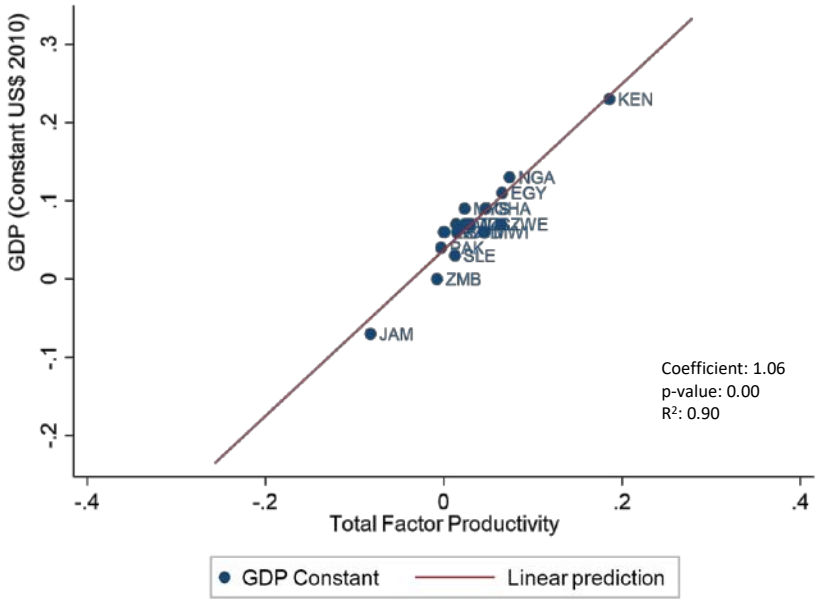
In 1990 each unit change of TFP is associated with a 100-percent increase in real GDP in the selected developing economies (Figure 6.2: Productivity and real GDP in 1990). By 2000 a unit change in TFP on average associated with a positive increase of 76 percent in real GDP in the selected developing economies (Figure 6.3: Productivity and real GDP in 2000). By 2015, a unit change in TFP on average is associated with a 95 percent percentage increase in real GDP in the selected developing economies (Figure 6.4: Productivity and real GDP in 2015).

Table 6.4: Average percentage change (log) of sources of growth of 17 selected developing economies 1990 to 2015

		Contribution to National Output		
Country	GDP Constant	Capital Stock	Labour Stock	Total Factor Productivity
BGD	0.05	0.04	0.01	0
BWA	0.05	0.04	0.01	0
EGY	0.04	0.02	0.01	0
GHA	0.06	0.02	0.01	0
IND	0.07	0.03	0.01	0
JAM	0.01	0.01	0.01	0
KEN	0.04	0.03	0.01	0
LKA	0.05	0.02	0	0
MUS	0.05	0.02	0.01	0
MWI	0.01	0.01	0.01	0
MYS	0.06	0.04	0.02	0
NGA	0.06	0.03	0.01	0
PAK	0.04	0.01	0.02	0
SLE	0.03	0.10	0.01	0
TZA	0.05	0.02	0.01	0
ZMB	0.05	0	0.02	0
ZWE	0.01	0.01	0.01	0

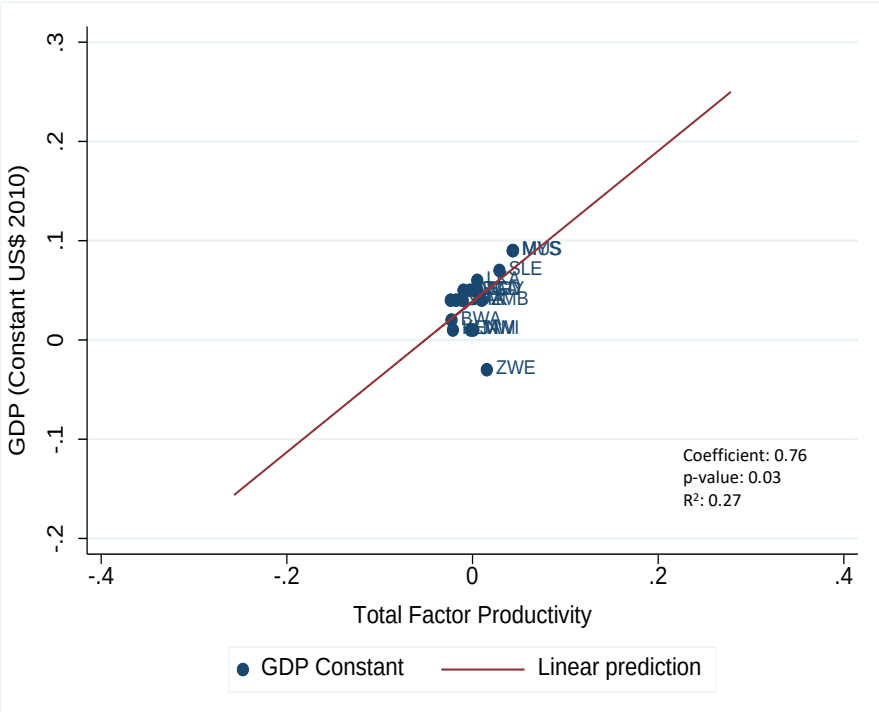
Notes: Results of Cobb-Douglas production function with TFP as Solow residual equation: $Y_t = A_t K_t^{\alpha} L_t^{1-\alpha}$. Data for GDP constant at 2010 US$ from World Bank (2017). Capital stock author's calculation using perpetual inventory method with data on gross fixed capital formation (constant 2010 US$) from World Bank (2017) and capital depreciation rates from Feenstra et al. (2015). Data for labour stock from World Bank (2017). TFP author's calculations using data on GDP, capital stock and labour stock from World Bank (2017).

Figure 6.2: Productivity and real GDP in 1990 for the sample of 17 selected developing economies



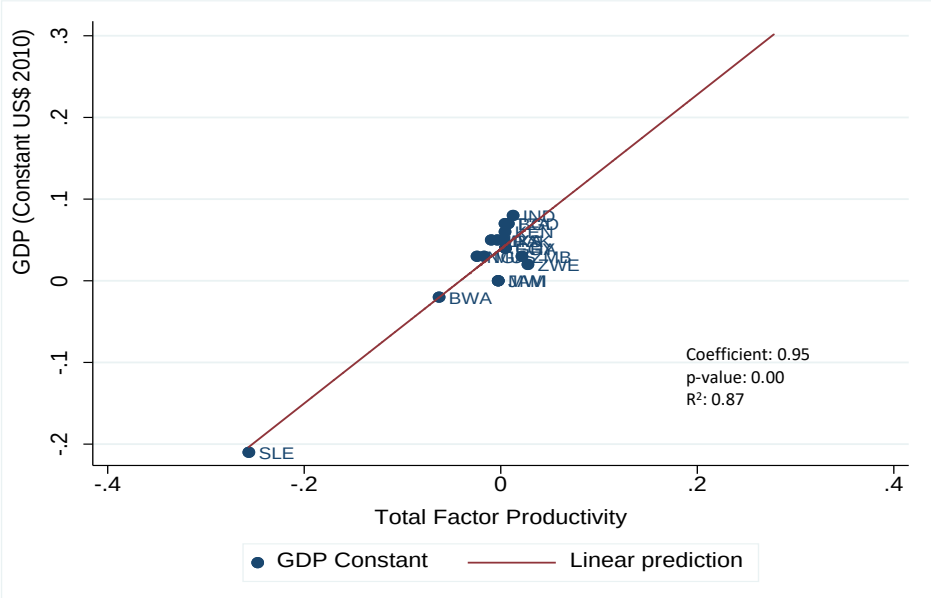
Notes: Data for Output per Worker from World Bank (2017). TFP author's calculations from data retrieved from World Bank (2017)

Figure 6.3: Productivity and real GDP in 2000 for the sample of 17 selected developing economies



Notes: Data for GDP per capitafrom World Bank (2017). TFP author's calculations from data retrieved from World Bank (2017)

Figure 6.4: Productivity and real GDP in 2015 for the sample of 17 selected developing economies



Notes: Data for GDP per capita from World Bank (2017). TFP author's calculations from data retrieved from World Bank (2017)

6.3 Summary of the results of calculating the aggregate institutional index and four institutional factors

This section sets out the results of the calculation of the aggregate institutional index for 17 selected developing economies for the period 1991 to 2015, using public data from EFW. The institutional index was calculated using factor analysis. Table 6.5 presents descriptive statistics of EFW data after missing data has been imputed. It indicates that after imputing missing data there is a strongly balanced panel of 425 observations for each of the 24 institutional indicators for the period 1991 to 2015.

Table 6.6 presents the average value of the market-legitimising, market-creating, market-stabilising, market-regulating institutional factors and the aggregate institutional index, by economy for the period 1991 to 2015. Appendix B provides a graphical portrayal of the trend of these institutional factors over the period for the 17 selected developing economies. Figure 6.5 displays the relationship between the institutional index and the measured percentage change of GDP per capita (*in logs)* in 1991 for the 17 selected developing economies. The economies with the highest

measured percentage change of GDP per capita in 1991 were Malaysia, Malawi and Botswana are also among the economies with the highest levels of institutional indicators. Unexpectedly, it also indicates that three economies with the lowest percentage change in GDP per capita in 1991 (Zambia and Nigeria) have the same level of institutional indicators as Malaysia and Malawi.

Figure 6.6 displays the association between the institutional index and the measured percentage change of GDP per capita in 2015 for the 17 selected developing economies. In 2015, the 17 selected economies all exhibit similar percentage changes of GDP per capita. India has the highest measured percentage change in GDP per capita and is among the economies with the highest level of institutional indicators. Surprisingly, Ghana and Zimbabwe display the highest level of institutional indicators in 2015. Bangladesh maintains the same level of institutional indicators from 1991. In 2015, Sierra Leone displayed the least measured percentage change in GDP per capita, a reduction from 1991. In 2015, Sierra Leone also displayed a reduced level of institutional indicator from 1991.

Table 6.5: Descriptive statistics of 24 EFW institutional indicators for the 17 selected developing economies.

Variable Name	Indicator	Obs	Mean	Std. Dev.	Min.	Max.
Judicial independence	*efw1*	425	-0.32	0.81	-2.64	2.56
Impartial courts	*efw2*	425	-0.36	0.85	-2.48	2.75
Protection of property rights	*efw3*	425	-0.28	0.96	-4.70	2.31
Military interference in rule of law and politics	*efw4*	425	-0.28	0.94	-3.88	3.01
Legal enforcement of contracts	*efw5*	425	-0.29	0.89	-3.75	1.80
Regulatory restrictions on the sale of real property	*efw6*	425	-0.28	1.03	-3.46	1.52
Reliability of police	*efw7*	425	-0.24	0.80	-4.25	3.30
Freedom to own foreign currency bank accounts	*efw8*	425	-0.06	0.90	-1.60	1.80
Regulatory trade barriers	*efw9*	425	-0.30	0.85	-2.85	3.43
Black market exchange rates	*efw10*	425	-0.09	1.11	-10.59	1.07
Foreign ownership/investment restrictions	*efw11*	425	-0.20	1.12	-4.64	2.53
Capital controls	*efw12*	425	-0.10	0.90	-2.48	1.96
Freedom of foreigners to visit	*efw13*	425	-0.14	1.07	-2.76	3.02
Credit market regulations	*efw14*	425	-0.24	0.99	-3.70	2.04
Hiring regulations and minimum wage	*efw15*	425	-0.19	1.10	-2.93	2.38
Hiring and firing regulations	*efw16*	425	0.00	0.85	-3.13	2.86
Centralized collective bargaining	*efw17*	425	-0.14	1.11	-3.79	3.32
Hours Regulations	*efw18*	425	-0.08	1.10	-3.67	2.54
Mandated cost of worker dismissal	*efw19*	425	-0.47	0.90	-1.93	3.75
Conscription	*efw20*	425	0.05	0.78	-2.67	0.46
Administrative requirements	*efw21*	425	-0.21	1.06	-7.04	2.68
Starting a business	*efw22*	425	-0.24	1.17	-4.19	2.05
Extra payments/bribes/favouritism	*efw23*	425	-0.36	0.83	-2.39	2.12
Licensing restrictions	*efw24*	425	-0.24	1.07	-3.05	2.15

Notes: Data for 24 institutional indicators from Gwartney et al. (2017) after imputing missing data.

Four factors were retained; they explained almost 72 percent of the total variance of the dataset. After rotation, the first factor explained on average 22

percent of the 72 percent of the total retained variance and the other three factors explained 13 percent, nine percent and seven percent of the retained variance respectively (Figure 6.7). These values were used as weights when combining the four factors into the institutional index ($INST$). The resulting aggregate institutional index captured large parts of the cross-country variation in the quality of institutions and highlights the relative importance of each dimension of market-creating, market-legitimising, market-stabilising and market-regulating institutions. Details of the extracted factors are provided in Table 6.7: *Details of factor loadings after varimax rotation of Market-Legitimising, Market-Creating, Market-Stabilising and Market-Regulating Institutions*.

The evidence of correlation was tested using Bartlett's test of sphericity with the null hypothesis that there is no correlation. The resulting Kaiser-Meyer-Olkin (KMO) statistic of 0.81 indicates that the sample is more than suitable for factor analysis. Figure 6.7 indicates that of the four retained factors, market-stabilising and market-regulating provide the least explanation of the retained variance. The market-legitimising (ML), market-creating (MC), market-stabilising (MS) and market-regulating (MR) factors are interpreted through factor loadings of individual indicators' relative importance to each factor. A loading is the correlation between observed variables and factors: higher loadings mean that the indicator is more relevant in defining the factor. Table 6.7 shows each factor's average loading with a relative weight of each indicator in each factor in proportion to its loading.

Protection of property rights (efw2), reliability of police (efw7), black market exchange rates (efw10), capital controls (efw12) and hiring and firing regulations have negative coefficients associated with the factor of market-legitimising institutions, indicating that these indicators have an inverse impact on the performance of the factor market-legitimising institutions. The indicators that exert the greater weight on the factor of market-legitimising institutions are foreign ownership/investment restrictions (efw11), hiring regulations and minimum wage (efw 15), centralised collective bargaining (efw17), hours' regulations (efw18), conscription (efw20), administrative requirements (efw21), starting a business (efw22), extra payments/bribes/favouritism (efw23) and licensing regulations (efw24).

Legal enforcement of contracts (efw5), freedom to own foreign currency bank accounts (efw8), hiring and firing regulations (efw16), centralised collective bargaining (efw17), hours' regulation (efw18), conscription (efw20), starting a business (efw22) and licensing restrictions (efw24) have negative coefficients associated with the factor market-creating institutions, indicating that these indicators have an inverse effect on the better performance of market-creating institutions. Judicial independence (efw1), impartial courts (efw2), protection of property rights (efw3), military interferences in rule of law and politics (efw4) and reliability of police (efw7), have the largest impact on the factor of market-creating institutions.

Military interference in rule of law and politics (efw4), freedom to own foreign currency bank accounts (efw8) and capital controls (efw12) have the strongest positive impact on the factor of market-stabilising institutions. Legal enforcement of contracts (efw5), regulatory restrictions on the sale of property (efw6), foreign ownership/investment restrictions (efw11), centralised collective bargaining (efw17), hours' regulations (efw18), conscription (efw20), starting a business (efw22) and licensing restrictions (efw24) have negative coefficients associated with the factor of market-stabilising institutions, suggesting that these indicators have an inverse effect on the better performance of market-stabilising institutions.

Foreign ownership/investment restrictions (efw11), administrative requirements (efw21) and starting a business (efw22) exhibit the strongest positive impact on the better performance of the factor of market-regulating institutions. Judicial independence (efw1), protection of property rights (efw3), military interference in the rule of law and politics (efw4), reliability of police (efw7), freedom to won foreign currency bank accounts (efw8), regulatory trade barriers (efw9), black market exchange rates (efw10), capital controls (efw12), credit market regulations (efw14), hiring regulations and minimum wage (efw15) and hiring and firing regulations (efw16) have negative coefficients associated with the factor of market-regulating institutions, providing evidence that these indicators have an inverse impact on the performance of market-regulating institutions.

Table 6.6: Average market-legitimising, market-creating, market-stabilising and market-regulating institutional factor indicators, by economy for the period, 1991 to 2015

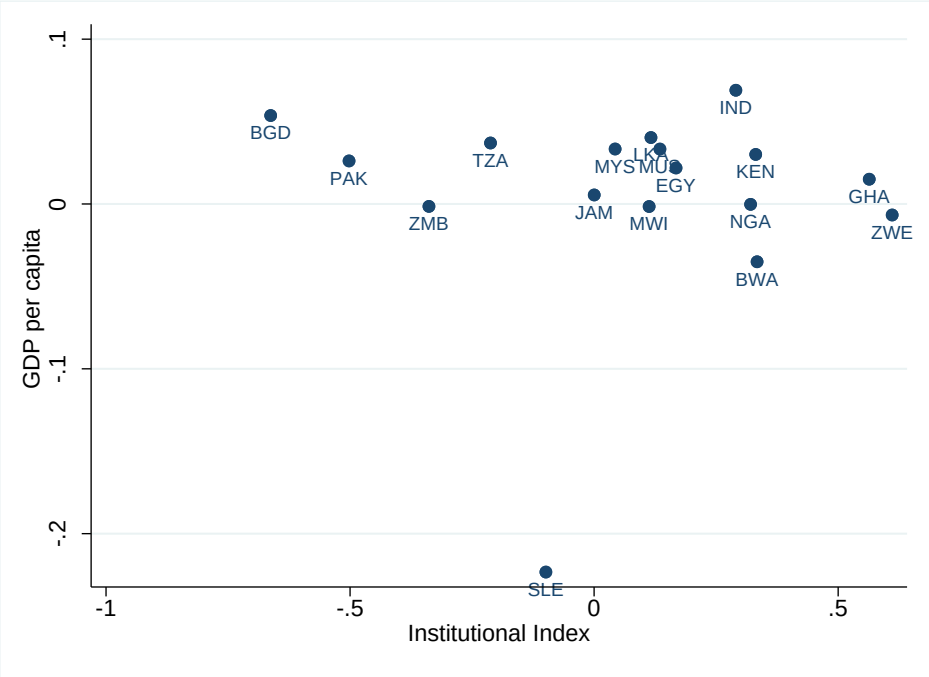
	ML	**MC**	**MS**	**MR**	**Inst. Index**
BGD	-3.05	0.64	0.52	-1.20	-0.63
BWA	0.59	1.38	1.64	-0.40	0.42
EGY	0.13	0.17	0.26	0.31	0.09
GHA	0.50	0.49	0.46	-0.48	0.18
IND	0.74	0.98	-1.47	-0.69	0.11
JAM	0.37	-0.82	0.45	-0.18	0.01
KEN	0.51	-0.97	0.97	-0.85	0.02
MWI	0.35	0.31	-0.01	-0.02	0.11
MYS	0.16	0.69	-1.68	1.31	0.06
MUS	0.42	-0.07	0.80	0.57	0.19
NGA	0.85	-0.41	0.11	-0.12	0.14
PAK	-0.90	-1.14	-1.26	-0.19	-0.46
SLE	0.23	-1.25	0.46	1.45	0.03
LKA	0.75	-0.51	-1.08	0.01	0.01
TZA	-2.02	-0.43	-0.58	0.46	-0.52
ZMB	0.19	0.43	0.46	0.01	0.14
ZWE	0.17	0.50	-0.03	0.01	0.10

Notes: Author's calculations using data retrieved from (Gwartney et al., 2017)

Figure 6.5: Institutional index and real GDP per capita in 1991 for the sample of 17 selected developing economies

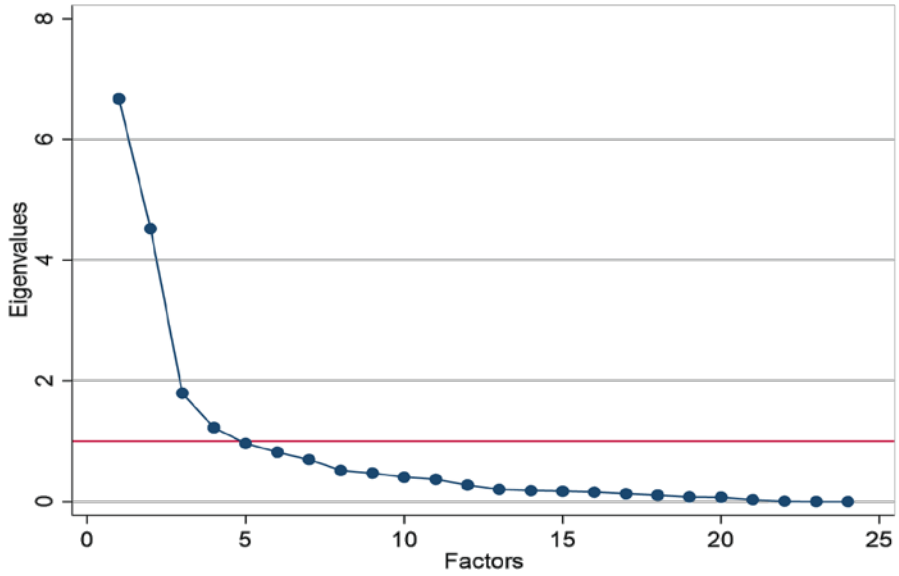
Notes: Data for GDP per capita from World Bank (2017). Institutional index author's calculations from data retrieved from Gwartney et al. (2017)

Figure 6.6: Institutional index and real GDP per capita in 2015 for the sample of 17 selected developing economies



Notes: Data for GDP per capita from World Bank (2017). Institutional index author's calculations from data retrieved from Gwartney et al. (2017)

Figure 6.7: Scree plot of eigenvalues of factor loadings after rotation.



Note: Eigenvalues of the four factors that are appropriate for retention.

