FINANCIAL SECTOR DEVELOPMENT AND ECONOMIC GROWTH NEXUS:

AN EMPIRICAL ANALYSIS OF PACIFIC MELANESIAN COUNTRIES

SOLOMON AWILI

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FINANCIAL SECTOR DEVELOPMENT AND ECONOMIC GROWTH NEXUS:

An Empirical Analysis of Pacific Melanesian Countries

A Dissertation submitted by

Solomon Awili

MFin, BEc, Dip.Acct

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Signed,

Solomon Awili
…….

27 February, 2015
…….

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ABSTRACT

The main objective of this thesis was to examine the relationship between financial development[1] (FD) (measured by financial indicators) and economic growth (proxied by real per capita GDP) for Melanesian Spearhead Group (MSG) countries in the Pacific namely, Papua New Guinea (PNG), Fiji, Solomon Islands and Vanuatu. The empirical analysis uses annual time series data for the period 1976 to 2010. The random effects (REs) with general-to-specific (GS) sequential modelling procedure for panel data and the vector error correction model (VECM) for time series data with accompanying econometric tests of unit root and cointegration were employed. This study was motivated by the lack of information on the topic in MSG countries and the MSG countries' recent attempts towards increased trade and integration among themselves and in the region. The use of four commonly used financial indicators to determine whether FD induced growth, or vice versa, plus the concurrent use of panel and time series models are unique to this study.

To test the validities of the hypotheses framed in Chapter 1, this study draws upon the endogenous growth theory (EGT) and financial intermediary theories. In the absence of a standard conceptual model, a model for the link between FD and growth has been developed for this thesis. Though it is claimed that studies on the finance-growth nexus are important to guide economic policy formulation there is no evidence to support or refute this when applied to MSG countries. This study has three main aims: (1) to investigate the extent of the contributions of the financial system to growth, or vice versa; (2) to determine factors that cause changes in the financial sector and the real economy; and (3) to develop knowledge that can support evidence-based policy formulation, institutional reforms and resource prioritisation, as the more efficient an economy is in allocating resources the greater its contribution to productivity and growth. This study, like previous studies, does not attempt to resolve the issue of determinants of FD and economic growth. Nonetheless, the dissertation does attempt to shed light on whether financial sector development influence growth, or vice versa, in MSG economies.

[1] The definition of key terms such as FD and economic growth are given in Appendix 2.

There are several substantial reasons for conducting this study: (1) to use new country-region specific data to fill the gap in research; (2) to extend the literature on FD and growth; (3) to contribute to knowledge about MSG economies; and (4) to generate evidence to guide policy formulation and resource allocation.

Empirical results showed that FD had a significantly positive effect on growth. This main evidence suggests that a positive finance-growth relationship is present in MSG economies. For PNG the Granger-causality test results revealed the presence of uni-directional causality with causality running from FD to growth. This implies that developments during the reviewed period positively influenced financial sector performance in the MSG countries. This in turn provided strong stimulus for the growth process in the countries studied. There is also evidence to conclude that growth in the prior period had a significant impact on current growth rates of the MSG economies. Additionally, as other variables such as trade, gross capital investment and inflation also had a significant effect on growth, it seems that a well-functioning financial system is a necessary, but not a sufficient condition to reach steady growth in the MSG countries. However, the *finance-leading growth hypothesis* was supported by the data. This main finding is consistent with the dominant assumption in the finance-growth nexus literature that FD induces growth.

Finally, as the finding of a positively significant association between FD and growth suggests that FD is one of the policy variables that determine growth in the MSG countries, policy makers, regulators, governments and development partners need to undertake essential measures to deepen the financial sector to strengthen economic growth in the long-term. Several primary and secondary measures related to financial sector deepening in terms of: how to grow the banking and non-bank sectors; improving financial infrastructure; improving the informal sector; adoption of technology; financial integration; and financial education to support the growth of the financial sectors are identified and proposed. This would in turn induce positive growth leading to improvements in key socio-economic indicators such as reduction in income inequality.

The absence of empirically supported and theoretically sound policy advice that contributes to ineffective policy formulation, which in turn may have resulted in

inefficient resource allocation and utilisation with adverse effects on overall economic progress, is now challenged. The implications for policy and theory, the study's contributions, limitations encountered in this study, plus avenues for future research are identified and proposed.

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LIST OF ABBREVIATIONS

ABBREVIATIONS	EXPLANATION
ACP	African, Caribbean and Pacific
AD	Anno Domini
ADB	Asian Development Bank
ADF	Augmented Dickey Fuller
ADIs	Authorised deposit taking institutions
AFC	Asian Financial Crisis
AFI	Alliance for Financial Inclusion
AIC	Akaike Information Criterion
AID	Aid assistance
AK model	Endogenous growth model
APRA	Australian Prudential Regulatory Authority
AR	Autoregressive
ARB	Australian Reserve Bank
ASIC	Australian Securities and Investment Commission
ATM	Automatic telling machine
AusAID	Australian Agency for International Development
BCL	Bougainville Copper Limited
BFIA	Banks and Financial Institutions Act
BOB	Bank of Baroda
BOP	Balance of payment
BPNG	Bank of Papua New Guinea
BSP	Bank South Pacific
CBSI	Central Bank of Solomon Islands
CCR	Comprehensive Credit Report
CDOs	Collateral debt obligations
CEs	Cointegrated equations
CEFI	Centre for Excellence in Financial Inclusion
CME	Coordinated market economy
CPI	Consumer Price Index
DCP	Domestic credit to private credit to GDP
DF	Dickey Fuller

DGP	Data generating process
EAP	East Asia Pacific
ECM	Error correction model
ECTs	Error correction terms
EFTPOS	Electronic funds transfer at point of sale
EGM	Endogenous growth model
EGT	Endogenous growth theory
EU	European Union
FD	Financial development
FDI	Foreign direct investment
FEs	Fixed effects
FEA	Forward exchange agreements
FGLS	Feasible generalised least squares
FIs	Financial intermediaries or Financial institutions
FJD	Fiji dollar
FRA	Forward rate agreement
FSD	Financial system deposit to GDP
FSM	Federated States of Micronesia
FSD	Financial system deposit
GCAP	Gross capital formation
GDP	Gross domestic product
GFC	Global financial crisis
GL	Generalised linear regressions
GMM	Generalised methods of moments
GOV	Government spending
GTS	Generic-to-specific
ICT	Informal communication and technology
IEA	Informal Economy Act
IMF	International Monetary Fund
IMR	Infant mortality rate
IPBC	Independent Public Business Corporation
IPS test	Im, Pesaran and Shin test
INF	Inflation
II	Informal investment
ISDCA	Informal Sector Development and Control Act

IS	Informal Savings
IV	Instrument variable
JB test	Jarque Bera test
JJ test	Johansen Juselius test
LCU	Local currency unit
LDCs	Less developing countries
LE	Life expectancy
LFP rate	Labour force participation rates
LLC	Levin, Lin and Chu
LL	Liquid liabilities to GDP
LM test	Lagrangian Multiplier test
LME	Liberal market economy
LMICs	Lower middle income countries
LR	Likelihood ratio
MC School	McKinnon-Shaw School
MFIs	Microfinancial institutions
MRW	Mankiw, Romer and Weil
MSG	Melanesian Spearhead Group
NASFUND	National Superannuation Fund Limited
NBFIs	Non-bank financial institutions
NCGM	Neoclassical growth model
NPV	Net present value
NSO	National Statistical Office
ODA	Overseas development assistance
OECD	Organisation for Economic Cooperation and Development
OLS	Ordinary least squares
OTC	Over-the-counter
PC	Private credit
PCSEs	Panel corrected standard errors
PFIP	Pacific Financial Inclusion Program
PICs	Pacific island countries
PICTA	Pacific Island Countries Trade Agreement
PIF	Pacific Island Forum
PIFS	Pacific Island Forum Secretariat
PIWG	Pacific Islands Financial Inclusion Group

PNG	Papua New Guinea
PNGBC	Papua New Guinea Banking Corporation
PNGK	PNG Kina
POMSoX	Port Moresby Stock Exchange
PPP	Public private partnership
RBF	Reserve Bank of Fiji
RBV	Reserve Bank of Vanuatu
REs	Random effects
RESET	Ramsey regression specification error test
RGDPC	Real GDP per capita
RP(s)	Research problem(s)
RQ(s)	Research question(s)
S	Savings
SASP	Structural Adjustments and Stabilization Programs
SBD	Solomon Islands dollar
SDGs	Sustainable Development Goals
SCPNG	Securities Commission of PNG
S.E(s)	Standard error(s)
SMEs	Small-to-medium-enterprises
SOEs	State-owned-enterprises
SPC	South Pacific Commission
SPSE	South Pacific Stock Exchange
SURE	Seemingly unrelated regressions equation
TRAD	Trade
UN	United Nations
UNCDF	United Nations Development Programme
UNData	United Nation Data
UNESCO	United Nations Educational, Scientific and Cultural Organisation
USA	United States of America
VAR	Vector autoregressive
VECM	Vector error correction model
VUV	Vanuatu vatu
WHO	World Health Organisation
WTO	World Trade Organisation