Table 6.7: Details of factor loadings after varimax rotation of Market-Legitimising, Market-Creating, Market-Stabilising and Market-Regulating Institutions

Variable	**ML**	Weights between the indicator and the factor	**MC**	Weights between the indicator and the factor	**MS**	Weights between the indicator and the factor	**MR**	Weights between the indicator and the factor
efw1	0.01	0%	0.77	20%	0.03	1%	-0.09	-5%
efw2	0.06	1%	0.86	23%	0.02	1%	0.23	12%
efw3	-0.24	-4%	0.38	10%	0.15	6%	-0.05	-3%
efw4	0.10	2%	0.36	9%	0.32	14%	-0.02	-1%
efw5	0.25	4%	-0.09	-2%	-0.12	-5%	0.13	7%
efw6	0.27	4%	0.00	0%	-0.12	-5%	0.14	7%
efw7	-0.15	-2%	0.52	14%	0.06	3%	-0.16	-8%
efw8	0.02	0%	-0.03	-1%	0.89	38%	-0.05	-2%
efw9	0.02	0%	0.28	7%	0.17	7%	-0.18	-9%
efw10	-0.04	-1%	0.22	6%	0.09	4%	-0.08	-4%
efw11	0.61	10%	0.02	1%	-0.03	-1%	0.37	19%
efw12	-0.25	-4%	0.18	5%	0.73	31%	-0.22	-11%
efw13	0.18	3%	0.28	7%	0.15	6%	0.03	2%
efw14	0.09	1%	0.23	6%	0.23	10%	-0.04	-2%
efw15	0.78	12%	0.24	6%	0.01	0%	-0.09	-5%
efw16	-0.07	-1%	-0.17	-4%	0.06	3%	-0.01	0%
efw17	0.70	11%	-0.05	-1%	-0.20	-8%	0.18	9%
efw18	0.68	11%	-0.09	-2%	-0.06	-3%	0.08	4%
efw19	0.15	2%	0.04	1%	0.16	7%	0.04	2%
efw20	0.91	15%	-0.15	-4%	-0.09	-4%	0.24	12%
efw21	0.30	5%	0.08	2%	-0.15	-7%	0.82	42%
efw22	0.62	10%	-0.28	-7%	-0.13	-5%	0.37	19%
efw23	0.58	9%	0.29	8%	-0.04	-2%	0.10	5%
efw24	0.68	11%	-0.08	-2%	0.18	8%	0.22	11%

Notes: Factors were extracted using iterated principal axes method and rotation was performed using varimax method. The weight of factors is based on the amount of variance explained by each factor in proportion to the total variance explained by all retained factors.

6.4 Summary of results of investigating the influence of institutions on the factors of production

This section presents the results of empirical estimations of the influence of the calculated institutional index on percentage changes (*in logs)* of capital stock and labour stock in the 17 selected developing economies for the period 1991 to 2015. Table 6.8 provides the correlation coefficient for the panel data sample. It indicates that there are extremely weak correlations amongst GDP and labour stock and the institutional index (all correlations less than 0.20 in absolute terms), except as between TFP and GDP. It is not surprising, considering how TFP is calculated that it exhibits statistically significant association with real GDP (*r(423)=0.87, p=0.00*). .

Table 6.8: Pearson correlation analysis of full panel data (GDP per capita, capital stock, labour stock, TFP and aggregate institutional index)

	GDP per capita	**Capital stock**	**Labour stock**	**TFP**
Capital Stock	0.09 (0.06)	1		
Labour Stock	0.01 (0.88)	-0.12* (0.01)	1	
TFP	0.87** (0.00)	-0.01 (0.78)	-0.01 (0.80)	1
Institutional index	-0.03 (0.68)	-0.06 (0.25)	-0.05 (0.28)	0.02 (0.62)

*Notes:425 observations for each variable. p value in brackets. ** Correlation is significant at the 0.05 level. * Correlation is significant at the 0.01 level.*

Table 6.9 presents the descriptive statistics of the balanced panel of 425 observations for each variable in the data sample for the period 1991 to 2015 used to conduct these estimations

Table 6.9: Descriptive statistics of variables used to test the influence of institutions on the factors of production.

Variable	Obs	Mean	Std. Dev.	Min	Max
*Institutional Index	425	0	0.32	-1.01	0.95
*Market-Legitimising	425	0	1.24	-4.78	2.90
*Market-creating	425	0	1.14	-2.63	5.25
*Market-stabilising	425	0	1.09	-2.41	2.46
*Market-regulating	425	0	1.24	-8.73	4.69
Capital stock	425	0.03	0.03	-0.04	0.51
Labour stock	425	0.01	0.01	-0.02	0.06

Notes: * calculated using public data from Gwartney et al. (2017). Capital stock author's calculation using data on gross fixed capital formation (constant 2010 US$) from (World Bank, 2017) and capital depreciation rates from Feenstra et al. (2015). Data for labour stock from World Bank (2017). *Lnsettmort* the log of potential settler mortality capped at 250 per 1000 based on the uncapped potential settler mortality variable computed by Acemoglu et al. (2001).

Tests for heteroscedasticity using the Breuschu-Pagan/Cool-Weisberg test returned a p-value of 0.02 supporting the rejection of the null hypothesis that the error variances are all equal, in favour of the alternative hypothesis that there is some evidence of heteroscedasticity. Similarly, the probability value of 0.02 for the White's test suggests that there is evidence of linear heteroscedasticity in the linear function of all the independent variables. Durbin and Wu-Hausman tests for endogeneity indicate that the aggregate institutional index must be treated as exogenous (p-value = 0.24 & 0.24).

6.4.1 Results of investigating the influence of institutions on capital stock

Hausman test results (p-value 0.00) support the choice of FE estimations for investigating the influence of institutions on capital stock in the selected 17 selected developing economies. Table 6.10 presents the results of FE estimations of the reduced-form equation model that allows for controls, investigating the influence of institutions on capital stock.

Not surprisingly, results in column (1) of Table 6.10 indicate that the lag of capital stock is highly statistically significant at the one percent level, exerting a positive effect on levels of capital stock within these 17 selected developing

economies. Capital stock investment within the selected 17 developing economies over time is associated with a positive average increase in capital stock by 42 percent. The specification including the four institutional factors displayed in column (2), indicates that levels of capital stock remains highly statistically significant at the one percent level; whereas lagged labour stock takes on a negative coefficient. These FE estimations indicate that institutions do not have a statistically significant relationship with levels of capital stock for the 17 selected developing economies.

The time dummies for 2008, 2011 and 2012 were unexpectedly statistically significant and positively associated with accumulation of capital stock. The inclusion of year effects in the fixed effect model is meant to capture the influence of aggregate trends on the variation of accumulation of capital stock. The variation accounted for by year fixed effect will be common to all the economies in the year.

Table 6.10: Results of fixed effect estimation of the influence of institutions on capital stock

Dep. Variable Capital Stock *(log)*	(1)	(2)
+Institutional Index	0.00 (1.06)	
+Capital stock	0.42*** (18.69)	0.42*** (18.55)
+Labour stock	0.05 (0.47)	-0.00 (-0.03)
GDP per capita	0.01 (0.53)	0.01 (0.55)
+GDP per capita	0.00 (0.25)	0.00 (0.20)
+Market-legitimising		0.00 (0.82)
+Market-creating		0.00 (0.13)
+Market-regulating		0.00 (0.41)
+Market-stabilising		0.00 (0.95)
2008	0.01* (2.11)	0.01* (2.13)
2011	0.01** (3.19)	0.01** (3.23)
2012	0.01** (2.82)	0.01** (2.86)
Constant	0.01*** (3.16)	0.01*** (3.08)
Obs	408	408
R^2 (within)	0.570	0.574

Notes: t-statistic in brackets *p<0.10, **p<0.05, ***p<0.01. +Lag of variable. Coefficients for other time- and country dummies not shown.

6.4.2 Results of investigating the influence of institutions on labour stock

Hausman test results (p-value 0.00) support the choice of FE estimations for investigating the influence of institutions on labour stock levels in the 17 selected developing economies. Table 6.11 presents the results of FE estimations of the reduced form equation model that allow for controls, investigating the influence of institutions on labour stock.

Not surprisingly, results in column (1) of Table 6.11 indicate that the lag of labour stock is highly statistically significant at the one percent level, exerting a positive effect on levels of labour stock within these 17 selected developing economies. As each new worker is added to the labour force within countries over the period 1990 to 2015, levels of labour participation positively increase on average by 30 percent within these 17 selected developing economies. Lagged capital stock is statistically significant at the five percent level but exerts a negative effect on labour stock levels. Within countries, a one-unit investment in capital results in a three percent decrease in levels of labour stock within the selected 17 developing economies. The specification including the four institutional factors displayed in column (1), indicates that capital could have only a marginally statistically significant effect at the ten percent level, but maintains an inverse effect on levels of labour stock within the 17 selected developing economies. With the inclusion of the institutional factors, capital maintains an inverse effect on changes in labour stock for these selected developing economies, but becomes more statistically significant for these changes, at the five percent level. These FE estimations indicate that institutions do not have a statistically significant relationship with the levels of labour stock in these 17 selected economies.

Unexpectedly, the time dummy for 1995 were unexpectedly statistically significant and positively associated with accumulation of capital stock. The inclusion of year effects in the fixed effect model is meant to capture the influence of aggregate trends on the variation of accumulation of capital stock. The variation accounted for by year fixed effect will be common to all the economies in the year.

Table 6.11: Results of fixed effect estimation of the influence of institutions on labour stock

Dep. Variable Labour Stock *(log)*	(1)	(2)
+Institutional Index	0.00 (0.27)	
+Labour stock	0.31*** (6.26)	0.30*** (6.03)
+Capital stock	-0.03* (-2.48)	-0.03** (-2.63)
GDP per capita (*levels)*	-0.01 (-1.41)	-0.01 (-1.50)
+GDP per capita	-0.01 (-1.41)	-0.01 (-0.38)
+Market-legitimising		-0.00 (-0.34)
+Market-creating		-0.00 (-0.60)
+Market-regulating		0.00 (1.51)
+Market-stabilising		0.00 (1.31)
1995	-0.00* (-2.00)	-0.00* (-1.97)
Constant	0.01*** (6.11)	0.01*** (6.18)
Obs	408	408
r2	0.191	0.204

Notes: t-statistic in brackets *p<0.10, **p<0.05, ***p<0.01. +Lag of variable. Coefficients for other time- and country dummies not shown.

6.5 Summary of results of testing the influence of institutions on productivity

This section presents the results of empirical estimations of the influence of the calculated institutional index on the calculated levels of TFP within the selected 17 developing economies for the period 1991 to 2015. Table 6.12 indicates that there is evidence of a very weak and not statistically significant correlation (0.04) between

the lag of TFP and $INST$. Similarly, Table 6.12 indicates that there is no statistically significant association between the lag of TFP and $INST$. More specifically Table 6.12 indicates that there is not a statistically significant relationship between $INST$ and the lag of GDP per capita, capital stock or labour stock. Table 6.13 presents descriptive statistics of the variables used to test the association between institutions and productivity.

Hausman test results (p-value 0.42) support the choice of RE estimations for investigating the influence of institutions on productivity in the 17 selected developing economies. Table 6.14 presents the results of the RE estimations of the reduced form equation model that allows for controls. Not surprisingly, results in column (1) of Table 6.14 indicate that the lag of capital stock are statistically significant at the 0.05 (significance) level and levels of GDP per capita are highly statistically significant at the 0.01 (significance) level. However, unexpectedly column (1) also indicates that a unit increase in level of capital stock have a negative effect (18 percent) on better productivity within the selected 17 developing economies. Levels of GDP per capita are positively related to levels of productivity; one-unit increase in GDP per capita contributes to a 30 percent increase in levels of productivity in these 17 selected developing economies. The inclusion of the four institutional factors (displayed in column (2)), does not change these results. These RE estimations indicate that for these 17 selected developing economies, institutions do not have a statistically significant relationship with levels of productivity.

Table 6.12: Pearson correlation matrix of institutional index and the GDP, capital stock, labour stock and TFP

	Institutional Index
Institutional Index (*lag*)	0.82** (0.00)
GDP per capita (*lag)*	-0.01 (0.80)
Capital stock (*lag*)	-0.06 (0.26)
Labour stock (*lag*)	-0.07 (0.13)
TFP (*lag)*	0.04 (0.37)

*Notes: p value in brackets. ** Correlation is significant at the 0.05 level. 408 observations for each variable.*

Table 6.13: Descriptive statistics of variables used to assess the relationship between of institutions and productivity.

Variable	Obs	Mean	Std. Dev.	Min	Max
Capital stock	425	0.03	0.03	-0.04	0.51
Labour stock	425	0.01	0.01	-0.02	0.06
TFP	425	0	0.04	-0.26	0.28
*Market-Legitimising	425	0	1.24	-4.78	2.90
*Market-creating	425	0	1.14	-2.63	5.25
*Market-stabilising	425	0	1.09	-2.41	2.46
*Market-regulating	425	0	1.24	-8.73	4.69
*Institutional Index	425	0	0.32	-1.01	0.95
GDP per capita	425	0.02	0.04	-0.22	0.30

Notes: * calculated using public data from Gwartney et al. (2017). Capital stock author's calculation using data on gross fixed capital formation (constant 2010 US$) from (World Bank, 2017) and capital depreciation rates from Feenstra et al. (2015). Data for labour stock from World Bank (2017). TFP author's calculation using public data from the World Bank (2017). GDP per capita (Constant 2010 US$) retrieved from World Bank (2017).

Table 6.14: Results of random effect estimation of the relationship between institutions and productivity

Dep. Variable TFP	(1)	(2)
+Institutional Index	-0.00 (-0.33)	
+Capital stock	-0.18** (-3.01)	-0.18** (-3.00)
+Labour stock	0.28 (1.04)	0.31 (1.13)
+TFP	0.04 (0.74)	0.04 (0.79)
GDP per capita (*levels)*	0.30*** (6.89)	0.30*** (6.60)
+GDP per capita	-0.02 (-0.34)	-0.02 (-0.42)
+Market-legitimising		-0.00 (-0.61)
+Market-creating		0.00 (0.96)
+Market-regulating		-0.00 (-0.11)
+Market-stabilising		-0.00 (-0.47)
Constant	-0.02 (-1.65)	-0.02 (-1.60)
Obs	408	408

Notes: t-statistic in brackets *p<0.10, **p<0.05, ***p<0.01. +Lag of variable. Time and country dummy variables omitted.

6.6 Robustness checks using Instrumental Variables

This section presents the results of robustness estimations of the influence of institutions on the factors of production, productivity and real GDP for the selected 17 developing economies, using instrumental variables. Tests for endogeneity indicate that the institutional index can continue to be treated as exogenous. However, for robustness checks, the institutional index was treated as endogenous and instrumented by the lag of the institutional index, the lag of capital stock and lag labour stock, lag TFP, lag GDP per capita and the log of settler mortality.

6.6.1 2SLS results

Table 6.15 indicates that the lag of capital stock and lag of labour stock are moderately and negatively correlated with the institutional index. The lag of the institutional index is unsurprisingly statistically significantly associated with the institutional index. . More particularly settler mortality is statistically significantly associated with $INST$. Table 6.16 reports results from the instrumental variables estimation of the effect of a change in the institutional index on the log of capital stock, log of labour stock and TFP. The Table reports the result of testing the influence of the institutional index on capital stock using instrumental variables. These results indicate that the results of FE are robust to the use of instruments.

The estimates of the institutional index's coefficient indicate that the institutional index is not statistically significant. Not surprisingly, Table 6.16 indicates that a difference in investment in capital is associated with a difference in levels of capital of 53 percent. Unexpectedly, column (1) indicates that with the inclusion of TFP changes in investment in capital has a stronger, but still positive effect on levels of capital stock. TFP also exhibits a highly statistically significant and positive effect on levels of capital stock. A unit increase in TFP is associated with a seven percent increase in levels of capital stock within the selected 17 developing economies (column 1). While capital stock has a negative (14 percent), yet highly statistically significant association with the better performance of TFP (column 3).

Table 6.15: Pearson correlation matrix of institutional index and the various instrumental variables

	Institutional Index
Institutional Index (*lag*)	0.82** (0.00)
GDP per capita (*lag)*	0.01 (0.80)
Capital stock (*lag*)	-0.06 (0.26)
Labour stock (*lag*)	-0.07 (0.13)
TFP (*lag)*	0.04 (0.37)
Settler mortality (*in logs*)	0.31** (0.00)

*Notes: p value in brackets. **Correlation is significant at the 0.05 level.*

Table 6.16: Results of instrumental variables estimation of the influence of institutions on the factors of production, productivity and economic performance.

Dependent Variable	Capital Stock (1)	Labour Stock (2)	TFP (3)	GDP per capital (4)
+Institutional Index	-0.00 (-1.19)	-0.00 (-0.71)	0.00 (0.19)	0.01 (1.28)
+Capital stock	0.53*** (25.71)	-0.02* (-2.07)	-0.14* (-2.25)	0.12 (1.85)
+Labour stock	0.03 (0.26)	0.46*** (10.81)	0.17 0.17	-0.26 (-0.82)
+GDP per capita	0.03 (1.60)	-0.00 (-0.34)	0.07 (1.37)	0.23*** (4.20)
+TFP	0.07*** (3.38)	0.01 (0.90)	0.04 (0.75)	-0.01 (-0.16)
Constant	0.01*** (6.62)	0.01*** (10.01)	0.00 (-0.22)	0.02*** (3.61)
Obs	408	408	408	408
r2	0.64	0.25	0.02	0.07

Notes: t-statistic in brackets *p<0.10, **p<0.05, ***p<0.01. +Lag of variable.

6.7 Summary and discussion of robustness checks and the implications of their results

The results presented in Chapter 6.6 indicate that the results presented in Chapters 6.2, 6.4 and 6.5 are robust for including a source of exogenous differences in the institutions. That is, institutions can continue to be treated as exogenous and further that fixed and random effects estimation methods are valid estimation methods. Overall, these results have changed remarkably little with the inclusion of instruments. It also provides evidence that the instrument emphasised by earlier empirical work may be insignificant regardless of whether institutions are treated as endogenous or exogenous. There is theoretical justification for the empirical validity of the use of fixed and random effects estimation methods to construct these relationships. This justification is crucial for the validation of the empirical analysis required to interpret the estimated coefficients presented in this thesis (Andés & Asongu, 2015). Moreover, the objective of this thesis is not only to assess the mechanisms through which institutions influence economic growth in developing economies, but also to examine which category of institutions is instrumental for economic performance.

Institutions are the explanatory variable of most interest and it is generally agreed that they are multidimensional and their definition may be broad (Glaeser et al., 2004). The choice of instrumental variable was contingent on the expectation that settler mortality rates of 200 years prior would have a positive link with the institutional index and the four institutional factors, but not on contemporary economic outcomes (Acemoglu et al., 2001). It would suggest that colonisation or the colonisation strategy did not have an enduring effect on the path of institutional development. These results add to the criticisms of Acemoglu et al. (2001) argument that colonisation influenced the institutional development of ‘extractive’ or ‘inclusive’ in these former colonies. One interpretation of the results of this thesis is that the colonisation strategy of over 200 years ago have not had a major or robust effect on the institutional differences amongst these selected developing economies. These results suggest that the historical colonialism has little effect on the results of this thesis.

The results in columns (1), (2) and (3) estimate the basic regressions and show that both the relationship between settler mortality and institutions and that

between institutions and the factors of production and productivity are very similar to those in the base regressions. For example, the 2SLS estimate of the effect of institutions on productivity is now -0.00 (s.e. = -0.33) controlling for settler mortality (Table 6.16) The FE estimate of the effect of institutions on capital stock was 0.00 (s.e. = 1.03). These results suggest that there is some unobserved individual heterogeneity within the sample that has some effect on the association between institutions and factors of production and productivity, but the results remain qualitatively similar as the institutional index coefficient remains *not* statistically significant. This would suggest that country-specific characteristics may have more practical and significant implications for institutional development than previously considered.

These results uncovered by these robustness checks are generally qualitatively similar to those results of the base regressions in Chapter 6. These results reinforce the analysis presented in this thesis on the mechanisms through which institutions influences economic performance through its direct effect on factors of production and productivity.

CHAPTER 7 DISCUSSION OF EMPIRICAL RESULTS

7.1 Introduction

This Chapter discusses the empirical results presented and summarised in Chapter 6 in the context of the extant literature and how these discussions and the results of these regression estimations potentially contribute to existing knowledge on the relationship between institutions, productivity and the factors of production in developing economies. The discussion in this Chapter address the research objectives underpinning this thesis:

1) To calculate levels of TFP in 17 selected developing economies;
2) To calculate an aggregate $INST$ index (using factor analysis) for 17 selected developing economies;
3) To test for the influence of institutions on factors of production in 17 selected developing economies; and
4) To test for the influence of institutions on productivity in 17 selected developing economies.

7.2 Discussion of total factor productivity in the selected 17 developing economies

This section will explore the results of investigating the relationship between productivity and economic performance in the 17 selected developing economies in the context of the existing relevant literature. The literature generally agrees that the rate of economic growth is driven by productivity of the factors of production. This functional relationship is presumed to lead to increased levels of output. This section will extend the relevant literature in the context of the results in Chapter 6.2, which tend to support the assumptions about the role of productivity in achieving higher rates of economic growth. It is informative to relate the variation of economic growth rates with the aggregate growth rates of capital, labour and TFP. Building upon existing empirical studies, this thesis investigated the role of productivity in explaining cross-country differences in the levels of output amongst the sample of selected developing economies. It identified the multiplicative contribution of the factors of production and productivity to levels of output. Research hypothesis 1, postulates that TFP does not account for much of the cross-country differences in

national output. The rejection of this hypothesis supports the view that TFP may be correlated with capital-output ratio as suggested by Hall and Jones (1999)

7.2.1 The relationship between TFP and capital stock and labour stock accumulation

Neoclassical exogenous technological progress comprised of investment in R&D, embodied in new capital (Solow, 1957) and any number of hard-to-measure components not otherwise accounted for by physical capital and labour (Easterly & Levine, 2001), is labour-saving at the firm level, but labour-augmenting at the aggregate level. Growth in neoclassical exogenous technical change implies that there is more output of goods and services, raising the marginal productivity of capital and the profit rate, reducing the effects of diminishing returns to both labour and capital. The measure of productivity in the neoclassical growth model is the Solow residual – TFP.