CHAPTER ONE

INTRODUCTION AND OUTLINE OF STUDY

1.1 Introduction

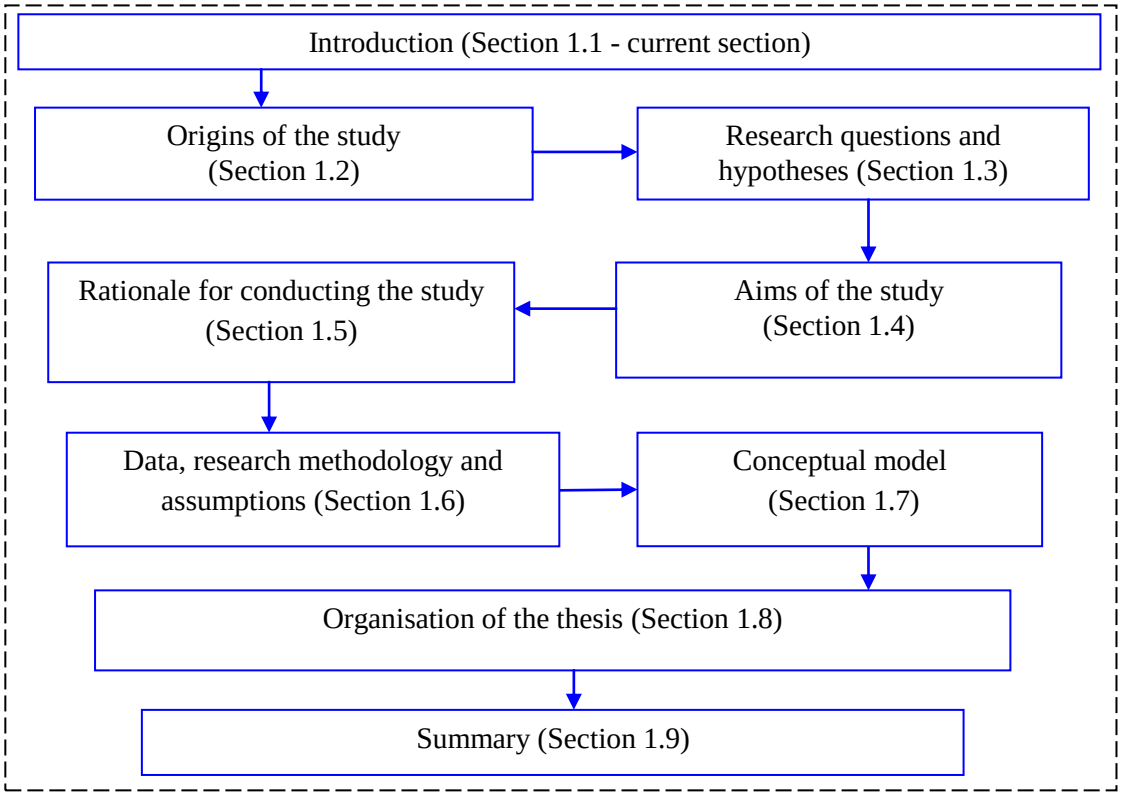
There has been growing debate about the relationship between financial sector development and the economic growth process. Specifically: does financial development (FD) have a significant causal effect on the economic growth process in the long run; does it simply follow growth in real output which is generated elsewhere; or do they (finance and economic growth) jointly influence each other? Having clearer insights into the relationship between FD and growth has three main benefits: (1) enhancing reconciliation of conflicting views and theories on the subject; (2) aiding resource prioritization (Calderon & Liu, 2003); and (3) guiding the formulation of appropriate economic policy (Levine, 1998). The second benefit is particularly noteworthy for developing countries that are structurally, i.e. economically, politically, and socially, different and comparatively underdeveloped (Shan et al., 2001). McKinnon (1973) claimed that the more efficient an economy is in generating, allocating and stabilising resources, the greater is its contribution to productivity and growth. Having deeper insights into the FD and economic growth relationship is to enable governments and policy makers to prioritize policy, resources and institutional reforms.

Until the 1990s FD was not explicitly modelled due to a lack of theoretical foundations (Eschenbach, 2004). This changed with the benchmark empirical study by King & Levine (1993) when financial intermediation was first used as a potential growth indicator (Blackburn & Hung, 1998). However, while studies on the hypothesised link between finance and growth have recently proliferated findings remain inconclusive and vary across countries and regions. This could be attributed to several factors: differences in methodology; interpretations; theory; data frequency; country coverage; sample period; and countries having a variety of financial systems at different stages of

development (Demirguc-Kunt & Levine, 2008). The size of the effect of FD on growth varies with different indictors of FD, estimation method, data frequency and the functional form of the relationship (Khan & Senhadji, 2003). A range of factors, such as those noted above, give rise to varied policy implications and differing views as explained in Chapter 2 (see Table 2.1).

Further, it is erroneous to draw statistical inferences based on cross-sectional country studies which implicitly treat different economies as homogenous entities (Demetriades & Hussein, 1996). Countries do not fall neatly into segments. The lack of similar studies on the relationship between FD and economic growth in the MSG countries on both aggregate (panel) and individual (country-specific time series) levels[2] in the reported literature motivated this study. Chapter One is organized into nine sections as illustrated in Figure 1.1.

Figure 1.1: Outline of Chapter One



[2] Fiji is an exception as two studies (mentioned in Chapter 2) on the topic exist.