TFP is often found to be as important to economic performance as capital accumulation (Easterly & Levine, 2001). To the extent that capital stock is measured correctly, approximately 50 percent of income differences amongst economies is typically found to depend on capital accumulation, with the remaining half being ascribed to TFP (Battisti, Del Gatto, & Parmeter, 2018). However, these earlier results have primarily focused on developed economies and OECD economies and the decomposition of their economic performance. Few empirical studies have focused their attention to identifying the role of TFP in developing economies. This thesis provides evidence that this relationship may persist for even developing economies, but to a larger degree. The results of this thesis suggest that TFP could account for a large portion of the variance in economic growth in developing economies.

This thesis has found evidence that TFP could contribute as much as 100 percent to explaining variance in national output amongst these 17 selected developing economies. More particularly, the negative or limited growth of TFP is a critical contributor to the poor economic performance of these 17 selected developing economies (Table 6.3). These results find support in Hofman et al. (2017) who investigated the role of TFP for a sample of developing Latin American and Caribbean economies and found that increased levels of ‘idle’ capacity will

show up in decreased levels of productivity, resulting in periods of low economic performance. Hofman et al. (2017) suggest that low economic performance could be associated with not only slower factor accumulation, but also the misallocation of productive resources across the market. These results also find support in Yalcinkaya et al. (2017) who found that TFP has a greater association with economic performance of G-20 economies than fixed capital formation.

This thesis has also found evidence that these 17 selected developing economies continue to depend strongly on capital accumulation, which has resulted in persistently low economic growth. One interpretation of these results is that the degree of misallocation of factors of production and resources across sectors can potentially have a large negative effect on aggregate productivity. These results also suggest that increases in the labour force may slow productivity and increases in capital may have similar effects. The former suggestion is not new, but the latter conjecture about the effect of capital on productivity has not been revisited for several years.

Urquhart (1959) had suggested that large increases to capital would lower its own marginal productivity. There being little improvement in the productivity of capital goods, the cost price of capital goods has increased, potentially doubled, while other prices remain unchanged. This results in only half as much real capital being added to the capital stock each year, as would have been added had relative prices remained unchanged (Urquhart, 1959). Consequently, the marginal productivity of capital has declined each year by the amount it would otherwise have declined and since the production function is starting with a large capital stock in terms of consumer goods, the real rate of return on a given amount of investment in new capital is actually substantially lower. This concept was more recently revisited, though not in depth by (Ling, 2010).

Economic theory suggests that an economy with high capital accumulation should produce more output compared to economies with low capital accumulation. An increase in the population growth rate and labour force stocks can be expected to decrease the rate of economic growth through reducing capital per worker and the possibility of substation of capital for labour in large percentages. Increasing levels of labour stock implies that more capital is needed to maintain an effective level of capital stock per worker (Ling, 2010). Since more capital is being invested

to ‘break-even’ the capital-labour ratio, the actual marginal product of capital will be lowered, this will contribute to the negative sign of the covariance between capital stock and labour stock.

The Cobb-Douglas production function assumes perfect substitution of skilled and unskilled labour (Hall & Jones, 1999). The effect of the increase in the relative employment of skilled labour may lead to a fall in the relative marginal productivity of labour and increase the relative efficiency of labour. Changes in the skills of the workforce may be associated with an inverse relationship between labour and productivity the effect of which may show up in TFP, as unskilled labour becomes less productive. This would suggest that technology choices may also depend on the endowment of the workforce. Differences in educational achievements or skill levels may also show up in TFP. These results would tend to support the findings of Caselli and Coleman (2006) that the skill level of the labour force is positively associated with an economies’ incentive to adopt more appropriate technology-driven production methods to increase levels of output and national income. The results of this thesis would tend to suggest that the abundance of low-cost, unskilled labour, de-incentivises firms in developing economies to invest in more technology-driven production methods. Thereby contributing to persistently low levels of productivity.

There is no evidence of technological convergence related to productivity amongst these 17 economies, as suggested by Barro and Sala-i-Martin (1997). An unsurprising result of this thesis’ decomposition of national output of these 17 selected developing economies is that TFP may account for more than 50 percent of income differences amongst these economies. These results could be interpreted to imply that the contribution of the Hicks-neutral component of productivity is much larger compared to the effect of capital accumulation in these selected 17 developing economies. Unfortunately, it is difficult to isolate the relative contribution of Hicks-neutral productivity using standard parametric techniques and this finding has no direct comparison in the extant literature. This highlights the opportunity for further research in this area to better understand the extent to which conventional assumptions about the nature of prouctivity are supported by the data.

Rodrik (2011) suggests that the differences in productivity between developed and developing economies could be attributed to the ability of economies

to adopt or imitate more advanced technologies, and that this capacity is influenced by the economies' distance from the technological frontier. Technological capacity relates to the quantity and quality of formal R&D, the extent to which an economy can turn ideas into new goods and services. Typically TFP is found to be higher in high income economies (Caselli & Coleman, 2006). In constructing labour stock in the Cobb-Douglas production function, workers with different educational achievements and skill levels are perfect substitutes in production. This would suggest that cross-country differences in productivity may not merely be a matter of the skill level of the work force and low levels of productivity; but as assumed by both the neoclassical and endogenous economic growth theories, also attributable to technical efficiency. The results of this thesis would tend to suggest that these selected 17 developing economies are using labour relatively efficiently allowing for capital-skill complementarity. Skilled-labour economies would be expected to adopt more skill-based technologies (Caselli & Coleman, 2006). While those of the selected 17 developing economies that are abundant with unskilled labour may be expected to rely on old technology to avoid the loss of efficient use of an abundant workforce.

The model adopted in this thesis allows economies to choose from many sources of productivity. Firms in each economy will choose production methods that will make the most efficient use of skilled or unskilled labour. This may suggest that the productivity frontier may be country specific, dependent in part on the endowment of the workforce (Caselli & Coleman, 2006). Where incentives to invest are low, there is lower buying power and less demand for goods and services. Economies with more barriers to the adoption and diffusion of technology may have more limited choices of production methods. One of those barriers to adoption and diffusion of technology may be the relative availability and skill of the workforce. Skilled-labour abundant economies may find it easier to adopt more technology driven methods of production. Conversely unskilled labour abundant economies may adopt methods of production that make the most efficient use of its unskilled workforce, there may be fewer incentives to invest in new technology, particularly the abundant unskilled-labour is low cost.

There is evidence that these 17 selected developing economies have been unable to reach their productivity frontier. This result finds support in the work of Irmen (2005) who argue that middle- and low-income economies are unable to

reach their technological frontier. One interpretation of these results is that differences in incentives to invest in R&D, and the quality of physical capital and the effects of vintage capital contribute highly to differences in levels of technological progress. Differences in technological progress may be one of the sources of differences in levels of national output in these 17 selected developing economies. Output in these selected developing economies is capital and labour intensive, there is insufficient absorptive capacity to take advantage of any gains from R&D or implicit technology in intermediate-goods (Teixeira & Queirós, 2016). Rodrik (2011) suggests that developing economies can only reach their productivity frontier through '*active policies that promote diversification and foster structural change from low-productivity activities to mostly tradeable higher-productivity activities'* (p. 4).

Economic performance in these selected 17 developing economies appears to continue to be driven by capital accumulation, possibly on the premise that return to physical capital is high and labour is cheap. It does not appear, from the results of this thesis that the cost of labour has yet, become sufficiently expensive to encourage firms to invest in new technologies to economise on labour. As such, there is no evidence that within these selected 17 developing economies, extensive growth has evolved to intensive growth, suggesting that these economies are in a stationary steady state.

High-income economies have a comparative advantage in capital-intensive and technology-intensive industries (Agenor, 2017). The neoclassical approach presumes that there is a prevailing production frontier common across countries. The results of this thesis are in line with the neoclassical framework and supports earlier economic growth literature, which asserts that differences in TFP levels are the main contributors to differences in the growth rate of GDP. Although TFP growth does not account for a large portion of the average growth of output in these 17 selected developing economies; sustained negative growth of TFP may account for much of the variance across these 17 selected developing economies.

One statistical explanation for this underlying logic is that all changes in output growth that are predictable by aggregate output growth are associated with aggregate productivity (Baier, Dwyer, & Tamura, 2006). This would suggest that variance in aggregate capital and labour stock growth explain a small variance of

output growth amongst the sample, and TFP explains virtually all the variance of output growth across the sample. This presumption only obtains as the correlation coefficient of TFP and the factor inputs are zero. These estimates assume that the there are no unmeasured effects of TFP on capital or labour stocks. All output growth will statistically be attributable to productivity, which is consistent with a model of exogenous technological growth closer to the model suggested by (Solow, 1957).

TFP does not only represent technological change and need not represent technological change at all amongst these selected developing economies. Measurement errors in output, capital stock and labour stock may appear in TFP growth (Baier et al., 2006). For example, new physical capital with zero marginal product (for example a useless road) may increase the measured growth of capital, but a marginal product of zero implies that the level of output does not change with the addition of new physical capital. The resulting change in TFP is the negative of capital's factor share times the new physical capital. Similarly changes in hours worked can show up as reductions in TFP growth. Changes in institutions and political regimes can also appear in changes in TFP. There could be many explanations for the changes in TFP.

7.2.2 Possible determinants of productivity for selected developing economies

R&D is known as a measure for innovation capacity; a key element behind the technological development and sustainable economic growth in developed economies (Ramzi & Salah, 2018). Innovation has been suggested as a critical determinant of productivity growth (Hofman et al., 2017). Innovation is the process through which new ideas can become successful products. Moreover, innovation can happen anywhere and anytime, not just in a laboratory; and its subsequent outcomes can take several forms, from new products, to new processes (Schumpeter, 1976). The innovation capacity index set out in the World Economic Forum (2018) competitiveness report provides an indication of the degree of economic efficiency of an economy. Advanced economies such as the United States, Germany and Sweden are the top-three ranked innovation powerhouses of the world according to the World Economic Forum (2018). The competitiveness

report highlights that for a vast majority of developing economies, innovation capacity continues to remain extremely limited, localised and restricted to only a few sectors (World Economic Forum, 2018).

An economy's capacity to innovate depends on the quality of its macroeconomic and institutional infrastructures. Developing economies are characterised by their limited capacity for innovation. The empirical estimations of this thesis provide a comparison of levels of economic performance, factors of production and productivity for 17 selected developing economies. Consistent with existing literature, these selected economies were characterised by low rates of economic growth, driven by high levels of capital accumulation. The traditional Solow model for deriving TFP is based on labour-augmenting technological progress driving capital deepening enhancing the marginal productivity of capital (Madsen, 2010). This in turn is presumed to increase the demand for capital. However, these relationships are not specifically set out in the standard Solow exposition as the capital asset market is not an explicit part of the model.

Productivity can be influenced by an economy's capacity to innovate by adopting new ideas, methods or products more quickly. Innovation is a complex process that appears to begin with the generation of ideas, from R&D (Ramzi & Salah, 2018), and from investment in education (Krueger & Lindahl, 2001) and the intensity of competition (Ezzeddine & Hammami, 2018) and from international technology transfer (Coe et al., 2009). The productivity of the stock of knowledge and innovation increases because of both local and international spill overs. Innovation enhances economic productivity if it can reach the desired markets and achieve commercial success. Any factor inhibiting the process of idea generation, can inhibit an economy's capacity to increase levels of productivity. These selected 17 developing economies have yet to record a significant increase in expenditure in R&D as a percentage of GDP. Unfortunately, there is a paucity of data on the level of R&D investment as a percentage of GDP in these 17 selected developing economies. The data that is available on R&D expenditure highlights that for the period 2000 to 2015, low- and middle-income economies' expend on average one percent of GDP on R&D (World Bank, 2017). Conversely, high income economies spend on average two percent of GDP on R&D for the same period (World Bank, 2017).

7.2.2.1 Research and development as a determinants of productivity for developing economies

Developing economies are still reliant on technology transfer from foreign investment and imports to increase levels of innovation. The negligible efforts in R&D contribute to persistently poor technological progress with limited capacity for innovation (Ramzi & Salah, 2018). The limited infrastructure and funding for R&D continue to oblige developing economies to look for alternatives to innovation through international technology transfer. International technology transfer is also crucial for innovation either through trade in intermediate and capital goods of high-tech products or inward foreign investment. Openness to trade and environments attractive for foreign direct investment can encourage domestic producers to improve the quality of output and increase opportunities for technological progress as well as the local R&D efforts and the innovation process (Coe et al., 2009). In this context trade openness can facilitate access to advanced economies' stock of knowledge and increases the market share of local firms (Grossman & Helpman, 1991). This can enable the developing economy to exploit increasing returns to scale and avoid excessive activities in the research sector by devoting a larger share of capital to R&D. China is an example of an economy that has been able to benefit from the use of technology embodied in equipment and intermediate goods to push their innovation by imitation (Maryam & Jehan, 2018).

7.2.2.2 Competition as a determinant of productivity in developing economies

Competition contributes to productivity when firms can attract the limited pool of highly skilled workers with new sets of skills required to cope with the pace of innovation. The lingering presence of poorly performing firms within the product market contributes to the trapping of valuable resources in unproductive activities. Structural settings that limit competition amongst firms in the product market; for example, barriers to entry and exit the resource or product markets, contribute to persistent skills mismatch (OECD, 2018). Competition incentivises firms to invest in innovation, building upon existing stock of innovations (Aghion & Howitt, 2006). More competition could increase the incremental profits that firms can earn by innovation. Conversely, less intense competition in the product market could make it easier for firms to earn profits without having to incur the expense of innovating. A

leader firm in a market that has a technological lead over its rival, may not be under the same pressure to continue to innovate (Aghion & Howitt, 2006). Similarly, increased entry and increased threat of entry, could enhance innovation and productivity growth through quality-improving innovation from new entrants, and innovation by the incumbent in response to the threat of being driven out by a potential entrant (Aghion, Burgess, Redding, & Zilibotti, 2005). An agile and dynamic private sector can increase productivity through testing new ideas and creating innovative products and services. Incentives for this type of behaviour may be encouraged through successful economic systems that are resilient to technological shocks.

7.2.2.3 Education as a determinant of productivity in developing economies

Finally, Krueger and Lindahl (2001) suggest that education matters for catching-up through innovation, the further an economy is from the technological frontier. Different types of education spending lie behind innovative activities. This includes spending in primary and secondary and tertiary education. Each level of education would have a different influence on levels of productivity. Tertiary education investment should have a more significant effect on an economy's ability to make leading edge innovations, while primary and secondary education may be more likely to make a difference in these selected developing economies in terms of their ability to implement existing (frontier) technologies. Krueger and Lindahl (2001) argue that primary and secondary education would tend to promote imitators rather than innovators; whereas tertiary education is critical for producing innovators. For an economy to move closer to the technological frontier, there should be increased investment in education.

For the period 2004 to 2013, low income economies spent on average 16 percent of total government expenditure on education and middle-income economies spent on average 15 percent of total government expenditure on education (World Bank, 2017). For the same period, high income economies spent on average 13 percent of total expenditure on education (World Bank, 2017). Of these amounts, for the period 2010 to 2013, low income economies spent on average 50 percent on primary education, 26 percent on secondary education and 18 percent on tertiary education; and the only available data for middle-income

economies is 18 percent of government expenditure spent on tertiary education; high income economies spent on average 25 percent on primary education, 38 percent on secondary education and 23 percent on tertiary education (World Bank, 2017). Inequalities in access to education may have decreased, however the failure of developing economies to catch-up with advanced economies, suggests that there are underlying differences in the quality of education that may have a greater implication for the capacity and pace of productivity.

7.3 Discussion of the aggregate institutional index and four institutional factors in the sample of 17 selected developing economies

This section will discuss the results of the factor analysis exercise used to calculate the aggregate institutional index and the market-creating, market-legitimising, market-regulating and market-stabilising institutional factors. The extant literature agrees that institutions are multi-dimensional. There are statistical limitations to using diverse indicators of institutions in a single regression framework, as strong correlations among indicators contribute to the risk of multicollinearity (Siddiqui & Ahmed, 2013). Existing studies have attempted to mitigate against this risk by using different indicators separately in different equations (Acemoglu et al., 2001) or aggregate different indicators using simple averages (Knack & Keefer, 1995; Mauro, 1995; Hall & Jones, 1999). For this reason, factor analysis was conducted to reduce the effect of correlations amongst the various indicators and not only create a weighted aggregate index, but also construct four factors to measure institutions.

7.3.1 Aggregate institutional index

The aggregate institutional index is an aggregate cross-national index. The factor analysis exercise identified four factors consistent with the extant literature. The first factor is interpreted as explaining market-legitimising institutions (*ML*), the second factor is interpreted as market-creating institutions (*MC)*, the third is interpreted as market-stabilising institutions (*MS*) and the fourth explains market-regulating institutions (*MR)*. According to the factor analysis, *ML* was the largest

contributor in the Institutional Index, with a contribution of 22 percent. *MC, MS* and *MR* contributed 13 percent, nine percent and seven percent respectively. The aggregate institutional index measures the strength of these four sets of institutional factors.

These four institutional factors are important for providing public goods such as protection of private property rights and the enforcement of contracts (Rodrik, 1999) and perform market supporting functions such as build resilience to shocks, facilitate socially acceptable burden sharing (Siddiqui & Ahmed, 2013), reduce transaction costs, encourage innovation and facilitate complex economic interactions (Das & Quirk, 2016). 'Institutional voids' exist when there is a lack of or inefficient institutions (Liu, Vahtera, Wang, Wang, & Wei, 2017, p. 516). Resilience includes the measure of the economy to minimise the risk of a financial meltdown and ability of resources to adjust to external shocks. Many of the institutions that support markets are publicly provided, and their effectiveness will be an important determinant of how well markets functions. The quality of regulatory governance will affect regulatory outcomes (Jalilian, Kirkpatrick, & Parker, 2007). Building effective institutional infrastructure is not merely an issue of design of institutional instruments, but also the quality of supporting regulatory institutions and capacity and their capacity to support R&D and productive activities within the economy.

Table 7.1: Correlation of Institutional Index, Institutional Factors and World Governance Indicators

	Institutional Index	Market-Legitimising	Market-Creating	Market-Stabilising	Market-Regulating
Institutional Index	1				
Market-Legitimising	0.81	1			
Market-Creating	0.39	-0.08	1		
Market-Stabilising	0.37	0.05	0.10	1	
Market-Regulating	0.17	-0.03	-0.08	-0.07	1
Control of Corruption	0.39	0.23	0.30	0.13	0.12
Government Effectiveness	0.25	0.17	0.27	-0.08	0.08
Political Stability and Absence of Violence/Terrorism	0.38	0.16	0.25	0.32	0.17
Regulatory Quality	0.24	0.16	0.15	0.05	0.10
Rule of Law	0.32	0.20	0.30	0.01	0.07
Voice and Accountability	0.24	0.15	0.09	0.24	0

7.3.2 Market-legitimising institutional factor

The market-legitimising institutional factor focuses on providing social protection and insurance, redistribution and managing conflict (Rodrik, 2003). Rodrik (1999) argues that deep social divisions during '*weak*' institutions of conflict management results in magnified costs of exogenous shocks (for example, deteriorations in the terms of trade) and triggers distributional conflicts. Such conflicts reduce productivity of factor inputs by delaying adjustments in fiscal policies and key relative prices (real exchange rate or real wages), and generates uncertainty contributing to the diversion of resources from productive activities. Intuitively, it is sensible to interpret this factor as a measure of those institutions that insure the market against idiosyncratic risks such as, market co-ordination failure among different factions within the economy. Decisions to change wage controls, import tariffs, government spending or levels of taxations can have distributional consequences, depending on the severity of underlying social conflicts within the society. These distributional

consequences could result in paralysing the economy from the effects of foreign-exchange bottlenecks, import compression, debt crises and 'bouts of high inflation' (Rodrik, 1999). Rodrik (1999) used the index of democratic institutions and ICRG quality of governmental institutions to proxy for institutions of conflict management.

Foreign ownership/investment restrictions, hiring regulations and minimum wage, centralised collective bargaining, hours' regulations, conscription, administrative requirements, starting a business, extra payments/bribes/favouritism and licensing regulations load heavily on the market-legitimising institutional factor. These institutions warn potential 'winners' of social conflict that their gains will be limited and assures the 'losers' that they will not be expropriated (Rodrik, 1999). Market-legitimising institutions tend to increase incentives for social groups to cooperate by reducing the payoff to socially uncooperative strategies. Social conflict institutions create a level playing field and enhance internal security, contributing to increased incentives to participate in the market. Farole et al. (2010) contend that formal market-legitimising institutions are necessary to bring structure to the interaction between preferences and actions of satisficing individuals.

7.3.3 Market-creating institutional factor

The market-creating institutional factor focuses on institutions that provide public goods such as justice and law, for protecting property rights and reducing transaction costs by enforcing contracts. These institutions are critical for the creation of the market (Rodrik & Subramanian, 2003). North and Thomas (1973) and North and Weingast (2000) argue that secure and stable property rights were key to the development of modern economic growth. Yet, formal property rights are meaningless unless they confer control rights to investors. Legislation may be unnecessary or insufficient to secure control rights and require supporting legislation, private enforcement, custom and tradition to be effective. These supporting formal institutions and informal norms may be distributed more narrowly or more diffusely than property rights (Rodrik, 2000).

The market-creating institutional factor loads heavily on judicial independence, impartial courts, protection of property rights, military interferences in rule of law and politics and the reliability of police. These indicators all tend to measure the quality and capacity of the legal system or consequences and

reflections of such quality and capacity. Rodrik et al. (2004) used the rule of law as a proxy for market-creating institutions. Similarly, Acemoglu and Johnson (2005) used executive constraint as a proxy for property rights institutions and legal formalism for contracting institutions in order to separately estimate their effects on long-run economic growth. Unexpectedly, the market-creating institutional factor constructed from this factor analysis exercise is weakly correlated to the WGI estimation of the rule of law (0.30) and government effectiveness (0.27) (Table 7.1). This is not sufficient to disregard the interpretation of this dimension as a measure of the institutional quality of market-creating institutions. Ideal proxies of market-creating institutions should capture the cost of enforcing private contracts and define the relationship between the state and its subjects and provide the legal framework for the enforcement of private contracts (Bhattacharyya, 2009).

The EFW measure of judicial independence and impartial courts sufficiently provide estimations of the impact of the judiciary in enforcing private contracts. Similarly, the EFW measure of military interference in rule of law and politics and the reliability of police provide an estimation of the relationship between the state and its subjects in relation to the enforcement of the legal framework. Finally, the EFW's measure of the protection of property rights estimates the level of control over private property. The combination of these institutions can reduce the cost of protecting property rights and strengthen contract enforcement. These institutions may also incur high externalities that may be only fully captured at the national level (Siddiqui & Ahmed, 2013).

7.3.4 Market-stabilising institutional factor

The market-stabilising institutional factor focuses on institutional indicators that measure an economy's resilience against macroeconomic shocks, with the potential to impact inflationary pressure and help avert financial crisis. Moderate or predictable inflation and sustainable public budgets reduce uncertainties within the resource and product markets, influence investor expectations for returns and increase business confidence, all of which can contribute to increasing productivity. These institutions feed into economic growth through numerous channels, including the reduction of uncertainty and encouraging investment and other productive long-run accumulative behaviour (Rodrik & Subramanian, 2003). These institutions could

take any number of forms, from central bank policies to avoid inflation during financial crisis or acting as lender of last resort. Similarly, fiscal policies could be market-stabilising institutions. Das and Quirk (2016) measured market-stabilising institutions through average inflation rate, four-year inflation volatility, which indicators this thesis argues, do not directly measure institutions. Das and Quirk (2016) argue that average inflation rates and four-year inflation volatility can be used to measure the ex-post performance of market-stabilising institutions.

Unexpectedly, military interference in rule of law loaded heavily on this market-stabilising institutional factor. Not surprisingly, the freedom to own foreign currency bank accounts and capital controls did load heavily on the market-stabilising institutional factor. It is noteworthy that some of the indicators that load heavily on the market-regulating institutional factor (*legal enforcement of contracts and foreign ownership/investment restrictions and starting a business*) and market-legitimising institutional factor (*centralised collective bargaining, hours' regulations, conscription, and licensing restrictions*), have an inverse effect on the better performance of market-stabilising institutional factor. One interpretation of these results may be that macroeconomic stability may require overriding social stability and social cohesion in favour of the redistribution of resources. Macroeconomic stability can reflect the extent to which the economy's public sector can provide appropriate counter-cyclical measures and invest in projects that the private sector cannot finance. Yet this interpretation would suggest that economies faced with large social inequalities and potentially volatile social conflict outcomes, may find that enforcing market-stabilising institutions can aggravate these social conflicts in favour of bridging tensions amongst market forces.

7.3.5 Market-regulating institutional factor

The market-regulating institutional factor focuses on institutions that not only support the effective functioning of the market-creating institutional factor, but also helps to eliminate or minimize institutional and policy rents (Brou & Ruta, 2013). The primary role of market-regulating institutions is to ensure an undistorted institutional environment that promotes efficient markets (Jalilian et al., 2007). Information asymmetry can contribute to imperfect regulation. Efficient market-regulating institutions support good governance that balances accountability,

transparency and consistency (Parker & Kirkpatrick, 2007). Accountability would require regulatory agencies to be accountable for the consequences of their actions, to operate within their legal powers and to observe the rules of due process when making decisions. Transparency requires regulatory decisions made in a manner that is open to interested parties. Consistency leads to certainty for investors, reducing the cost of capital and providing incentives to invest.

The market-regulating institutional factor loads heavily on foreign ownership/investment restrictions, administrative requirements, and starting a business. These indicators most resemble the measure of market-regulating institutions defined by Rodrik and Subramanian (2003). They envisage market-regulating institutions as those rules, structure and arrangement that a society effectively enforces upon itself in response to situation where its markets are known to fail. They include institutions that help minimise market idiosyncratic risk to economic growth and employment.

EFW estimations of foreign ownership/investment restrictions measure those formal institutions that regulate international capital flows and foreign ownership of companies. The EFW estimations also attempt to measure those formal institutions that regulate the administration of permits, regulations or reports issued by the state and measures their burdensomeness. Market-regulating institutions quantifies regulatory and bureaucratic efficiency. Bureaucratic efficiency measures the strength and expertise of bureaucrats and how they govern political fluctuation without extreme interruptions in government services or policies (Siddiqui & Ahmed, 2013). Bureaucrats act as agents of government and in the absence of efficient checks on these agents, there could develop diversions of State rents to these bureaucrats (Brou & Ruta, 2013), which contribute to the increased cost to monitor and collect taxes and the cost of corruption, rewarding people through patronage rather than on ability. Higher regulations to start a business and administrative requirement could result in barriers to entry in favour of established businesses earning higher profits through monopolistic rents, earned in part from government licenses, policies and directives.

7.4 Discussion of the association between the institutional index and four institutional factors on changes in capital and labour stock

This section will present a discussion of the results of the estimation of the relationship between institutions and changes in capital and labour stock in the 17 selected developing economies. This section deals with results relating to three main issues: (i) the link between institutions and incentives to invest in capital stock; (ii) the link between institutions and incentives to increase labour stock; and (iii) whether there is a category of institutions that is most relevant for incentives to invest in capital or labour stocks. All three issues are addressed by the significance of estimated coefficients. The null hypothesis of issues (i) and (ii) is that there is no association between institutions and incentives to invest in capital and labour stocks. The null hypothesis of the third issue is that there is no specific category of institutions that are relevant for incentives to invest in capital or labour stocks. A rejection of either of these null hypotheses is not a rejection of the importance of institutions for incentives to invest, but may be an indication that within these economies, there does not exist the appropriate institutional infrastructure that would support these relationships.

7.4.1 Discussion of the association between institutions and capital stock

The neoclassical model argues that as economies develop, capital accumulation is subject to diminishing marginal effects. Over time extensive economic growth should be eroded, leading to more investment in labour-augmenting technology, leading to intensive economic growth (Agenor, 2017). Neoclassicism has long downplayed the significance of institutions as it continues to explain economic growth primarily by reference to the production function that includes the two factors of production (capital and labour) and utility functions that depict levels of utility associated with different input choices (Ugur, 2010). This comparatively institution-free perspective of the disparity in cross-country economic performance fails to consider the potential influence of different market and non-market institutions that coexist with markets and how they interact and whether cross-country differences in the rate of economic growth may be related to differences in institutional characteristics of national economies.

7.4.1.1 Accumulation of physical capital

Sustained rates of capital accumulation have indeed continued to be a key feature of the economic experience of developing economies (Schatz, 1968). The scarcity of capital should lead to higher rates of return on capital in developing economies. This should result in these developing economies being able to attract capital, to access disembodied technology from the import of machinery and equipment to increase output and catch up with their developed counterparts (Blomstrom, Lipsey, & Zejan, 1994). This thesis has already discussed that the contribution of productivity growth in the process of increasing levels of output is modest and may even be negligible (Chapter 6). This thesis has also already identified that the increase of the production factors, especially capital, is far more important for economic growth in these economically less developed economies (Chapter 6). The correlation between the institutional index and the four institutional factors and the factors of production are zero. This suggests that the changes in levels of capital accumulation may be interpreted in isolation of any unmeasured influence of institutions on capital stock.

The underlying logic of this result may be that for these selected developing economies, institutions are not acting as mechanisms for encouraging investment in capital. These results find support in Hall et al. (2010) who found that there are appropriate institutions that can exhibit an influence on the potential returns to investment in rent-seeking activities that plunder the wealth of others, through pressing for political action and misuse of the system for lawsuits, in their investigation of the role of institutions in the accumulation of human and physical capital in 96 developed and developing economies. In particular they suggest that physical capital is most responsive to market-creating institutions that secure property rights, ensure unbiased contract enforcement and permit market prices and profits and losses to guide economic activity (Hall et al., 2010).

An alternative interpretation is that over time, the efficiency of investment is being eroded, because of redistribution or investment in capital that had zero marginal effect (for example, useless roads or idle factories). These factors may also contribute to weakening of the quality of capital, diminishing their marginal benefits for the economy. The less efficient investment results in the sustained deterioration of the quality of capital, having adverse effects on economic growth for these 17 selected developing economies. This would suggest that these selected

developing economies may not have the appropriate institutional structures to support the efficient regulation of markets or to overcome the deficiencies of information asymmetry or incomplete markets and externalities arising from disparities in income and wealth distribution within these economies.

7.4.1.2 Significant year effect

In 2007, the global financial markets were hard hit from the collapse of the US housing sector. This was followed by the 2011 'Black Monday' US and global stock market crash following the Standard and Poor's downgraded credit rating of the US sovereign debt, the effects of which continued to affect the European financial and stock market, through to 2012. Pre-2008 developing economies would have benefited from the developed-economy boom, characterised by increased export revenues and higher commodity prices (Lin, 2008). The increased export revenue and higher commodity prices would have contributed to increased inward FDI and remittances from abroad. Average exports as a share of middle- and low-income economies' GDP experienced steady growth from 2000 (27 percent) to 2007 (31 percent), but fell sharply by 2009 (25 percent) post the 2008 global financial crisis. Similarly, inward FDI as a share of GDP in middle- and low-income economies increased from two percent in 2000 to four percent in 2007. Net inflow of FDI as a share of GDP subsequently returned to its 2000 level by 2009 (two percent). These transfers would be particularly important sources of capital investment for labour-abundant, resource-poor economies.

During the pre-2007 period developing economise also experienced average annual GDP growth of 6.4 percent (2000 – 2007) (World Bank, 2017). The growth rate peaked at 8.6 percent in 2007, with all developing regions close to or exceeding five percent growth (World Bank, 2017). By contrast, average annual GDP growth for 1990 to 2000 only reached three percent and in the period 2008 to 2015, average GDP growth was five percent (World Bank, 2017). The growth in developing economies during 2000 to 2007 resulted in the emergence of vulnerabilities from a combination of abundant investment capital and rapid growth. By 2007, the rapid economic growth will have contributed to capacity constraints and the increasing cost of resources, including labour stock.

The 2007 global financial crisis would have contributed to a substantial reduction in imports by developing economies, while these selected developing economies were expanding their trade capacity to these selected developing economies. Particularly in cases of commodity and exporters, the sharp decrease in export volume would have been accompanied by a fall in prices and terms of trade, cutting into earnings from export (Lin, 2008). The surge in FDI projects over 2000 to 2007 would mean that many investment projects would have already begun and be underway. Sharp decreases in investment would have resulted in either: i) projects not being completed, resulting in unproductive and capital investments, leaving national financial institutions with non-performing loans; or ii) completed projects contributing to excess production capacity, adding to the risk of deflation, from decreased global export demand.

The epicentre of the global financial crisis was the US and Europe, and these economies attracted the most attention for policy responses at an institutional level. Developing economies needed to respond by strengthening their macroeconomic policies that build resilience to external shocks from falling demand in the markets of developed economies. The zero parameter estimate of β suggests that these 17 selected developing economies did not have sufficiently appropriate or flexible institutions to stave off the global bank lending and stock market contagion effect from 2007, 2011 and 2012.

This thesis does not reject the null hypothesis 2 that postulates that there is no association between national institutional infrastructure and differences in levels of investment in physical capital stock in developing economies. This suggests that institutions do not matter for investment in capital stock in these selected developing economies meaning that these selected developing economies do not have appropriate institutions that define '*a set of payoffs to political/economic activities'* that encourage productive activity (North, 1990, p. 11) or ensure macroeconomic management to allow scope for policy responses to global market shocks (Rodrik, 2008a).

7.4.2 Discussion of the relationship between institutions and labour stock

This thesis does not reject the null hypothesis 2 that postulates that there is no association between national institutional infrastructure and differences in levels of

investment in physical capital stock in developing economies. This suggests that institutions do not matter for investment in labour stock in these selected developing economies. Not surprisingly, capital stock has only a marginally statistically significant inverse effect on changes in labour stock for these selected developing economies. For the regression estimates in this thesis it is assumed that labour is homogeneous within an economy. For each unit increase in capital, labour stocks decrease by three percent in these selected 17 developing economies. These results would suggest that over the period 1991 to 2015, an economies' capital-labour ratio will increase, but not as the result of higher levels of productivity (Chapter 6.3) but possibly because of increased investment in capital that has a zero-margin effect.

7.4.2.1 Accumulation of labour stock

These results support the neoclassical Cobb-Douglas production function assumption that the elasticity of substitution between labour and capital is equal to unity (Solow, 1962a). However, this thesis has found evidence that capital investment may not create employment in these 17 selected developing economies. A possible implication of this contention is that measures to stimulate investment may have an important role to play in increasing unemployment in these selected developing economies (Stockhammer & Klär, 2011). Moreover, measures to improve the quantity of the labour force, or the efficient use of the labour force may lead to higher unemployment rates if they are accompanied by more investment in physical capital (Stockhammer & Klär, 2011; Agenor, 2017). These findings find support in Heller and Stephenson (2014) who found that market-creating institutions that protect private property and regulate free-market activity with minimal government intervention have a strong positive association with higher labour force participation rates and employment-population-ratios. The zero coefficient for the institutional index and the categories of institutions would suggest that in these 17 selected developing economies, there are not sufficiently appropriate market-creating institutions that support labour force participation.

The zero parameter estimate of β could be evidence that where rules do exist, they may be counterproductive, imposing excessive controls or insufficient controls required for complex economic exchanges taking place on the resource market

(Aaron, 2000). A further interpretation of these results is that the existing institutions are not effectively enforced. The effectiveness and enforcement of institutions affects economic agents, governments and firms within the market and influence the amount spent on transactions and transformation of the factors of production.

Typically, as labour costs increase, firms look to substitute capital for labour, contributing to high capital to labour ratios. Generally this would lead to a more efficient use of labour and less labour stock would be required. Amongst these selected 17 developing economies, the average capital to labour ratio is 2 percent, suggesting that there is minimal gain from productivity and suggests that these economies will tend to have lower real wages (cost of labour is low) (Hall & Jones, 1999). The pattern of labour-intensive production amongst these 17 selected developing economies has remained broadly unchanged over the period 1991 to 2015. At the same time, they continue to face significantly slow economic growth. One interpretation of these circumstances is the inability of these selected developing economies to induce a shift in their production structure to defend against their lack of capacity to meet the needs of fast-evolving international product markets where the emphasis is on innovation and product differentiation (Agenor, 2017). These selected developing economies appear to have been caught in low-wage labour-intensive production, with low levels of mature industries, innovation or technology-intensive industries.

Some literature explains these deficiencies in terms of diminishing returns to physical capital (Solow, 1956), exhaustion of low-cost labour and imitation gains and insufficient efficiency (Glass, 1999). Specialisation in low-skilled-intensive activities, may prevent a low-income economy from providing sufficient incentives for workers to invest in education. This in turn reduces the chance of promoting broad-based productivity from innovation and a more efficient labour force, it also reduces firms' incentives to invest in R&D (Agenor, 2017). These distorted incentives could contribute to the misallocation of labour skills to sectors that offer higher wages. Many of these arguments are compatible with the evidence that the economic slowdowns in these 17 selected developing economies may be the result of not only their distance from the technological frontier, but productivity slowdowns (Chapter 6.3). Yet these arguments differ in terms of the reasons for these slowdowns and consequently what type of institutions may be most appropriate to

encourage productivity growth. This may suggest that these arguments are in fact complementary rather than substitutionary.

7.5 Discussion of the association between institutions and productivity in the selected 17 developing economies

Growth encouraging institutions should restructure the environment in which the combination of the factors of production is accelerated (Ugur, 2010). The extant literature agrees that institutions may influence economic growth by encouraging the adoption of new technologies and increasing the rate at which capital is combined with labour (Jones & Romer, 2010; Hédoin, 2012). In particular, Anderlini, Felli, Immordino, and Riboni (2013) contend that '*technology and legal rules are bound to coevolve*' (p. 937), suggesting that there is a feedback relationship between technology and institutions. This assumption makes technological change endogenous, arising randomly proportional to the rate of R&D investment. It is expected that R&D is more strongly connected to TFP in economies where enabling institutions are more developed (Fuglie, 2018). This occurs as the process of knowledge creation and diffusion depends on the appropriate institutional structure that themselves are the outcome of advances in knowledge creation and diffusion (Andés & Asongu, 2015). The relative importance of innovation and R&D as drivers of productivity have been well researched and affirmed in many empirical studies (Petrakos et al., 2007). As discussed in section 6.3.2 the innovation process is complex and can be generated in part from R&D, investment in education, competition and international technology transfer. All four sources of innovation depend on appropriate institutional infrastructure that enables firms to exploit opportunities offered by global markets for knowledge and innovation spill overs (Maryam & Jehan, 2018)

7.5.1 Institutions and R&D

As discussed in Chapter 6.3 a fundamental challenge to increasing levels of productivity in these 17 selected developing economies is their inability to harness the benefits of knowledge creation or diffusion. Investment in R&D in these economies is weak or non-existent and they are unable to harness implicit

technological progress from imported intermediate goods. The results of this thesis highlights that the institutional infrastructure of these 17 selected developing economies are more likely to affect behaviour in ways that do not provide incentives for productivity-enhancing activities. These results find support in North (1991) who suggests that institutional constraints that define '*a set of payoffs to political/economic activities'* (p.11) do not encourage productive activity. One interpretation of these results may be that within these economies, there is an absence of institutions that could be significant determinants of productivity. This lends support to the suggestion that there are specific types of institutions which could potentially stimulate, rather than impede the adoption of new technologies and the efficient formation of productive capital (Tylecote, 2016).

Macroeconomic and institutional factors explain the pace of technological progress. Wang (2010) identified three hypotheses on the determinants of R&D investment: i) intellectual property rights ('IPR'); ii) technology transfer; and iii) income growth. IPR is considered an incentive to innovation, rewarding R&D by enabling innovators to retain profits generated from the patents of their new innovation (Schumpeter, 1976). Patent protection is a way of promoting creation of new technology, rather than mere imitation. IPR provides the inventor with a temporary monopoly on the invention and a guarantee of a durable income that can make future R&D financing stable and sustainable. Patent protection can also increase product market shares for owners of new goods and prevent the threat of imitators entering the product market (Ramzi & Salah, 2018). IPR can also be used to facilitate the diffusion and transfer of new knowledge in a competitive product market (Romer, 1990a). The benefits of R&D increase only if the benefits of patent protection are not unduly delayed (Ezzeddine & Hammami, 2018).

The more robust the IPR institutions, the stronger are incentives to file patents; the more patents that are granted, the more permission will be sought by innovators that want to build on existing knowledge (Crosby, 2000). Varsakelis (2001) assessed the impact of national culture, openness and patent protection framework on R&D investment in 50 economies of varying degrees of economic development. Varsakelis found that patent protection is the most important factor affecting the intensity of R&D (Varsakelis, 2001). Later, Chen and Puttitanun (2005) investigated the impact of IPR protection on innovation in 64 developing economies

and found that innovations in developing economies increase with increasing IPR protection.

The institutional framework can reduce private investors' ability to appropriate returns on their investment through a variety of mechanisms: contractual incompleteness, hold-up problems, corruption, lack of property rights and poor contract enforcement (Rodrik, 2008a). Institutional gaps can result in reducing or eliminating incentives for capital accumulation and technological progress. Unsupportive institutional frameworks may deter relationships among economic actors within the product market, which may result in static misallocation of resources that penalise private investors and distortions from capital investments with zero marginal returns. Institutional frameworks can limit, reduce or eliminate these types of 'taxes' on transactions. Strong innovation presumes the appropriate institutional framework that allows the creation of new knowledge and strikes the balance between protection and diffusion of new ideas.

The unexpected negative sign of the aggregate institutional index and the four institutional factors may be evidence that institutions have created monopolies for economic actors within these selected 17 developing economies that rather than contribute to diffusion and transfer of new knowledge, are constraining investment in knowledge and technological creation and diffusion (Yifu Lin & Nugent, 1995). Innovator's profits can diminish in highly competitive product markets where there are high levels of imitation (Arrow, 1962). While IPR through patent protection can act as a stimulus for firms to invest in R&D, greater protection does not always increase motivations to innovate and could instead encourage more imitation (Ezzeddine & Hammami, 2018). The effects of IPR institutions within these economies may be conditional on the complementarity of institutions within the system that provide access to knowledge and technology and protects against high and volatile inflation or external shocks to innovation and enable innovators to profit from creating new knowledge, rather than rewarding imitators.

7.5.2 The relationship between institutions and capital investment and productivity

TFP can increase the capital-labour ratio, which grows faster because of increased savings and investment from higher real output. This ever-increasing investment capacity, cannot be matched by increasing the speed of the growth of the labour force. Solow (1962b) concedes that technological change can only occur through both investment in new plant and equipment and through 'disembodied' technological change from existing factors, but asserts that technological progress embodied in new capital is more important. Technological change is similar in nature to any investment process. It requires time and adjustment that is not instantaneous (Solow, 1957; Arrow, 1962; Solow, 1962b; Arrow, 1969; Fagerberg, 1987; Romer, 1990a). Future and current technological change depends on past investment in technology; current technology reflects past technological choices (Romer, 1990a).