1.2 Origins of the study

Though the Pacific Island Countries (PICs) are part of the East Asia Pacific (EAP) region there is little sign in the PICs of the broader economic changes that are transforming much of the EAP region. The fundamental question in economic growth that has preoccupied economists and researchers is why different economies grow at different rates (Khan & Semlali, 2000). There are many determinants are responsible for the phenomenal economic growth occurring in the EAP emerging economies and elsewhere. The empirical growth literature has purported a wide range of possible factors such as factor accumulation, macroeconomic stability, international trade, educational attainment, and institutional development. Though the list of factors continues to expand, the role of the financial sector in the growth process has begun to receive considerable attention (Khan & Semlali, 2000; Eschenbach, 2004) since the benchmark empirical work of King & Levine (1993) in the 1990s when financial intermediation was first incorporated into the endogenous growth models (EGM) as a potential growth inducing factor (Blackburn & Hung, 1998). This implies that theoretical and empirical work in this area of research is still very much in progress, especially in relation to developing countries.

In the Pacific Islands many countries experienced favourable political and socio-economic conditions immediately after gaining their respective political independence mainly in the 1970s. For instance, as will be shown in Chapter 3[3], after a smooth transition to political independence from Australia in 1975, PNG experienced a period of macroeconomic stability coupled with generally good external relations until the 1980s (May, 2004). Nonetheless, besides the severe impact of the second world oil price increases and subsequent global recession during the 1980s the MSG economies also encountered several adverse developments between the mid-1980s to the late 1990s triggered by the difficult financial and socio-economic circumstances.

Despite several changes of government by votes of no confidence motions, or by elections in the MSG countries over the last three decades, none of the governments introduced any major economic reforms. This is in contrast to other countries such as Japan in the 1990s, which introduced major reforms to correct perceived structural

[3] Chapter 3 complements this chapter by analysing the financial and socio-economic developments of the MSG economies.

imbalances when they encountered financial crises. According to Hughes (2003, p.18) "Pacific governments deny that they have serious economic and social problems. They do not indicate any intention of reforming their economies". Fiji, however, is a notable exception as it introduced minor financial sector reform programs in the form of quantitative restrictions such as fixing credit limits (Jayaraman & Choong, 2009).

After realizing the need for national policy reforms, the governments of the small developing Pacific countries introduced several minor market-oriented economic reforms. For instance, PNG, Vanuatu and the Solomon Islands initiated brief economic, financial sector, public sector and governance reforms in the late 1990s and early 2000s while Fiji discontinued quantitative restrictions. The international financial institutions (FIs), - notably the International Monetary Fund (IMF) and the World Bank - backed the initial formulation and implementation of the restructuring programs with technical, advisory and funding support. Their support for implementation of the reforms was primarily aimed at achieving their own desired objectives: sustained growth; a viable balance of payments (BOP) position (or external balance); and low levels of inflation (Gani, 1996).

Initially, the orthodox market friendly-reforms were met with widespread public protests. In PNG, for example, these protests primarily targeted the IMF and World Bank sponsored austerity measures termed Structural Adjustments and Stabilization Programs (SASP). Austerity measures emerged in the form of conditionalities such as the "user-pay" concept, where fees are charged for the use of public services such as health and education, to pay for the concessional lending to bail-out the ailing economies. In the aftermath of the 2008 global financial crisis (GFC), Eurozone countries that faced a debt crisis similarly adopted tough austerity measures too. Increasing voter backlash against the harsh fiscal austerity measures saw the replacement of a number of governments in countries such as Greece.

Though the magnitude of the problems differed, a similar situation prevailed during the height of the GFC in the European Union (EU) member counties such as Portugal, Ireland, Italy, Greece and Spain. For instance, massive civil protests were staged against their governments' adoption of unpopular tough austerity measures such as privatization, tax administration reforms, bank recapitalization and public sector

downsizing, all of which were claimed to be necessary to avert the possible collapse of their economies due to heavy sovereign debt burdens. As GFC adversely affected the economic growth rates of many countries around the world, in this study its effects on MSG countries are controlled by a dummy variable *(D2[4])*.

The prevailing financial and socio-economic developments in the MSG economies for the period examined will be detailed in Chapter 3. These developments, both internally (such as minor reforms) and externally (such as the GFC), may have impacted: (1) the MSG countries' financial sector performances and real economic growth rates; and (2) the nature and dynamics of the relationship (if any) between finance and economic growth performance. While a study by Gani (1998) investigates the macroeconomic determinants of growth using panel data for seven PICs, which also includes the MSG economies for the period 1980 to 1992, no attempt has been made to date (to the best of the author's knowledge and with the exception of Fiji) to systematically investigate the impact of all these changes on the financial sector and real economic growth and the causal effects (if any) between FD and economic growth in the MSG economies on an aggregate level or on an individual level.

1.3 Research questions and hypotheses

This study intends to fill the gap in knowledge for the MSG economies from both the panel and country-specific time series perspectives. This is accomplished by addressing two fundamental research questions (RQs), sub-sets of research questions (sub-RQs) and the corresponding testable hypotheses (H0s) that are formulated based on the extant finance-growth nexus literature.

Research questions

RQ 1: To what extent did financial sector development (as proxied by FSD, LLY, PC and DCP) induce economic growth (as measured by the change in real per capita GDP) in the MSG countries over the period 1976-2010?

RQ 2: To what extent did financial sector development influence economic growth process in PNG over the period 1976 to 2010, Or vice versa?[5]

[4] Dummy variables and the variables used in this study are discussed in Chapter 2 (Section 2.8).
[5] This is to test Granger-causality between FD and economic growth.

RQ 1 is empirically tested in Chapter 5 using panel datasets for MSG countries and RQ 2 is tested in Chapter 6 using time series datasets for PNG. To address the RQs the following sub-RQs are framed to address region and country specific factors affecting the development of financial services sector and economic growth of MSG countries.

Firstly, on the basis of RQ 1 the following sub-RQ is framed:

Sub-RQ 1.1: What financial and nonfinancial factors influenced financial sector development in MSG countries over the period 1976 to 2010?

Secondly, the following three sub-sets of RQs are formulated on the basis of RQ 2:

Sub-RQ 2.1: What financial and non-financial factors contributed to financial sector development in PNG over the period 1976 to 2010?

Sub-RQ 2.2: What financial and non-financial factors contributed to economic growth in PNG over the period 1976 to 2010?

Sub-RQ 2.3: Is there a causal link between financial sector development and economic growth in PNG?

Sub-RQ 1.1 is tested in Chapter 5 and the three sub-RQs related to RQ 2 are tested in Chapter 6. The econometric approaches and frameworks behind these empirical tests are discussed in Chapter 4. The testable hypotheses that the sub-RQs are based on are developed next.

Hypothesis development

Developments that transpired during the period 1976 to 2010 are reviewed in Chapter 3. These developments may have both directly and indirectly influenced the performance of the financial system through the effects of its major components: banks; non-banks; and capital markets. The overall financial sector performance may in turn have induced real economic growth performance, or vice versa[6]. Thus, the proposition that FD should have positive repercussions on the development of the real sector, or vice versa, must not be taken for granted; rather, its validity needs to be theoretically examined and empirically tested within specific cases (Ang, 2008; Odedokun, 1996). This led to the formulation of two testable hypotheses $H0_1$ and $H0_2$ outlined below.

[6] The different views on finance-growth nexus are summarized in Chapter 2 (refer Table 2.1).

$H0_1$: Financial sector development (as measured by FSD, LLY, PC and *DCP) may have induced the economic growth process (as measured by the change in real per capita GDP) in MSG countries over the period 1976-2010.*

$H0_1$, which relates to RQ 1, is tested in Chapter 5. It is consistent with early literature that did not address the hypothesized causality between finance and growth, but only assumed that FD causes growth and is widely tested using panel datasets. However, as will be seen Chapter 2, analysing the causality patterns between FD and economic growth interest in single-country time series studies has surged in recent years. In line with this trend $H0_2$, which is tested in Chapter 6, is proposed to test the hypothesized causal relationship between FD and economic growth i.e. *the bi-directional causality hypothesis.*

$H0_2$: Financial sector development (as measured by FSD, LLY, PC and DCP) may have induced the process of economic growth (as measured by the change in real per capita GDP) in PNG over the period 1976-2010; or vice versa, i.e. the process of economic growth (as measured by the change in real per capita GDP) may have induced financial sector development (as measured by FSD, LLY, PC and DCP) in PNG over the period 1976-2010.

The rationale behind the development of the two testable hypotheses based on theory and empirics is discussed in Chapter 2 (Section 2.7). The empirical investigation to test the validity of the hypotheses is not only necessary, but warranted as it has important implications for policy formulation and resource prioritisation especially in underdeveloped economies.

1.4 Aims of the study

While the overarching aim of this study is to empirically investigate the relationship between FD and economic growth in MSG countries over the period 1976 to 2010, the study aims to achieve the following five specific objectives:

(1) investigate the extent of the contributions of the financial system on economic growth or vice versa;

(2) determine the factors that may have caused changes in the financial sector and the real economy during the studied period;

(3) develop an understanding of the nature of the causal relationship between finance and growth;

(4) support evidence-based policy formulation and resource prioritisation, as this would promote inclusive financial development and sustainable economic growth; and

(5) provide a platform for further research on the subject and related areas specifically in MSG economies and generally within the wider Pacific region.

1.5 Rationale for undertaking the study

There are several substantial reasons for conducting this study.

Firstly, there is no similar study on both aggregate (panel) and individual (country-specific time series) levels in the reported literature in the context of MSG countries.

Secondly, a better understanding of the potential factors that influence FD and economic growth could provide knowledge and new insights to guide future economic policy formulation (Levine, 2003). Many developing countries lack evidence and theoretical backing to support the formulation of economic growth and FD promoting reforms and strategies. Evidence-backed policy formulation would ensure that the sector (either finance or real) that could stimulate and sustain real growth is effectively funded and appropriately guided in terms of policy attention to realize its full potential. The adoption of sound economic policy choices that are theoretically rooted and supported by evidence would help facilitate the efficient channelling of society's scarce economic resources (i.e. land, skilled labour, capital and entrepreneurial ability, and technology) to the most productive uses thereby fostering long-term economic growth. Consequently, this could lead to the creation of better economic opportunities such as employment creation, increased business opportunities and improved health and education services.