Solow (1962b) presented a new technique for studying the role of capital formation in economic growth. His fundamental assumption was that technical progress is 'built into' machines and other capital goods and that this built in technical progress must be taken into when making empirical measurements of capital. This presumes that new investments are characterised by the most modern technology and the capital that forms as a result does not change in qualitative terms over its remaining life (Solow, 1962b). It is expected that investment would augment capital and labour stocks towards increasing future productivity (Barrell et al., 2010). The results in Colum (1), Table 6.14 highlight that increased capital accumulation may be associated with decreasing levels of productivity. Capital accumulation may be hindered by relatively high prices of (mostly imported) capital goods, because of an industrial policy of import substitution. High custom tariffs and interest rates induce high relative prices of capital goods contributing to the reduction of the capital-labour ratio and resulting in a reallocation of labour (Asfaw, 2015). The result in Table 6.14 may be further evidence of investment in machines, capital goods, obsolete foreign technologies or infrastructure that has a zero-marginal product.

Considering the low investment in R&D in developing economies, they become more reliant on international technology transfers as determinants of R&D.

These international technology transfers may occur through either trade in intermediate and capital goods of high-tech products or inward foreign investment. Openness to trade and environments attractive to inward FDI can encourage domestic firms to improve the quality and opportunities for technological progress and R&D efforts and innovation (Coe et al., 2009). Trade openness facilitates access to advanced economies' stock of knowledge and can potentially increase domestic firms' share of the product market (Grossman & Helpman, 1991). This is one way for developing economies to exploit increasing returns to scale and avoid extravagant activities in the research sector by allocating a larger share of capital investment in investment in technology encapsulated in equipment and intermediate goods.

During the period 1991 to 2015, Bangladesh, India, Pakistan and Sri Lanka experienced great political instability. Simultaneously, they were in the midst of launching various economic liberalisation programmes that were slowed by the political instability that contributed to increased uncertainty and rent-seeking behavior. The effect of the political instability and institutional instability improved by 2015 and since 2016, all four countries have reported significant growth. Since 2009, Sri Lanka has reported on average a growth rate of 5.8 percent per year (World Bank, 2017). In 2016, the World Bank reported that Bangladesh reported one of the fastest rates of productivity growth from 1995 (average 2.7 percent per year, second to China. Berggren et al. (2012) maintains that to improve institutions, they must go through a process of change. This change can only be accomplished through periods of institutional experimentation. These countries were going through a transitional period of top-down institutional change (Brousseau et al., 2011), driven by government reformers seeking policy implementation.

These results find support in Berggren et al. (2012) who suggest that the economic environment is continuously evolving. During periods of institutional change there may be periods of instability, and may be associated with periods of lower growth in the short- and medium-run (Berggren et al., 2012). Credibility of changes in institutional quality must be earned and there will often be a time lag between institutional change and when that change will exert an impact on economic activity (De Haan, Lundstrom, & Sturm, 2006).

During the period under review, the high- and middle-income countries in this sample would have had to deal with the effects of the disturbances to their financial systems resulting from the 2008 Global Financial Crisis. Central banks in these countries would have responded to these shocks in a variety of ways, in some cases beyond their traditional frameworks. Suggesting that market-stabilising institutions are heterogenous across the sample and countries would have individual responses to shocks to their economies that allow them to widen their operational parameters, while constraining their degrees of freedom of their central banks. As these shocks are often times unexpected threats, these results would also suggest that country responses may be more contemporaneous to address evolving systematic risks outside of the normal, providing some measure of country-specific discretion that reflects market and institutional structures and the relative country-specific risk.

Developing economies are expected to be capital scarce, with assets accumulated by investment within the economy rather than from foreign financial assets. High-yielding domestic assets in resource-rich developing economies would imply rapid aggregate economic growth (Collier, 2010). Likewise, the return on assets from domestic asset accumulation becomes dependent on the domestic investment process. If these economies may be capital scarce, the investment process may not be able to deliver high returns. As asset accumulation increases from increased investment, these selected developing economies may encounter both managerial and physical bottlenecks that depress marginal returns to capital (Collier, van der Ploeg, Spence, & Venables, 2009). This may also contribute to their inability to capitalise on the technology embodied in equipment or intermediate goods. To address this issue, developing economies need a strategy for absorbing investment. This strategy could include appropriate institutions that not only smooth investment but raise the overall average rate at which investment can be productive.

7.6 Contribution to knowledge

7.6.1 Total factor productivity in the 17 selected developing economies

There is a dearth of studies that explore the factors that influence technological progress in developing economies, especially economies that may be connected by

historical conventions and events. The rejection of null hypothesis 1 (*there is no association between differences in TFP and differences in levels of output in developing economies)* supports the neoclassical economic growth theory that the factors of production only explain a small portion of the differences in output across economies. These results give emphasis to the power of differences in levels of TFP in these 17 selected developing economies. The limited infrastructure and funding for R&D and innovation continue to oblige these selected developing economies to look for alternatives to technological progress through technologies transferred from foreign investment.

It is important to understand the characteristics of the technological capacities of these economies. This thesis contributes to closing this gap in the existing knowledge. The extant literature has identified several factors that contribute to productivity. These include investment in training (Pedrini, 2017), R&D investment (Romer, 1990a; Sequeira et al., 2017), political stability (Tavares & Wacziarg, 2001) and institutional quality (Hall & Jones, 1999; Dias & Tebaldi, 2012). The results of this thesis, combined with the low rates of economic growth in these 17 selected developing economies contradict the contentions of Kumar and Russell (2002) that technological progress has a greater effect on economic performance in relatively wealthy economies than less developed economies. Instead, the results highlighted in this thesis support the original neoclassical contention that productivity is a large contributor to economic performance.

Solow (1957) initially found that physical capital accumulation only accounted for approximately 12 percent of output growth per hour worked in the United States for the period 1900 to 1949. While TFP growth accounted for the remaining 88 percent. More recent empirical work by Lee and Hong (2012), Eberhardt and Teal (2013), Manuelli and Seshadri (2014), Bergeaud, Cette, and Lecat (2017) and Yalcinkaya et al. (2017) have similarly found that national output is most responsive to TFP growth. Low-income economies tend to have a comparative advantage in labour-intensive industries. These studies focused primarily on the effect of TFP in developed economies. This thesis expands their findings to developing economies suggesting that the contribution of capital and labour to explain differences in national output are dwarfed by the effect of the unexplained residual.

This is in contrast to the critiques by Jorgenson and Griliches (1967) of the neoclassical theory of the importance of the residual to economic growth. Jorgenson and Griliches (1967) found that the residual had all but disappeared in their study, which was based on a strict application of the neoclassical theory of productivity. Their study provided an alternative perspective on how much output growth could be explained by TFP and how much could be explained by capital formation. Conversely, this thesis provides evidence that capital accumulation along neoclassical lines has not led to a switch into a regime of endogenous technical change as past capital accumulation has not rendered labour sufficiently expensive. This seems consistent with arguments by Aghion and Jaravel (2015) that in the long-run an economy with a low rate of innovation will continue to fall further behind the frontier. Aghion and Jaravel (2015) argue that an economies' absorptive capacity is crucial for technological catch up, particularly when an economy is further from the technological frontier.

Furthermore, this thesis demonstrates that many factors can contribute to persistently low levels of TFP in these selected 17 developing economies, including the structure of competitive markets, increases in government regulation or disruptions in private markets. There is evidence that sustained decreases in TFP are not atypical for these selected developing economies for the 25-year period, 1990 to 2015. It may be anachronistic to conclude that this is merely a phenomenon of a business or economic cycle.

7.6.2 The aggregate institutional index and four institutional factors in the 17 selected developing economies

The factor analysis exercise to calculate the aggregate institutional index and identify the four institutional factors has provided an alternative method to the traditional use of including diverse indicators to proxy institutions in a single regression or the use of simple averages to calculate aggregate indicators. The results of the factor analysis in this thesis adds a new argument to the critiques by Siddiqui and Ahmed (2013) of the previous parsimonious methods used to construct indices to measure institutional qualities. These critiques find support in earlier calls by Glaeser et al. (2004) that '*most indicators of institutional quality used to establish the proposition that institutions cause growth are constructed to be conceptually*

unsuitable for that purpose.' The use of factor analysis not only permits the isolation of correlation effects amongst the indicators, but standardising the indicators transforms the data to a comparable scale that can prevent giving an indicator with a larger range a weight of 100 in the analysis. Standardising the institutional indicators equalises the range and data variability, which effect is further reduced by the factor analysis.

7.6.3 The association between the institutions and capital stock and labour stock in the selected 17 developing economies

The findings of this thesis add to the critique of the neoclassical argument that the mobilisation of the right quantity of savings and investment may lead an increase in the rate of aggregate economic growth rates, leading to a higher equilibrium growth path. This prediction of convergence can only be conditional on homogeneity of savings rate, labour force growth rates and productivity. These assumptions are further challenged by the results of this thesis. This thesis also suggests that there is the possibility of heterogeneity in other dimensions which may be of significance to growth in developing economies, such as the quality of their institutional structure. This thesis contributes to arguments by Eicher and Leukert (2009) for the importance of the possibility of an impact of institutions on the accumulation of capital and labour stocks, thereby contributing to economic growth in developing economies. The results of this thesis also suggest that there is less reliance on the lowering of transactions costs in exchange transactions through formal property rights and enforcement of contracts. Appropriate institutional frameworks are required to provide adequate social safety nets and labour market activation as well as provide opportunities to access life-long learning, digital technologies, innovation, finance and entrepreneurship. More particularly, institutions that support the reduction of information asymmetries in the labour market and ensure more effective training or subsidies to employers, aimed at increasing skill levels.

Instead, what may be required are appropriate institutional structures that ensure that the continued capital accumulation in these selected developing economies has full effect. It can hardly be denied that for capital accumulation in these selected developing economies to have full effect it must be accompanied by additional inputs of labour, improvement in technology and other improvements in

the economic environment. More particularly, what may be required are more flexible institutions that provide these selected developing economies with the mechanisms to respond to global macroeconomic shocks. There is evidence that developing economies may be more financially integrated than previously thought and it is necessary that national institutional infrastructure is able to meet the demand and respond to shocks from decreased export revenue, FDI and encourage increased public investment and enhance credit supply in the economy.

This thesis also supports the argument that not only do institutions matter for economic growth, but different sets of institutions may matter for economies at different levels of development (Eicher & Leukert, 2009). For these selected 17 developing economies one channel to improve the factors of production, increase access to and investment in technology and improve the economic environment is the adoption of institutional structures that protect against coordination failure within the market, regulate the distribution of the factors of production and protect the market against external shocks, minimise abuse of market power, internalise externalities and deal with information asymmetries.

7.6.4 The association between institutions and productivity in the selected 17 developing economies

These results would support the argument that institutions may affect economic growth through its effect on: i) transaction costs; ii) predictability of economic relationships; and iii) information asymmetries. This is in line with North's '*institutions as rules of the game*' approach, which is principally focused on how institutions shape the incentive structure within the economy. This approach assesses the mechanisms of unequal exchange and exploitation, externally-induced economic and political distortions as determinants of the divergent development of productivity paths between developed and developing economies (Ugur, 2010). The persistent economic growth slowdowns coincide with the point in the economic growth process where it is no longer possible to increase productivity by shifting additional labour from low-productivity industries to high-productivity sectors and where gains from importing foreign technology diminish (Eichengreen, Park, & Shin, 2018). In fact, the results from this thesis suggest that the institutions within these selected developing economies may be enabling the persistence of monopolistic

power within the market that contributes to increase inefficient use and distribution of innovation and knowledge. More particularly, these results lend support to the argument that productivity is not independent of capital as suggested in the neoclassical economic growth model. It may even suggest that contrary to the neoclassical economic growth model, productivity may be endogenous, arising in response to investments in R&D and knowledge creation (Romer, 1990a).

There is no evidence that the difference in categories of institutions has any statistical significance for changes in TFP for this sample of economies. The absence of statistical significance is more telling for this sample. It further supports the suggestion that these economies lack the appropriate institutions that could influence productivity and thereby economic performance. These findings support the suggestion by Liu et al. (2017) that institutional voids can lead to poorly functioning or underdeveloped resource and product markets. Institutional voids contribute to the increase of transaction costs arising from increased regulatory and bureaucratic burdens, increased costs of enforcing contracts, increased costs of protecting and insuring private property and the effects of corruption. Firms faced with these institutional voids may find alternative ways of dealing with the resulting missing or poorly developed markets, which could divert their resources away from adopting or creation of new technology or investing in productive activities.

Alternatively, there is strong evidence of statistically significant links between capital stocks and productivity. The negative coefficient of capital stock not only supports the suggestion that there exists monopolistic power within the market that increases inefficiency and diverts resources from being invested in innovation or new knowledge (Comin, 2010). This suggests that technology may not be a public good within these selected developing economies and more particularly, knowledge and technological progress is not free for use by all businesses within these economies. Further that knowledge and technological progress is not independent of either capital or labour as suggested by the neoclassical economic growth model (Solow, 1994). Labour productivity can be improved from higher capital per unit of labour and increased productivity. This would reflect firms' ability to produce more output by better combining of inputs, through new ideas, technological innovations as well as process and organisational innovations, including new business models.

CHAPTER 8 CONCLUSION

8.1 Introduction

Comprehending the determinants of aggregate economic performance is critical in understanding how to increase levels of productivity and output in middle- and low-income economies. This thesis has sought to extend this discussion with regard to identifying the mechanisms through which productivity and institutions affect economic performance of middle- and low-income economies. This thesis firstly investigated the relationship between productivity, measured as TFP and national output measured as real GDP. It investigated the relative importance of TFP in the economic performance of selected middle- and low-income economies. This thesis has sought to fill the gap in the lack of empirical consensus on the effect of productivity on economic performance in developing economies.

Secondly, this thesis sought to augment existing literature on the association between institutions and economic performance in developing economies by using alternative estimation methods. For the most part, existing studies have used reduced-form models that have been developed on the assumption that institutions are endogenous. Furthermore, extant empirical literature has focused on the importance of institutions of property rights and contract enforcement in creating incentives for investment in the market. This thesis has expanded this area of research not only by using factor analysis to calculate an institutional index and four institutional factors, but has expanded the institutional indicators that have been included in the model. This thesis has investigated the mechanisms through which market-creating and market-deepening institutions influence long run accumulation and distribution of the factors of production and levels of TFP in middle- and low-income economies using fixed and random effects estimation methods.

The results in Chapter 6 highlight the importance of both TFP and institutions for long run economic performance of middle- and low-income economies. They add to support to the argument for the move away from investment and accumulation in the factors of production for increasing levels of output towards increasing income per capita for middle- and low-income economies. More particularly, the findings and discussions in Chapter 4 lend support for the neoclassical economic growth theory that differences in exogenous TFP accounts

for the differences cross-country economic performance. The results and discussion also suggest that institutions may be considered exogenous for empirical estimations of the influence of institutions for long-run economic performance. The remainder of this Chapter will provide a summary of the key findings of this thesis, highlighting the limitations of the study and areas for further research.

8.2 Key findings

8.2.1 The association between productivity and economic performance in developing economies

Chapter 2 highlighted the relevance of productivity for increasing levels of output, towards achieving higher levels of economic growth. Neoclassical economic growth theory posits that productivity is one of the components of the amorphous 'black box' called TFP, which is traditionally used to measure levels of productivity and technological progress. Predominantly, earlier studies have considered the hypothesis that cross-country differences in economic performance are dependent on differences in labour productivity and the productivity of capital. Capital has always been treated as a very important factor for the development of underdeveloped economies. Productivity has only slightly contributed to increased production. Yet developing economies remain capital scarce and labour abundant. Section 6.3 emphasises the importance of productivity to explain differences in the economic performance of developing economies.

This thesis has rejected the null hypothesis that there is no association between TFP and economic performance in developing economies. Quite to the contrary, this thesis finds evidence that suggest that TFP is highly statistically significantly associated with increases in national output of developing economies. Persistently low levels of TFP seemingly account for the persistently low levels of economic growth in the sample of selected developing economies. There is also evidence that the limited infrastructure and funding for R&D and innovation in developing economies continues to oblige these selected developing economies to rely on continued capital accumulation to increase levels of production.

This thesis finds support for the arguments that the competitive structure of the resource and product markets and the absorptive capacity of developing

economies contribute to levels of TFP. As these selected developing economies continue to drift further away from the technology frontier, they may find it harder to catch up, because they lack the absorptive capacity to take advantage of technological spill overs and firms lack the incentives to invest in more efficient ways of production, during abundant low-cost labour. Table 8.1 summarises the key findings of investigating the relationship between productivity and economic performance in the selected developing economies.

Table 8.1: Key findings on the association between productivity and economic performance in the sample of selected developing economies

Research Question	Key Literature	Hypothesis	Key Findings
To investigate the association between productivity and economic performance in selected developing economies	Solow (1957, 1962b); Easterly and Levine (2001); Hall and Jones (1999); Caselli and Coleman (2006); Hofman et al. (2017); Yalcinkaya et al. (2017)	There is no association between differences in TFP and differences in levels of output in developing economies.	– TFP is highly statistically significant at the five percent level. – Holding capital stock and labour stock constant, a unit increase in TFP is associated with a 100 percent increase in national output amongst the sample of 17 developing economies. – TFP levels in the sample 17 developing economies are persistently low with an average growth of 0 percent per year.

8.2.2 The role of institutions in economic performance in developing economies

Chapter 3 highlighted the importance of institutions for increasing levels of accumulation and productivity towards achieving higher levels of economic growth. Table 8.2 summarises the key findings of the investigation of the role of institutions

for the accumulation of physical capital and labour and increasing levels of productivity for the sample of 17 selected developing economies. The results of this thesis suggest that what is more important for economic performance in developing economies are flexible institutions that can respond to not only external shocks, but changes in demand from developed economies, than ‘good’ or ‘inclusive’ or ‘efficient’ institutions.

The findings from this thesis confirm the findings of earlier empirical investigations into the influence of institutions on economic performance, but goes further, by identifying the mechanisms through which institutions indirectly influence economic performance in developing economies. The results confirm that institutions that increase investment in education and health care, indirectly influence productivity through the promotion of skills and knowledge creation, contributing to the diffusion and adoption of new technology and processes. Further, that institutions that are aimed towards enhancing credit supply in the economy, increasing public investment and supporting expansionary budget policies contribute to ensuring a flexible institutional infrastructure that can respond effectively to external shocks to its macroeconomic stability. Likewise, institutions that establish social policies to respond to the impact of macroeconomic crisis, such as safety nets for households affected by the ‘fall out’ of the resource market, are important to ensure social protection and insurance, redistribution and management of social conflict.

Table 8.2: Key findings on the role of institutions for economic performance in the sample of selected developing economies

Research Question	Key Literature	Hypothesis	Key Findings
To investigate the role of institutions in economic performance in selected developing economies	North (1991); Hall and Jones (1999); Rodrik (2005, 2008a); Hall et al. (2010); d'Agostino and Scarlato (2012); Aisen and Veiga (2013); Dequech (2013); Heller and Stephenson (2014); Agenor (2017)	– There is no association between national institutional infrastructure and differences in levels of investment in physical capital stock in developing economies – There is no association between national institutional infrastructure and differences in levels of investment in labour stock in developing economies – There is no association between national infrastructure and differences in levels of productivity in developing economies.	– Institutions are important for the accumulation of capital and labour stocks in developing economies. – Appropriate institutional frameworks are required to provide adequate social safety nets and labour market activation to provide opportunities for increased productivity and levels of output. – Flexible institutions are more important for long run economic performance of developing economies, than 'good' or 'inclusive' institutions, to deal with contagion effects of being integrated with the global economy.

8.3 Contribution to practice and policy

This thesis contributes to existing literature in three different ways. Firstly, it adds to the limited existing empirical discussion of the role of productivity for economic

performance among developing economies. Much of the discussion of the role of productivity and technological progress on economic performance has centred on OECD and developed economies, unfortunately leaving behind scarce evidence of this relationship between productivity and technological progress and economic performance within developing economies. Secondly, this thesis employs factor analysis to create an institutional index and institutional factors. While some aspects of the influence of institutions on economic growth have been investigated in other studies, there continues to be questions about the choice and aggregation of institutional indicators. This has resulted in the call for the use of much more robust techniques to quantify institutions.

Thirdly, the persistent slow economic growth and the lack of productivity convergence has brought to light the relevance of empirical research into the influence of institutions and productivity on economic performance in developing economies. One motivation of this work is the ongoing debate on whether there are categories of institutions that are more relevant for economic growth, premised on the argument that certain political and economic conditions are particularly propitious for economic growth. Moreover, how market-creating institutions, such as enforcement of property rights, the rule of law, enforcement of contracts; market-legitimising institutions that regulate social conflict and market-stabilising institutions that protect against external shocks impact investment decisions and the ability of these economies to access and distribute factors of production, technology and knowledge in developing economies.

Subsequent to the global financial crisis a number of uncertainties and risk continue to loom for developing economies. There continues to be a high level of policy uncertainty, clouding prospects for world trade, development aid and global investment and productivity. This coupled with rising geopolitical tensions contribute to the intensified tendency towards more unilateral and isolationist policies. Those developing economies that may have more open capital markets remain vulnerable to increased risk aversion, disorderly tightening of global liquidity and sudden capital withdrawal. These weak demand and lower capital investment conditions have all contributed to the continued low levels of productivity in developing economies.

Key takeaways from developments since the period of data collection (1990 to 2015) are that: i) many commodity-dependent exporting developing economies

have continued to be hard hit by declining export prices and weakened demand from the developed economies, experiencing significant growth slow-down that has largely carried on into 2018; and ii) developing economies that are less dependent on commodity exports have benefited from price movements including reduced oil import bills. Those commodity dependent developing economies may continue to suffer the effects from short-term economic vulnerabilities due in part to weaker demand for commodity exports. This underscores the need for a better understanding of how institutional adjustments and adjustments in productivity could strengthen fiscal and external positions of these economies.

8.3.1 Contribution to practice

Overall, this thesis adds to the extant empirical literature that argues that the quality of institutions has a significant *absolute* effect on economic performance in developing economies. Consistent with earlier research, this thesis has found evidence that supports the contention that '*institutions matter for economic growth*' (Das & Quirk, 2016). Institutions indirectly determine economic performance through their direct impact on efficiency and intensity of production and investment in the factors of production. More importantly, this research finds evidence that institutional development may not be path dependent. There is no evidence that the historical origins of institutions influence their current quality or current levels of economic performance of developing economies.