Hence, a more resilient, flexible and competitive economy with sustainably rising per capita income, *ceteris paribus*[7], could further induce positive effects on key socio-economic indicators such as improvements in life expectancy[8]. Such improved socio-economic outcomes could in turn induce enhancements to the quality of life for the vast majority of the population particularly the poor, marginalized, uneducated and the geographically isolated people in many parts of the Pacific. In the process, poverty would be reduced and the widening income inequality so common in these developing countries would be narrowed with enhancements to social safety nets.

Thirdly, as the MSG economies have witnessed the entry of new competitive foreign businesses into their key sectors (e.g. financial services) due to the adoption of more outward looking policy initiatives[9] insights from this study may stimulate further research into the various dimensions of the topic and contribute to building research capacity in the MSG countries. Open informed public policy discussions (in academia, politics, bureaucracies and the media) on development strategies are useful for policy makers to take informed policy action to bring about positive change in the economic development process. To date such well-informed open policy debates and research capacity to support policy change do not exist throughout the Pacific (Hughes, 2003). This is because formulating economic policies supported by research is an important feature of designing effective governance, sound structural frameworks and appropriate development strategies (Levine, 2003).

Further, this study would in general contribute to the growing body of knowledge on financial development and economic growth processes not only in the specific context of MSG countries, but in the broader context of the Pacific. The understanding of various competing economic growth and financial theories will also be helpful in policy design and intervention to support the growth of the real economy.

Finally, the presentation and availability of this study's findings to the public via common mediums (such as public seminars and workshops) would raise awareness on

[7]Assuming growth reducing factors such as corruption, which is so rampant in developing economies, remain fixed as they remain an obstacle to achieving much needed progress.
[8] A number of financial and socio-economic developments and issues are discussed in Chapter 3.
[9] MSG countries as members of the World Trade Organisation (WTO) have in recent years opened up key sectors such as the financial services sector.

areas that may need to be addressed by relevant government policies and research. In the process, financial literacy and curriculum development may be promoted because issues such as: financial education; financial inclusion; and consumer protection to support the growth of a well-diversified financial sector and inclusive economic growth in the Pacific, remain critical development challenges.

Given the significance of this study's potential contributions, this country-region specific study is not only necessary but warranted.

1.6 Data, research methodology and assumptions

The dataset, empirical methodologies employed for the estimations, basic assumptions and definition of terms for this study are covered here.

(a) Data description: panel and time series datasets

The lack of consistent and quality empirical data for the Pacific region is a significant barrier to evidence-based policy formulation. The absence of fully functioning data repository facilities further compounds this problem which affects effective planning and cost effective resource allocation (Batten, 2010). According to Hughes (2003), a number of factors are responsible for the weak, poor or non-existence of data in the Pacific: under-resourcing; lack of value placed on data; and inadequate coordination domestically among key players and externally with donor agencies and international bodies. Browsing of the official websites of relevant local data sources of the MSG countries and visits to data sources, especially in PNG[10], confirmed this observation.

Given the lack of data, this study relied on three main external reliable database providers, namely United Nation Data (UNData), World Bank and International Monetary Fund (IMF), for the 34-year period analysed. The data gathered from these dependable sources ensured the reliability, comparability and strength of the data. The gathered datasets are given in Appendix 1. The operational definitions of the variables of interest along with their measurements, plus the expected effects of the variables relative to the dependent variable (growth) are described in Chapter 2.

[10] Three key data sources in PNG are: Bank of PNG (BPNG); National Statistical Office (NSO); and the Departments of Finance and Treasury.

Based on the assembled annual time series datasets two different properties of the data were derived: panel and time series datasets. According to Kennedy, (2008), panel data[11] have repeated observations on the same set of cross-section units (such as firms, individuals and countries) in several different time periods[12]. As a typical panel dataset has a cross-section variable and a time series variable (Park, 2011) it brings in information from two dimensions to permit analysis that would otherwise be impossible with time series or cross-sectional data alone. For this study four countries *(N)* are included in the panel. This results in a total of 140 country-year observations *(NT)* for the 34-year period *(T)* from 1976 to 2010. This shows that panel data combines cross-sectional data on *N* spatial units (for this study *N* is countries) and time periods *(T)* to produce a dataset of *NT* observations.

In addition, panel data also need to be contrasted to cross-sectional data as the later refers to data for cross-section units at a particular point-in-time. For panel data a limited number of units are observed over a relatively long time period of about 20-50 years. This according to Stimson (1985) could be conceptualized as "temporally dominated". The panel dataset used in this study is therefore temporally dominated. Panel models make more information available, resulting in the production of more degrees of freedom with more efficiency. Consequently, a large number of the growth studies that focus on developing countries are panel in nature (Barro, 1991).