This thesis builds upon existing literature to develop a coherent framework for understanding which institutions matter most for economic performance of developing economies. It attempts to explain the dynamic linkages between institutions and long-run economic performance of developing economies that share an institutional origin. The findings address the question of whether the development of institutions with a shared origin is path dependent. This adds to criticisms of Acemoglu et al. (2001) and Engerman and Sokoloff (2001) who argue that differences in colonisation strategies provide a more practical or significant implications for institutional development than country-specific characteristics.

The findings of this thesis confirm that institutions affect long-run economic performance for developing economies through their direct impact on productivity. The results also allude to the argument that the positive effect of the interaction between institutions and TFP may be hindered by a lack of absorptive capacity to take advantage of gains in education or technology. The results are particularly important when considering the returns to investment in education for developing economies. These findings provide evidence of the arguments by Mankiw, Romer, and Weil (1992) that higher levels of capital-labour ratio may lead to higher levels output by increasing incentives to acquire technology to make labour more efficient. This suggest that the technological frontier can only be achieved through the support of institutions that encourage and provide incentives for investment in training and education, R&D and new labour-saving technology. Confirming the critical role of institutions as '*rules of the game'* to fill the gaps in the market (North, 2016).

This thesis contributes to existing literature on the critical role of productivity for economic performance. There is evidence that differences in national output are determined by how efficiently and intensely the factor inputs are converted in the production process (Comin, 2010). The aggregate neoclassical production function is driven by TFP. For these 17 selected developing economies there is evidence that cross-country differences in output may be due to differences in TFP. The large coefficients could be evidence that measurement errors in output, capital stock and labour stock may appear in TFP (Baier et al., 2006). This could include physical capital with zero marginal product, changes in hours worked or changes in institutions and political regimes. This highlights the need for further research in this area to better isolate TFP and the extent to which conventional assumptions about the nature of TFP are supported by the data and current parametric estimation techniques used to calculate TFP. Governments must pay attention to institutional environments as a factor of productivity.

8.3.2 Contribution to policy

There is evidence that developing economies may be more financially integrated than may have previously been thought. Three policy implications have emerged from the investigation undertaken in this thesis. First, institutions may be strongly

linked to economic performance in developing economies. After accounting for the effect of the proximate determinants of economic growth, parameter estimates associated with the exogenous component of institutions, extracted by factor analysis are found to have no statistical significance for the accumulation of physical capital, labour or productivity in these selected developing economies. The absence of statistical significance can be interpreted to mean that the poor economic performance of the proximate determinants within these selected developing economies may be attributed to the lack of relevant institutions that can appropriately support the efficient functioning of the resource and product markets in these selected developing economies. Moreover, the results suggest that the critical lever to inform policymakers to ignite long-run economic growth is the quality of institutions that encourage efficient allocation and use of capital and labour. Institutions that not only encourage capital investment, but efficient capital investment that will contribute to productive activities.

Continued declines in commodity prices in 2015 – 2018 may require commodity exporting developing economies to consider tempering existing institutional infrastructure to support increased domestic demand or increasing access to financial support from multilateral financial institutions. To achieve increased national output objectives, commodity exporting developing economies may need to adjust their market-deepening institutional infrastructure to include support to boost domestic revenue mobilisation and achieve diversification into new export products that could replace lost commodity revenues.

The results of this thesis also highlight that among these selected developing economies, holding the proximate determinants constant, productivity depends on investment in capital stock. The unexpected negative coefficient of capital stock suggests that there may be existing monopolies within these economies that constrain the absorptive capacity of these economies to take advantage of gains from R&D or implicit technology from imports (Teixeira & Queirós, 2016). Economic performance in these selected developing economies continues to be primarily capital driven. It suggests that the return to physical capital is high during the low-cost labour-intensive production. The persistent low-cost labour discourages investment in new technologies contributing to the negative and low levels of productivity. Not surprisingly, low levels of productivity account for a large proportion of the variance in economic performance as these economies are

unable to take advantage of economies of scale or more efficient combination of capital and labour to increase output levels.

The importance of labour for economic growth in developing economies, is well recognised. Levels of health and education, are found to have a positive and robust relation to the efficiency of the labour force. If labour is to be regarded as efficient, it is necessary that the institutional infrastructure contribute to increasing the endowment per worker to offset any reduction in productivity. Technological-advance can be embodied in labour-increasing progress, enabling increased levels of production in the same way as if more labour were used. In the absence of short-term high-tech capacity, developing economies may be stalled unless they are able to develop complementary capacity of an educated workforce. These complementary capacities will require an increase in the quality and quantity of schooling and health care for the labour force. This could increase the chance of developing economies to be able to adapt technological spill over to meet their needs and constraints, increasing their opportunities for innovation towards increased levels of productivity.

These results would suggest that there is room for the development of all four categories of institutions identified in this thesis – market-creating; market-legitimising; market-regulating and market-stabilising. There is evidence to suggest that market-legitimising, market-regulating and market-stabilising institutions designed to regulate and legitimise the market, impose roles within the market and constrain inefficiencies have a significant impact on levels of factor accumulation and productivity. These results would support the call for strengthening market-legitimising and market-stabilising institutions that protect against coordination failure within the market, regulate the distribution of the factors of production and protect the market against external shocks, minimise abuse of market power, internalise externalities and deal with information asymmetries in developing economies, to improve factor accumulation, increase access to and investment in technology and improve the economic environment.

8.4 Limitations to research

This thesis has utilised well-known and reliable methodologies to test the various research hypotheses. The resulting interpretations of these findings provide relative comparisons of cross-country growth impacts of productivity and institutional quality. There are limitations in terms of the quantification of institutional quality that make it difficult to make conclusive pronouncements in terms of the results. These are limitations that can provide areas for further research.

The first limitation is the availability of reliable information for many of the economies included in the sample. This research has utilised up to date data from the World Bank, Penn World Tables and the Economic Freedom of the World Index. Many countries have been omitted from this study because there was no data readily available for all indicators from any source. A larger sample size may allow a more accurate representation of characteristics of the population of developing economies that share historical institutional origins (there are over 55 former British colonies) (Marcoulides, 1993). This thesis was only able to select a sample of four low-income economies from a possible population of 20 low-income economies. This could potentially result in over-estimated standard errors (the standard deviation of the sampling distribution). Larger sample sizes increase power and decrease estimation error (VanVoorhis & Morgan, 2007). Consequently, there is room for further research projects to collect and collate reliable data from a wider cross section of countries, particularly lower middle- and low-income countries on their macroeconomic and institutional environments.

Secondly, endogeneity remains an issue in the study of institutions. This thesis has found evidence that the institutional index calculated using factor analysis was not econometrically endogenous and could be treated as exogenous for this research. Yet the existing literature maintains that institutions are theoretically endogenous. The results in this thesis that the institutions parameter was not econometrically endogenous could be indicative of the way the indicators were collected. The variables were derived from the Economic Freedom of the World Index. The data is primarily the result of survey results, which are the respondents' subjective ex-post perception of how the rules and norms impacted exchange transactions. These types of responses may not always elucidate whether the rules and norms provided incentives to engage in exchange transactions or whether they

the rules or norms were adapted to enable the exchange transactions to take place. While this type of retrospective measure of the effectiveness of institutions may be useful, it does not answer the question of whether institutions are truly endogenous.

Many of the existing empirical studies have proceeded with their investigation on the premise that their institutional parameter is endogenous and do not implement diagnostic tests to predetermine if this is in fact so. This thesis has attempted to address the issue of potential endogeneity using factor analysis to estimate parameters that express the relation between the indicators, mitigating against the subjectivity of the Economic Freedom of the World Index and the researcher's subjective judgements on the choice of which indicators to include in this research. Moreover, the factor analysis deals with issues of multicollinearity. This thesis has also tested for the robustness of this approach, using 2 stage least squares with instrumental variables. Yet this may not be conclusive evidence that the issue of endogeneity may be reduced through factor analysis. There is certainly room for further research on the most appropriate methods of removing potential endogeneity issues and further research to examine the effect of removing endogeneity on the interpretation of results.

The third limitation lies in the omitted variable bias. This thesis has not controlled for the effect of other potential determinants of economic performance; geography, culture or trade. The primary aim of this thesis is to investigate the relationship between TFP and institutions and their effect on national output in developing economies. While this thesis recognises that geography is another deep determinant of economic performance, and the role of international trade as a driver of productivity change (Rodrik et al., 2004), they are beyond the scope of the current research. This thesis may be extended by controlling for the effect of geography and international trade on the interaction of institutions on productivity and output. This type of further research could explore whether these parameters operate additively or interact with institutions. This research could also be extended to identify how the different categories mitigate or enhance the effect of other deep determinants.

8.5 Areas for further research

There are some questions that the analysis in this thesis could not address. Institutions are predominantly treated as a 'black box' and the results of this thesis suggest that improving the quality of the institutions in these selected developing economies could result in significant gains in income per capita. However, these results do not point to the concrete steps that are necessary to lead to an improvement in these institutions. Institutional features, such as their enforcement, equitable implementation and applicability can be interpreted as an equilibrium outcome (Acemoglu et al., 2001) associated with some more fundamental features of informal norms, such as the distribution of power within the society, which cannot be easily changed. A more detailed analysis of the effect of the more fundamental informal norms will be an appropriate area for further study to examine how they impact the enforcement and application of more formal rules that more readily influence economic performance.

The contention of this thesis is that formal institutions cannot be fully examined apart from the innovations and social norms that underlie them. Institutions critically underpin the 'rules of the game' which help shape the complementarity or substitutability of the factors of production toward productive activities. Static juxtapositions of institutional forms have predominantly disregarded the fact that functionally equivalent institutions can take different forms. In the long-run it is the elementary informal norms that may be likely to drive the sustainable outcomes of formal institutions. The elements of economic performance are dynamic, complex and volatile, and require both country specific formal and informal rules and norms that contribute to reducing transaction costs and contagion effect of cross-border activities, thereby increasing the opportunity for economic growth among developing economies.

Secondly, the lack of good indicators prevents this thesis from fully examining the direction of causality in the relationship between institutions, the factors of production and productivity. The scarcity of annual institutional indicators and data on capital stock investment means that many developing economies were omitted from this thesis. Given the limitations of data availability, there continues to be a paucity of studies that examine these relationships for developing economies. There is room for the development of more appropriate means of data collection.

Further study of the interrelationship among institutions, productivity and the factors of production in developing economies at both the micro and macro level can contribute to reinvigorating international business research by providing mechanisms by which scholars can confront the complexities that characterise the role and status of developing economies in the ever changing and volatile global economy. It is hoped that the framework presented in this thesis has taken this research one step further in that direction.

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APPENDICES

Appendix A: Index of institutional indicators used

	Type	Definition	Source
Judicial independence	Informal	Comprised of responses to the World Economic Forum, *Global Competitiveness Report* question: 'Is the judiciary in your country independent from political influences of members of government, citizens or firms.'	World Economic Forum, Global Competitiveness Report
Impartial courts	Informal	Comprised of responses to the World Economic Forum, *Global Competitiveness Report* question: 'the legal framework in your country for private businesses to settle disputes and challenge the legality of government actions and/or regulations is inefficient and subject to manipulation, or is efficient and follows a clear and neutral process.' Ratings from the World Bank's *Governance Indicators* were used for any missing values from primary data sources since 1995.	World Economic Forum, Global Competitiveness Report World Bank's World Development Indicators
Protection of property rights	Formal	Comprised of responses to the World Economic Forum, Global Competitiveness Report question: 'Property rights, including over financial assets are poorly defined and not protected by law or are clearly defined and well protected by law.'	World Economic Forum, Global Competitiveness Report
Military interference in rule of law and politics	Informal	Comprised of data from the *International Country risk Guide* Political risk Component G, Military in Politics: 'A measure of the military's involvement in politics'. Data from the World Bank's *Governance Indicators* were used where values were missing from the primary data source since 1995.	PRS Group, International Country Risk Guide World Bank, Governance Indicators
Legal enforcement of contracts	Informal	Comprised of data from the World Bank's *Doing Business* of the time and money required to collect a debt.	World Bank, Doing Business
Regulatory restrictions on the sale of real property	Informal	Comprised of data from the World Bank's *Doing Business* of the time measured in days and financial costs to transfer ownership of property that includes land and warehouses.	World Bank, Doing Business
Reliability of police	Informal	Comprised of data from *Global Competitiveness Report* question: 'To what extent can police services be relied upon to enforce law and order in your country?'	World Economic Forum, Global Competitiveness Report

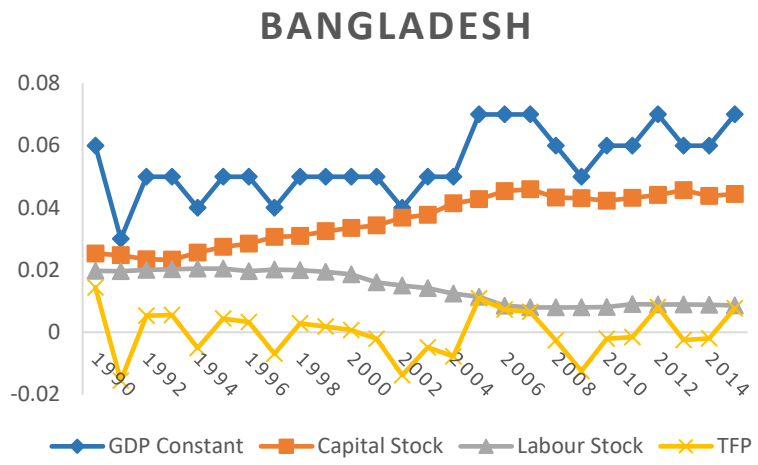
	Type	Definition	Source
Freedom to own foreign currency bank accounts	Informal	Comprised of data from Global Competitiveness Report question: 'To what extent does the incidence of crime and violence impose costs on businesses in your country?'	International Monetary Fund, Annual Report on Exchange Arrangements and Exchange Restrictions
Sound Money	Formal	Focuses on the importance of money and relative prices stability in the exchange process. It refers to money with a relatively stable purchasing power across time, which can reduce transaction costs and facilitate exchange. Comprised of data on money growth - average annual growth of money supply	World Bank's World Development Indicators International Monetary Fund, International Financial Statistics & Annual Report on Exchange Arrangements and Exchange Restrictions United Nations National Accounts
Regulatory trade barriers	Formal	Comprised based on data from: (1) *Global Competitiveness Report* on tariff and non-tariff barriers and whether their impact on the ability to import goods to compete in the domestic market; (2) World Bank's *Doing Business* on the non-money cost of procedures required to import a full 20-foot container of dry goods that do not contain hazardous or military items.	World Economic Forum, Global Competitiveness Report World Bank, Doing Business
Black market exchange rates	Informal	Based on the percentage difference between the official and the parallel exchange rate.	MRI Bankers' Guide to Foreign Currency
Foreign ownership/investment restrictions	Formal	Based on data from the two questions from the G*lobal Competitiveness Report:* (1) 'How prevalent is foreign ownership of companies in your country?' (2) 'How restrictive are regulations in your country relating to international capital flows?'	World Economic Forum, Global Competitiveness Report
Capital controls	Formal	Based on the International Monetary Fund, *Annual Report on Exchange Arrangements and Exchange Restrictions* data on up to 13 types of international capital controls.	International Monetary Fund, Annual Report on Exchange Arrangements and Exchange Restrictions

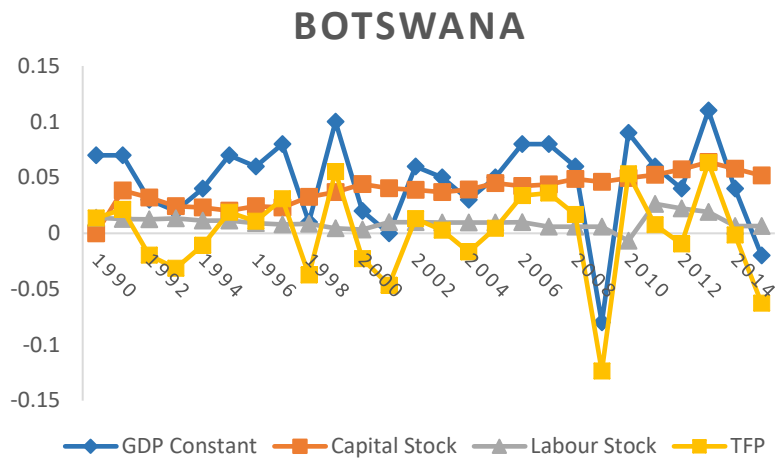
	Type	Definition	Source
Freedom of foreigners to visit	Formal	Measures the percentage of economies for which visas are required from foreign visitors. It reflects the freedom of foreigners to travel for the purpose of both tourists and for short-term business	Robert Lawson and Jayme Lemke (2012). Travel Visas. *Public Choice* 154, 1-2-; 17-36.
Credit market regulations	Formal and Informal	Comprised of data on: (1) ownership of banks - the percentage of bank deposits held in privately owned banks (2) private sector credit - measures the extent of government borrowing relative to borrowing by the private sector (3) interest rate controls/negative real interest rates - data on credit-market controls and regulations	World Bank, Bank Regulation and Supervision Survey & World Development Indicators James R. Barth, Gerard Capiro and Ross Levine (2006). Rethinking Bank Regulation: Till Angels Govern. Cambridge University Press World Economic Forum, Global Competitiveness Report International Monetary Fund, International Financial Statistics
Hiring regulations and minimum wage	Formal	Data from the World Bank's *Doing Business* based on the "Employing Workers' section, comprised of three sub-components – (1) whether fixed-term contracts are prohibited for permanent tasks; (2) the maximum cumulative duration of fixed-term contracts; and (3) the ratio of the minimum wage for a trainee or first-time employee to the average value added per worker	World Bank, Doing Business
Hiring and firing regulations	Formal	Based on the *Global Competitiveness Report* survey question: 'the hiring and firing of workers is impeded by regulations or flexibly determined by employers'	World Economic Forum, Global Competitiveness Report
Centralized collective bargaining	Informal	Based on the *Global Competitiveness Report* question: 'wages in your country are set by a centralised bargaining process'	World Economic Forum, Global Competitiveness Report

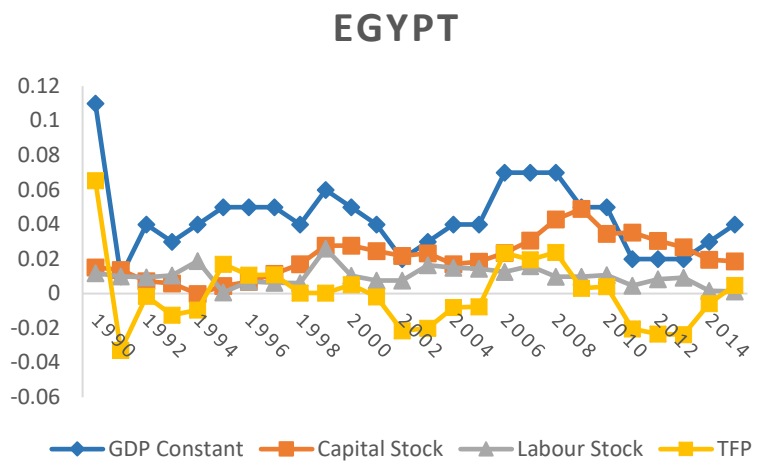
	Type	Definition	Source
Hours Regulations	Formal	Based on the World Bank's *Doing Business*, 'Rigidity of Hours Index', which uses five components on whether: (1) there are restrictions on night work; (2) there are restrictions on holiday work; (3) the length of the work week can be 5.5 days or longer; (4) there are restrictions on overtime work; and (5) the average paid annual leave is 21 working days or more.	World Bank, Doing Business
Mandated cost of worker dismissal	Formal	Based on the World Bank's *Doing Business*, data on the cost of the advance notice requirements, severance payments and penalties due when dismissing a redundant worker with 10 years tenure.	World Bank, Doing Business
Conscription	Formal	Measures the use and duration of military conscription. Economies with longer conscription periods received lower ratings. In economies where conscription is never used, though possible was rated 10. Economies without military conscription were rated 10. If mandated national service included clear non-military options, the country was rated 5.	International Institute for Strategic Studies, The Military Balance War Resisters International, World Survey of Conscription and Conscientious Objection to Military Service
Administrative requirements	Formal	Based on the *Global Competitiveness Report* survey question: 'Complying with administrative requirements (permits, regulations, reporting) issued by the government in your country is (i) burdensome, (ii) not burdensome'	World Economic Forum, Global Competitiveness Report
Starting a business	Informal	Comprised of data from the World Bank's *Doing Business* on the amount of time and money required to start a new limited liability business.	World Bank, Doing Business

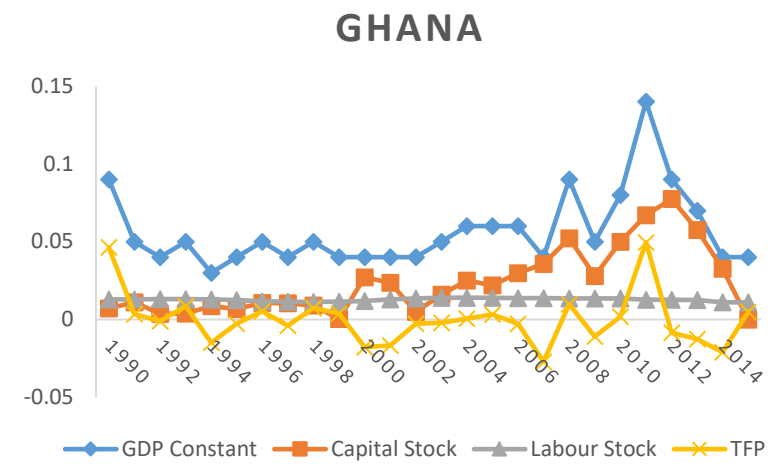
	Type	Definition	Source
Extra payments/bribes/favouritism	Informal	Based on the Global Competitiveness Report questions: (1) 'In your industry, how commonly would you estimate that firms make undocumented extra payments or bribes connected with - import and export permits; connection to public utilities; annual tax payments; awarding of public contracts; getting favourable judicial decisions?' (2) 'Do illegal payments aimed at influencing government policies, laws or regulations have an impact on companies in your country?' (3) 'To what extent do government officials in your country show favouritism to well-connected firms and individuals when deciding upon policies and contracts?'	World Economic Forum, Global Competitiveness Report
Licensing restrictions	Formal	Based on the World Bank's *Doing Business* data on the time in days and financial costs to obtain a license to construct a standard warehouse.	World Bank, Doing Business

Appendix B: Decomposition (in logs) of GDP by Capital Stock, Labour Stock and TFP for 17 selected developing economies









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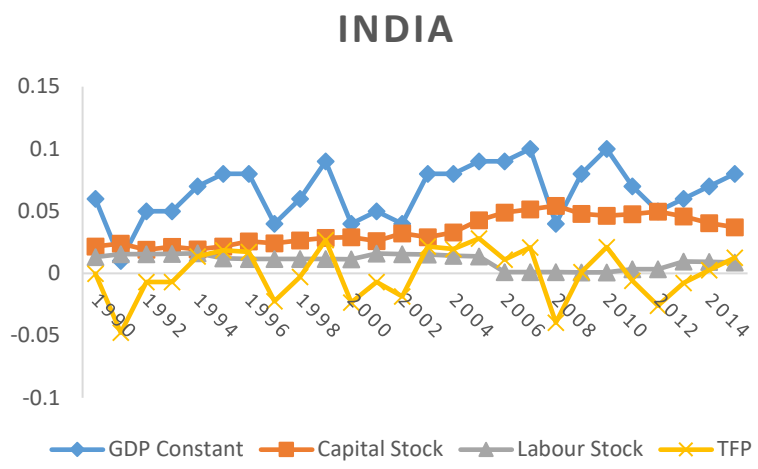

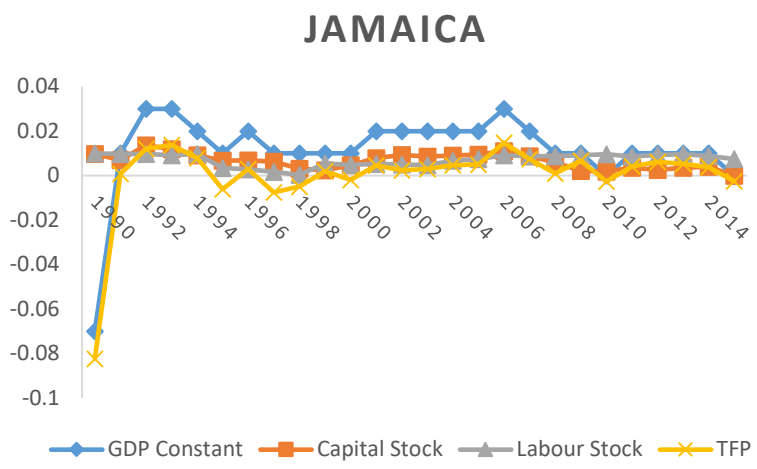

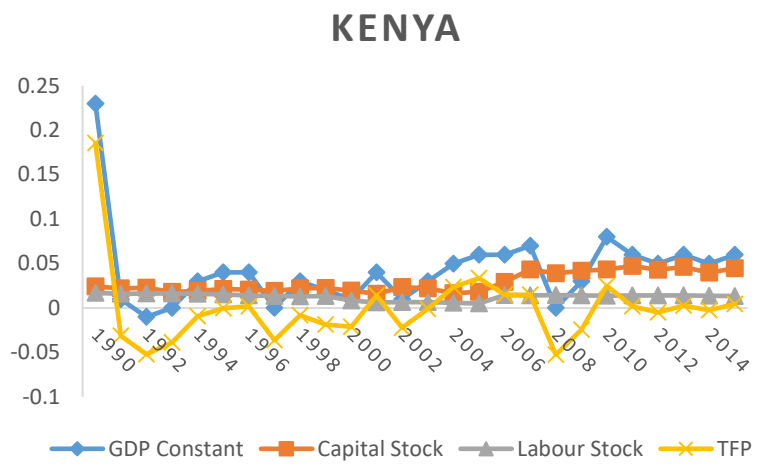

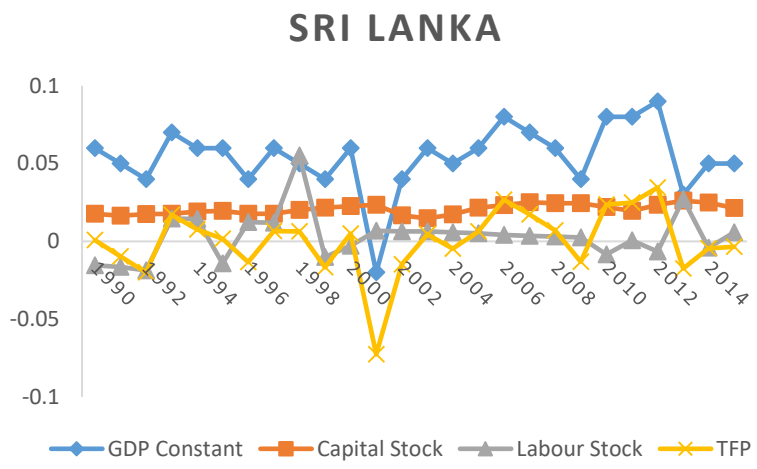

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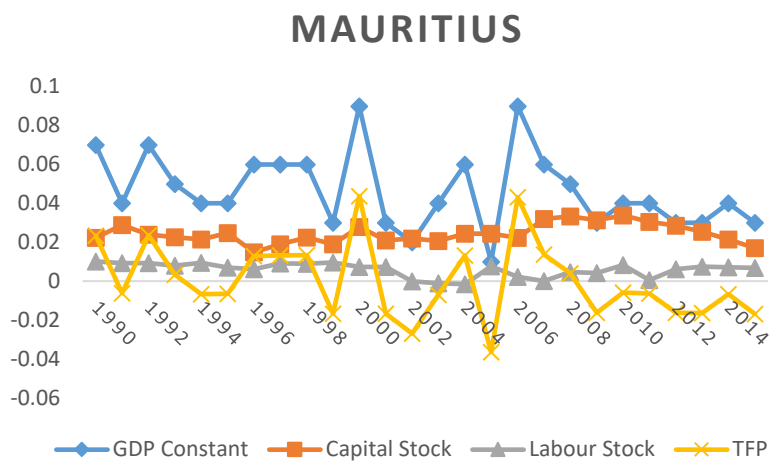

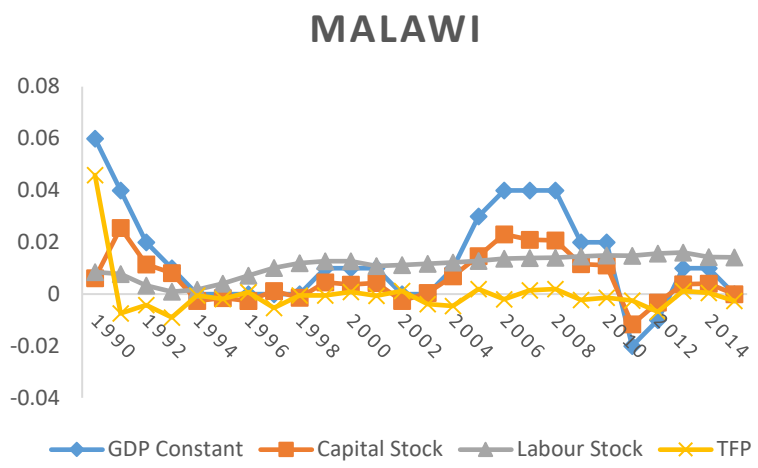

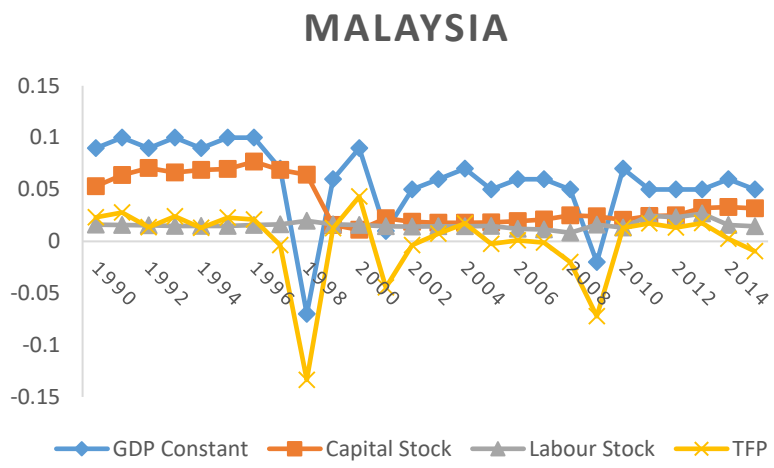

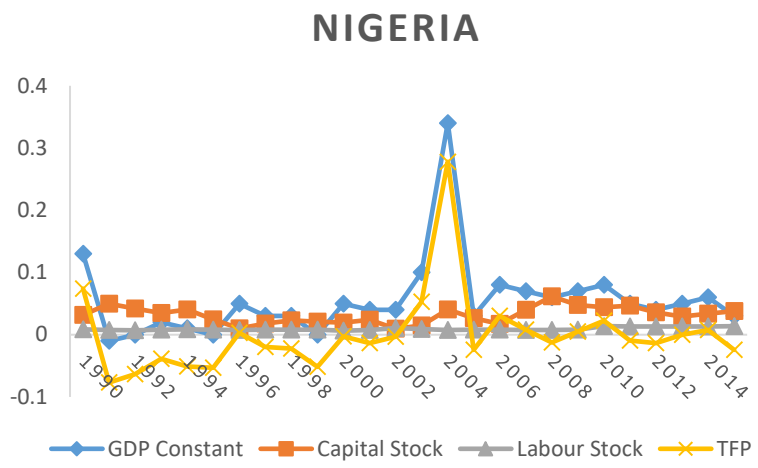

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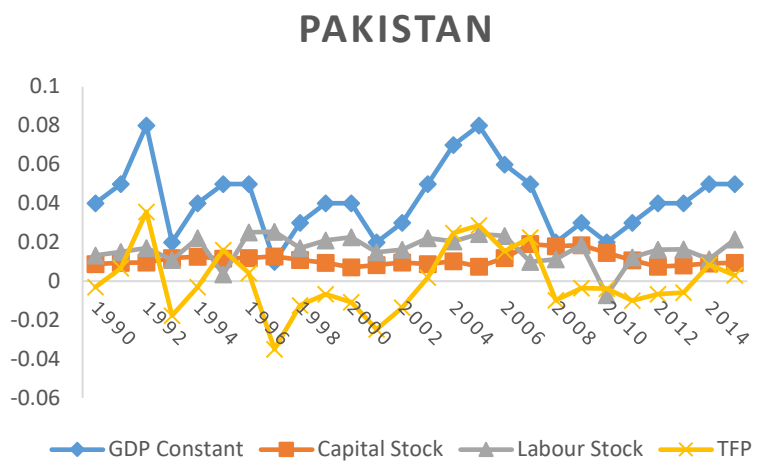
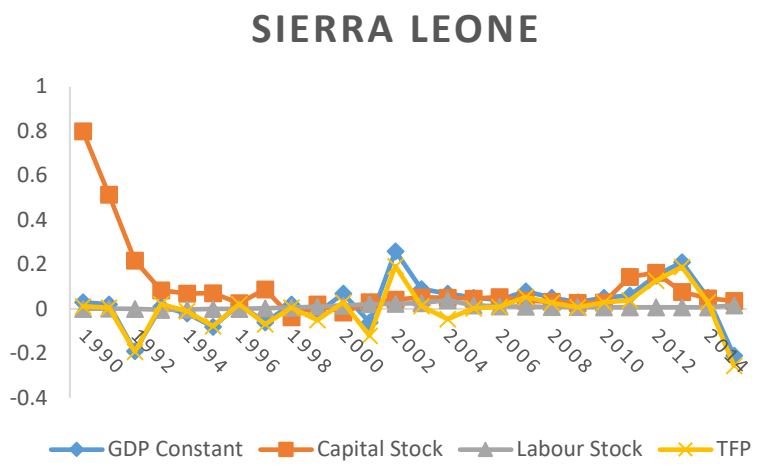
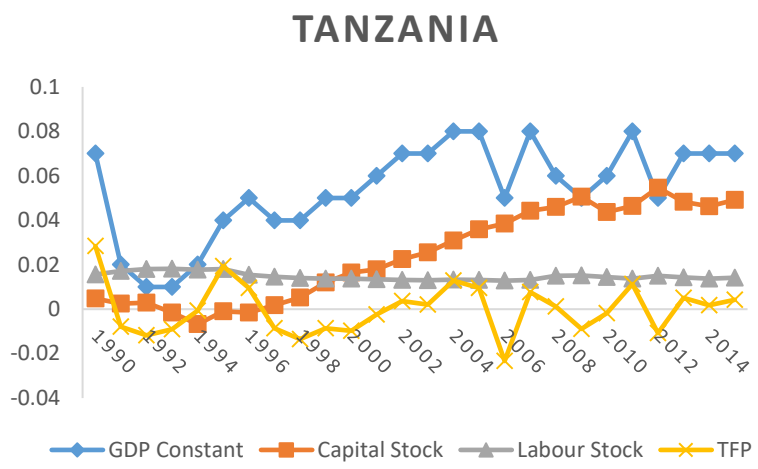
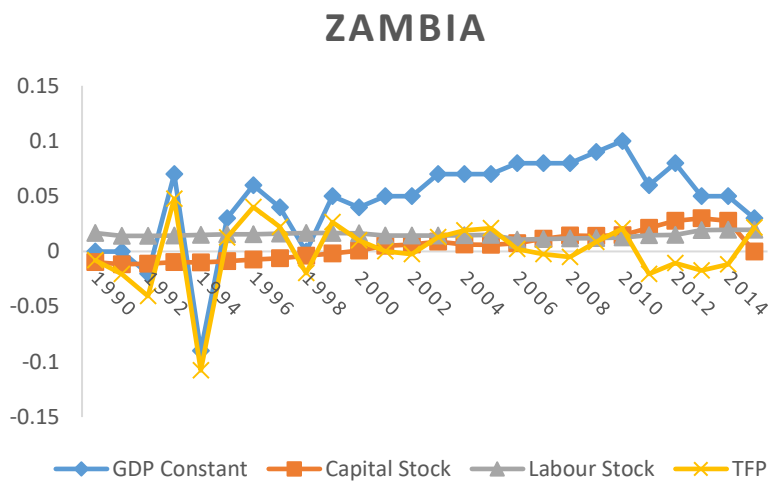
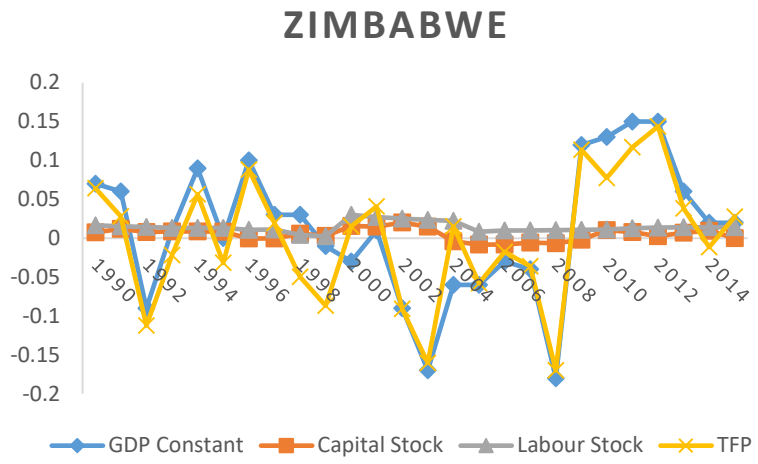




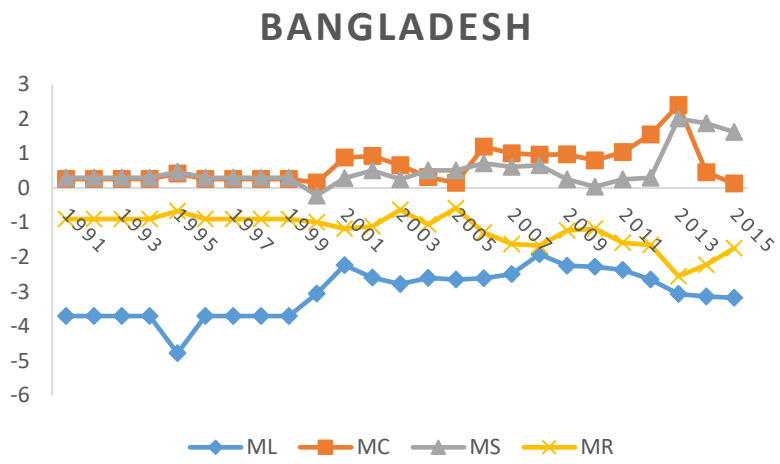


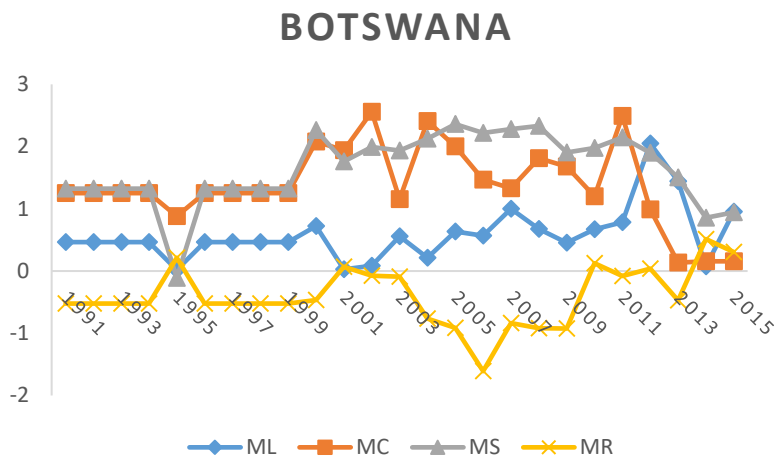


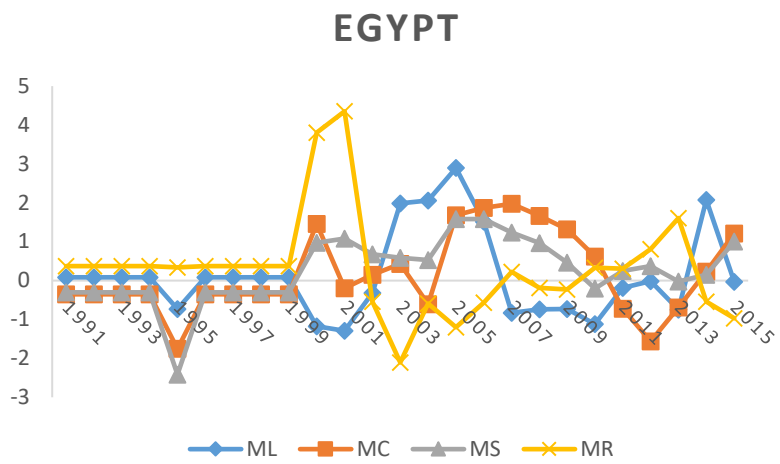
Appendix B continued

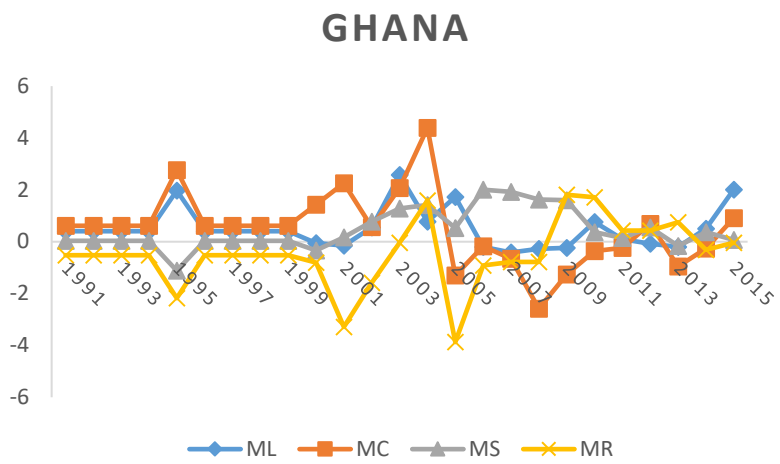


Appendix C: Trend of market-legitimising, market-creating, market-stabilising and market-regulating institutional factors

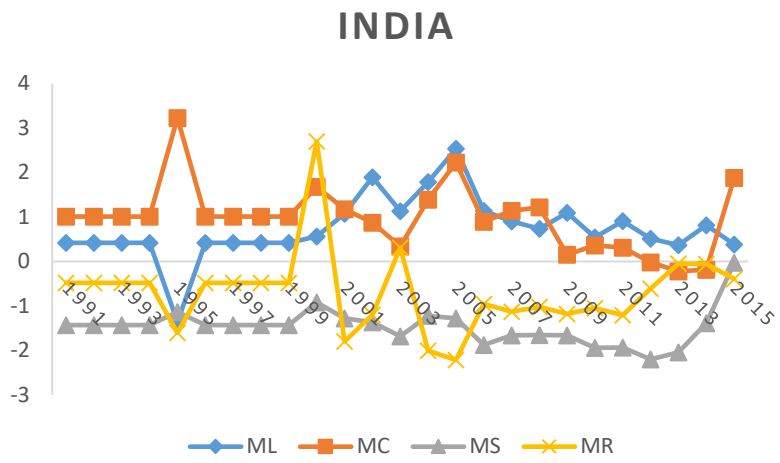


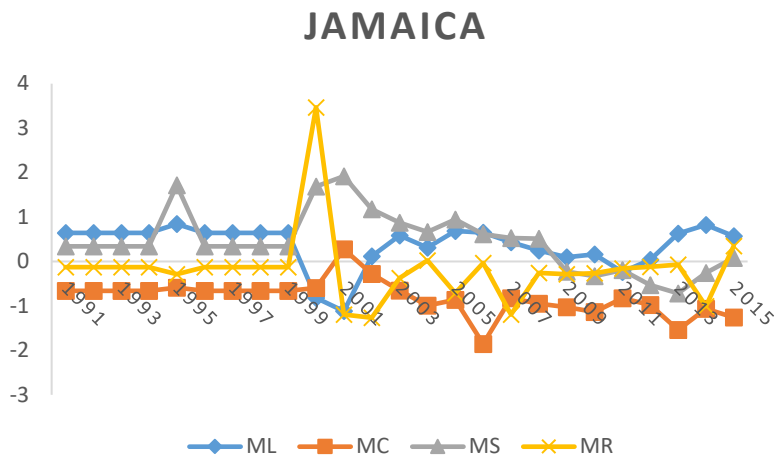


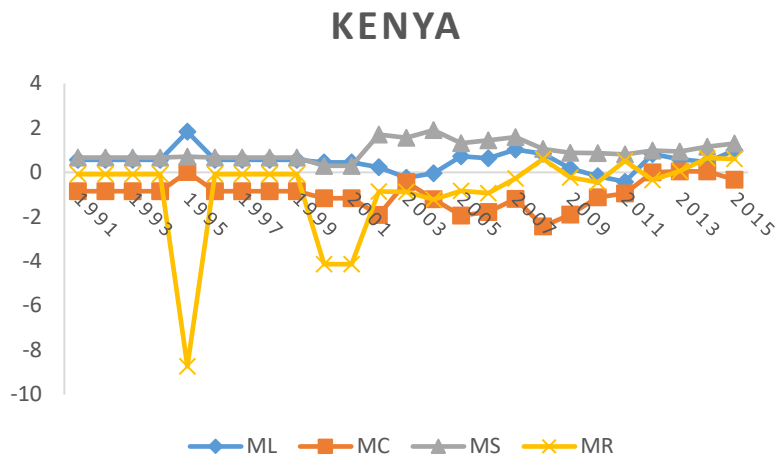


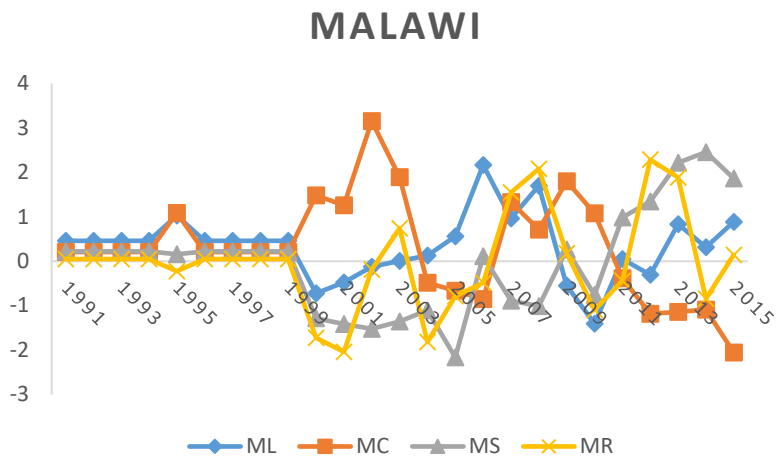


Appendix C continued

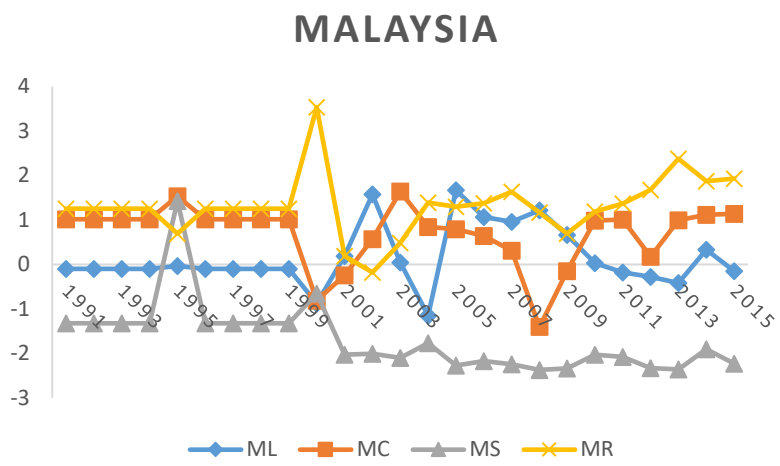


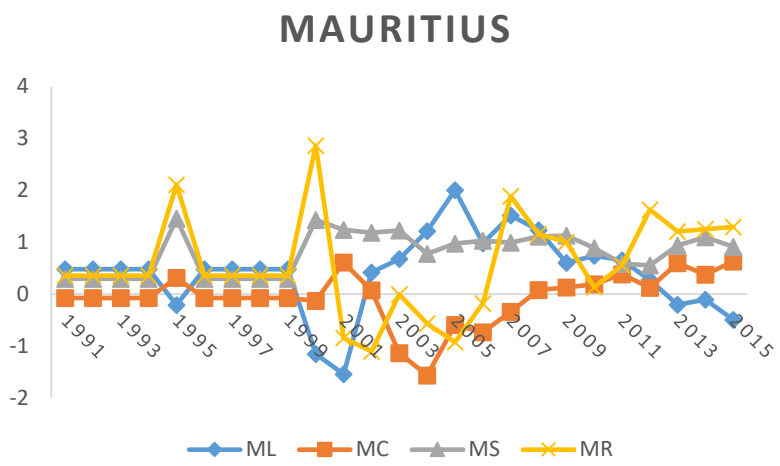


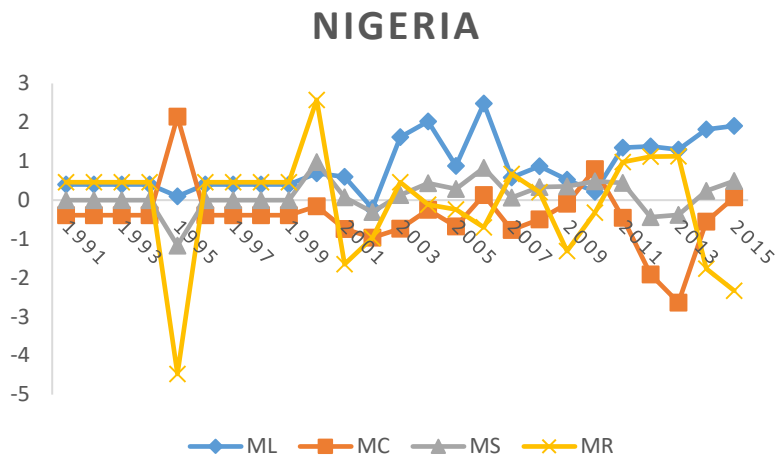


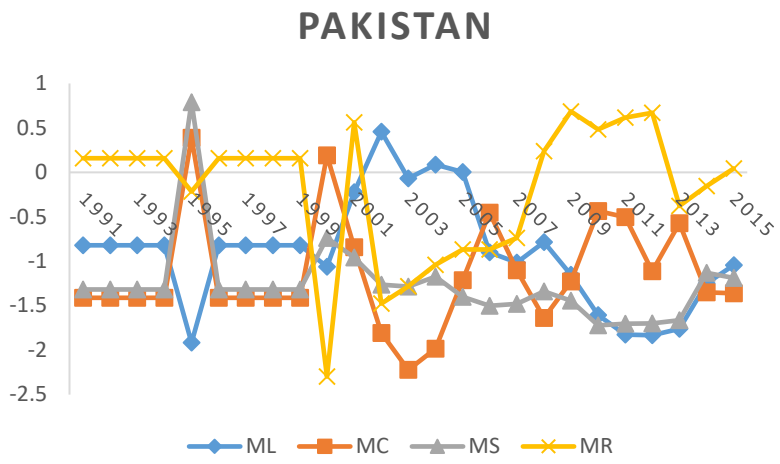


Appendix C continued

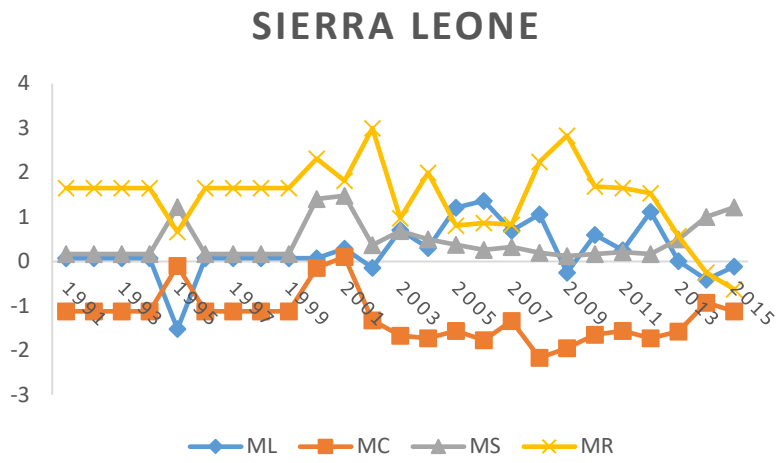


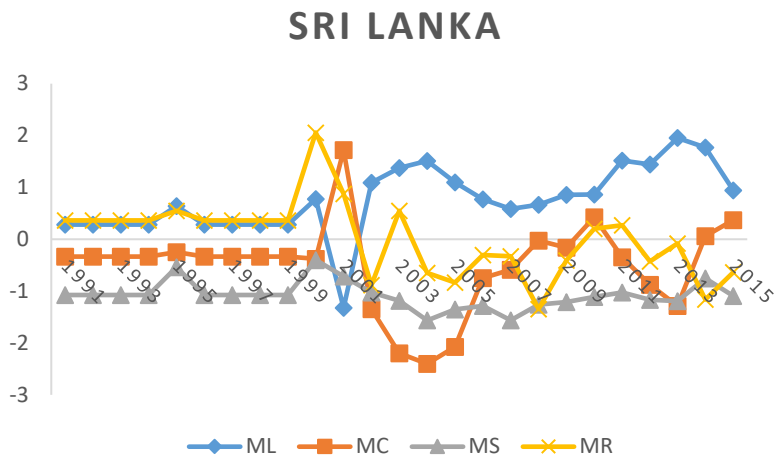


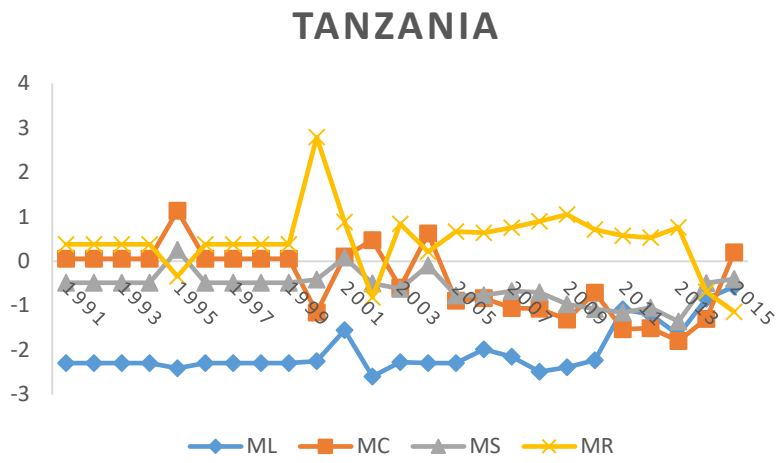


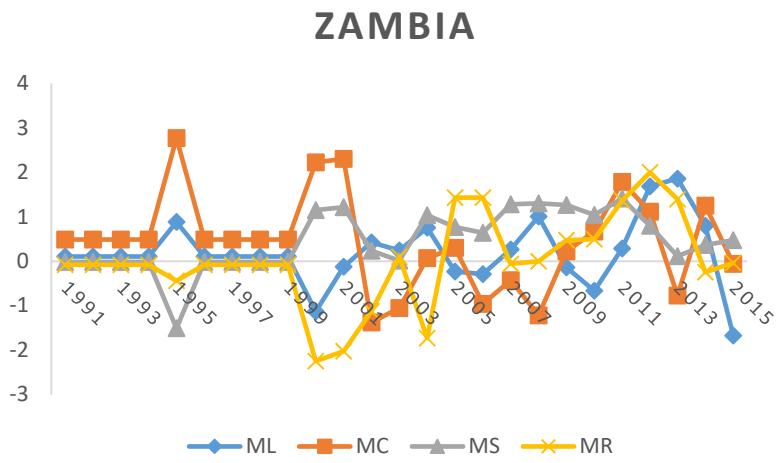


Appendix C continued

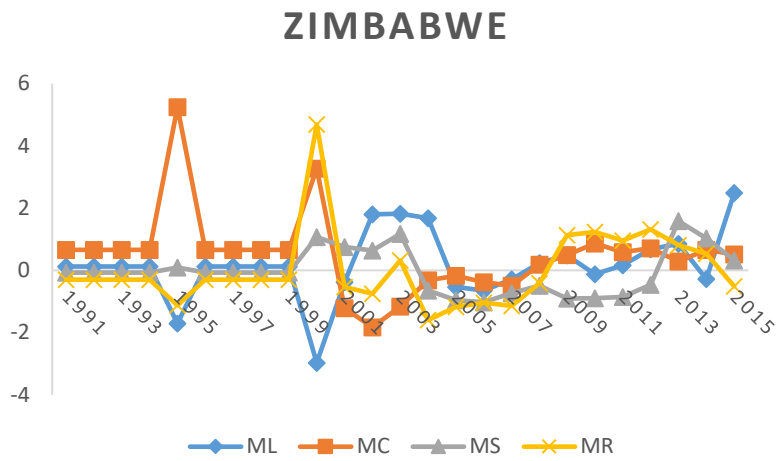








Appendix C continued



Appendix D: Capital Stock - Full fixed effect estimation results with time-dummies

	(1) Capital Stock	(2) Capital Stock
L.Institution Index	0.00389	
	(1.06)	
L.Labour Stock	0.0496	0.0435
	(0.47)	(0.41)
L.Capital Stock	0.423***	0.422***
	(18.69)	(18.55)
GDP per capita	0.00827	0.00869
	(0.53)	(0.55)
L.GDP per capita	0.00395	0.00329
	(0.25)	(0.20)
year== 1992	-0.00168	-0.00132
	(-0.39)	(-0.31)
year== 1993	-0.00303	-0.00272
	(-0.71)	(-0.63)
year== 1994	-0.000529	-0.000193
	(-0.13)	(-0.05)
year== 1995	-0.0000390	0.000281
	(-0.01)	(0.07)
year== 1996	-0.00342	-0.00279
	(-0.81)	(-0.63)
year== 1997	0.00263	0.00296
	(0.62)	(0.69)
year== 1998	-0.00475	-0.00443
	(-1.13)	(-1.03)
year== 1999	-0.00114	-0.000818
	(-0.27)	(-0.19)
year== 2000	-0.000552	-0.000234
	(-0.13)	(-0.05)
year== 2001	0.00181	0.00197
	(0.43)	(0.44)
year== 2002	0.0000866	0.000330
	(0.02)	(0.08)
year== 2003	0.00121	0.00136
	(0.29)	(0.32)
year== 2004	0.00199	0.00208

	(0.47)	(0.48)
year== 2005	0.00181	0.00195
	(0.43)	(0.46)
year== 2006	0.00447	0.00462
	(1.05)	(1.08)
year== 2007	0.00722	0.00724
	(1.70)	(1.70)
year== 2008	0.00889*	0.00901*
	(2.11)	(2.13)
year== 2009	0.00485	0.00485
	(1.15)	(1.14)
year== 2010	0.00633	0.00650
	(1.48)	(1.51)
year== 2011	0.0136**	0.0141**
	(3.19)	(3.23)
year== 2012	0.0120**	0.0123**
	(2.82)	(2.86)
year== 2013	0.00565	0.00587
	(1.33)	(1.35)
year== 2014	0.00337	0.00342
	(0.79)	(0.79)
L.Market Legitimising		0.000848
		(0.82)
L.Market Creating		0.000104
		(0.13)
L.Market Stabilising		0.00101
		(0.95)
L.Market Regulating		0.000282
		(0.41)
Constant	0.0104**	0.0103**
	(3.16)	(3.08)
N	408	408
r2	0.570	0.571

t statistics in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Appendix E: Labour Stock - Full fixed effect estimation results with time-dummies

	(1) Labour Stock	(2) Labour Stock
L.Institution Index	0.000463	
	(0.27)	
L.Labour Stock	0.307***	0.296***
	(6.26)	(6.03)
L.Capital Stock	-0.0262*	-0.0278**
	(-2.48)	(-2.63)
GDP per capita	-0.0103	-0.0109
	(-1.41)	(-1.50)
L.GDP per capita	-0.00165	-0.00287
	(-0.22)	(-0.38)
year== 1992	-0.00107	-0.00101
	(-0.54)	(-0.51)
year== 1993	0.000129	0.000139
	(0.06)	(0.07)
year== 1994	0.000573	0.000613
	(0.29)	(0.31)
year== 1995	-0.00398*	-0.00394*
	(-2.00)	(-1.97)
year== 1996	0.000151	0.000765
	(0.08)	(0.37)
year== 1997	-0.000528	-0.000482
	(-0.27)	(-0.24)
year== 1998	0.00134	0.00137
	(0.68)	(0.69)
year== 1999	-0.00165	-0.00161
	(-0.83)	(-0.80)
year== 2000	-0.000108	-0.0000762
	(-0.05)	(-0.04)
year== 2001	-0.000123	-0.000833
	(-0.06)	(-0.41)
year== 2002	-0.000207	-0.0000555
	(-0.10)	(-0.03)
year== 2003	0.000671	0.000977
	(0.34)	(0.50)
year== 2004	0.000967	0.00106
	(0.49)	(0.53)

year== 2005	-0.000779	-0.000483
	(-0.39)	(-0.24)
year== 2006	-0.00157	-0.00112
	(-0.79)	(-0.56)
year== 2007	-0.00212	-0.00198
	(-1.07)	(-1.00)
year== 2008	-0.00203	-0.00203
	(-1.03)	(-1.03)
year== 2009	-0.000982	-0.00111
	(-0.50)	(-0.56)
year== 2010	-0.00348	-0.00360
	(-1.74)	(-1.80)
year== 2011	0.000926	0.000994
	(0.46)	(0.49)
year== 2012	0.000229	0.000227
	(0.12)	(0.11)
year== 2013	0.00297	0.00285
	(1.49)	(1.42)
year== 2014	-0.00243	-0.00266
	(-1.22)	(-1.33)
L.Market Legitimising		-0.000162
		(-0.34)
L.Market Creating		-0.000222
		(-0.60)
L.Market Stabilising		0.000644
		(1.31)
L.Market Regulating		0.000475
		(1.51)
Constant	0.00938***	0.00954***
	(6.11)	(6.18)
N	408	408
r2	0.191	0.204

t statistics in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Appendix F: TFP - Full random effect estimation results with time-dummies

	(1) TFP	(2) TFP
L.Institution Index	-0.00192	
	(-0.33)	
L.Labour Stock	0.282	0.311
	(1.04)	(1.13)
L.Capital Stock	-0.175**	-0.175**
	(-3.01)	(-3.00)
L.TFP	0.0404	0.0431
	(0.74)	(0.79)
GDP per capita	0.304***	0.297***
	(6.89)	(6.60)
L.GDP per capita	-0.0167	-0.0208
	(-0.34)	(-0.42)
year== 1992	0.000321	-0.000609
	(0.03)	(-0.05)
year== 1993	0.00918	0.00847
	(0.72)	(0.66)
year== 1994	0.00799	0.00715
	(0.63)	(0.56)
year== 1995	0.00569	0.00491
	(0.45)	(0.38)
year== 1996	0.0214	0.0187
	(1.69)	(1.45)
year== 1997	0.00465	0.00389
	(0.37)	(0.31)
year== 1998	-0.000660	-0.00152
	(-0.05)	(-0.12)
year== 1999	0.00268	0.00184
	(0.21)	(0.14)
year== 2000	0.0125	0.0118
	(0.99)	(0.93)
year== 2001	-0.00204	-0.00387
	(-0.16)	(-0.30)
year== 2002	0.00880	0.00720
	(0.69)	(0.56)
year== 2003	0.00486	0.00462
	(0.38)	(0.36)

year== 2004	0.0231	0.0235
	(1.81)	(1.83)
year== 2005	0.00992	0.00989
	(0.78)	(0.77)
year== 2006	0.0162	0.0167
	(1.27)	(1.30)
year== 2007	0.0145	0.0150
	(1.14)	(1.18)
year== 2008	0.000357	0.000270
	(0.03)	(0.02)
year== 2009	0.00549	0.00609
	(0.43)	(0.48)
year== 2010	0.0206	0.0205
	(1.61)	(1.60)
year== 2011	0.0174	0.0167
	(1.36)	(1.30)
year== 2012	0.0190	0.0186
	(1.49)	(1.46)
year== 2013	0.0202	0.0206
	(1.59)	(1.60)
year== 2014	0.00907	0.00964
	(0.71)	(0.75)
L.Market Legitimising		-0.000941
		(-0.61)
L.Market Creating		0.00166
		(0.96)
L.Market Stabilising		-0.000831
		(-0.47)
L.Market Regulating		-0.000180
		(-0.11)
Constant	-0.0159	-0.0155
	(-1.65)	(-1.60)
N	408	408

t statistics in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$