On the other hand, Beck (2001) asserts that a time series is a sequence of data points measured typically at successive points in time, spaced at uniform time intervals. One of the key aims of this study is to examine the determinants of the long-run steady state growth with time series observations, because time series dataset plays a crucial role in providing dynamic information. It is important to note that the question of whether to use annual data or five-or ten-year averages to avoid the effects of business cycles remains largely unsettled (Temple, 1999). Thus, to accommodate business cycle effects annual data series with lags of the independent and explanatory variables are included in regressions. Though theoretically this sounds feasible, in reality any structural

[11] Panel data is also referred to as longitudinal or pooled cross-sectional time series data (Park, 2011). See Baltagi (2005) for a comprehensive list of benefits and pitfalls of panel data.

[12] The notation *'t'* for time period in years is also given by *'T'* and *'n'* for sample or entity is also given by *'N' or 'i'*. Observations are indexed by both unit *(i)* and time *(t)* subscripts where $i = 1, 2 \ldots N$ and $t = 1, 2 \ldots T$ throughout.

adjustment effects may not be fully captured by the variables or proxies used. Nevertheless, for this study, the assembled data gives sufficient degrees of freedom to execute the required statistical analyses.

Two statistical data analysis software programs were used to analyse the datasets: (1) the *Stata*[13] and (2) *Eviews*. Though both programs are capable of performing the required statistical analyses, the former was used to analyse panel datasets and the latter for the time series datasets. The gaps in research on the finance-growth nexus in the context of MSG countries, as well as PNG, are addressed by undertaking both panel and time series analyses concurrently. It is expected that the estimates would be robust as there are no gaps in the data series, which would lead to valid statistical conclusions.

(b) Empirical methodology

To test the validities of the proposed hypotheses this study relied on the theoretical endogenous growth model (EGM) proposed by Mankiw-Romer-Weil (1992) (henceforth MRW). The MRW framework, together with the methodology used, is presented in Chapter 4. The MRW framework basically shows how to significantly improve the explanatory power of a neoclassical growth model by augmenting its production function with appropriate shift variables like human capital (Rao, 2010). The MRW framework is considered an appropriate benchmark specification for growth empirics due to its impressive success in growth studies. In Chapter 4, after starting with a parsimonious specification of the growth equation in the form of the AK EGM, extended models are further developed and incorporated into the econometric specifications for estimation purposes.

The extended model is subsequently incorporated into an estimable econometric specification of both time series and its panel version. This is because the two general econometric methodologies that empirical studies in growth-finance nexus apply are: (1) panel; and (2) the time series modelling approaches (Shan & Jianhong, 2006). These two approaches depend on whether the type of data employed is pure cross-country, panel or time series. Growth equations in the style of Barro (1991) are typically employed in the pure cross-country and panel analyses, while time series analyses

[13] *Stata*/SE 12 version was used to analyse the panel datasets.

mainly adopt a vector autoregressive (VAR) framework or an error correction model (ECM) (Ang, 2008).

More specifically, the random effects (REs) model with general-to-specific (GS) sequential modelling procedure will be applied with panel corrected standard errors (PCSEs) as the estimator in Chapter 5 to test the validity of $H0_1$ using the panel property of the dataset. Conversely, the multivariate time series technique of vector error correction (VECM) with Granger-causality or VAR, depending on the outcome of co-integration test[14], will be applied in Chapter 6 to test the validity of $H0_2$ using the time series property of the dataset. The use of two econometric approaches in one single study makes this study unique. This study starts with parsimonious specifications and moves on to more comprehensive specifications. As detailed in Chapter 4, the EGM and MRW framework, in the form of a Cobb-Douglas long-run equilibrium production function with the variables of interest, are integrated into the two econometric methodologies (i.e. time series and its panel version) for estimation purposes. Equations (1) to (43) in Chapter 4 capture the above methodological sequences quantitatively. The flowchart of the methodology is given in Figure 1.2.

(c) Basic assumptions

As the field under consideration is large and diverse it is impossible to include all the factors and issues that may have some bearing on FD and economic growth into a single study such as the current study. Therefore, to narrow the scope, studies rely on assumptions. For this study, a number of assumptions have been identified[15]:

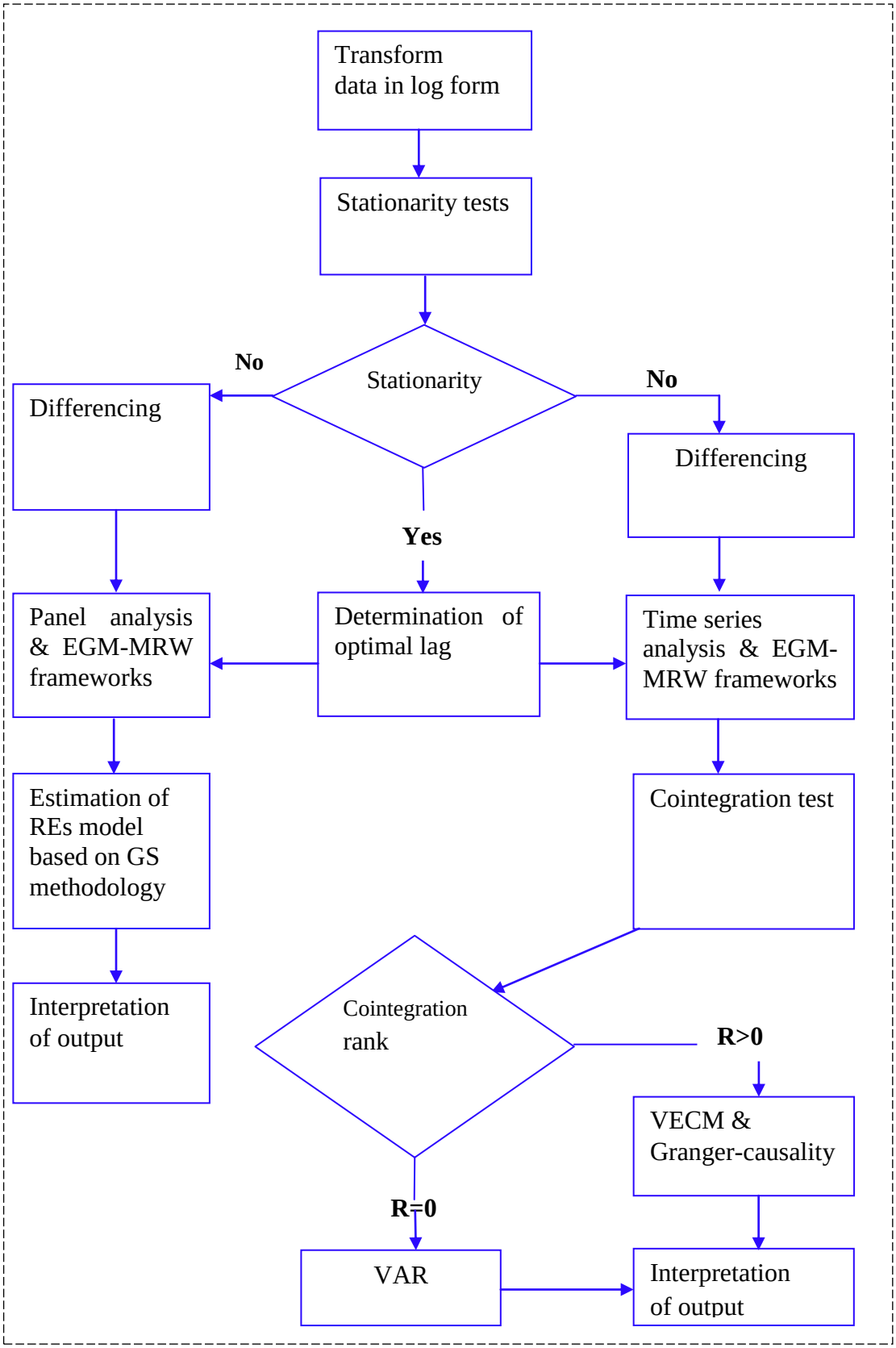
Monetary policy effects

The effects of monetary policy, for instance, due to increases or decreases in interest rates by the central banks or their equivalent authorities in the countries studied that has the effect of either discouraging or encouraging borrowing and spending, is assumed to be captured by the four sets of financial indicators used in this study.

[14] Cointegration test will be implemented in Chapter 6.

[15] The assumptions underpinning the conceptual framework, the theoretical model and the empirical specifications of this study are highlighted where appropriate in Chapters 2, 3 and 4.

Figure 1.2: Flowchart of methodology: Panel and time series analyses



Source: Adapted from Achsani et al., (2013, p.38) with modifications by the Author.

Effects of omitted variables

The effects of omitted variables and sectors of the broader economy on the real economy are assumed to be captured by the annual real per capita GDP growth rates.

Independence between real and financial markets

Given that analytical difficulty exists in reconciling the financial and real markets, the link between the two is assumed to be interdependent. It is thus assumed that the effects of financial markets in MSG economies are captured by indicators of FD while the effects of the real market are captured by the growth measure i.e. real per capita GDP. The interdependence between real and financial markets is captured in the conceptual model developed for this study.

Financial indicators capture the effects of the interaction of the financial sector

The four financial measures employed here are assumed to capture the effects of the interaction of the components i.e. financial intermediaries (FIs), financial markets and products, as well as the market participants of the financial sector, as there is deep interaction amongst them.

Free market model

This study argues that the notion of a free market model, such as that of an Arrow-Debreu world of a perfectly competitive market, exists only in theory due to the presence of market frictions and structural rigidities in prices, wages/income, interest rates and exchange rates in the real world.

(d) Definition of key terms

To forestall any confusion associated with not clearly defining the terminologies used in this study (as many of the terms are used with different meanings by different authors) the definitions of key words and concepts which are close to standard usage have been chosen and are provided in Appendix 2.

1.7 Conceptual model

Since the reviewed literature has no generally accepted, consensual conceptual framework on the finance-growth nexus issue, one has been developed for this study in Chapter 4 (Figure 4.1). In developing the framework, the structural layout of a typical

dual economy of the type common in economies of many developing countries, where the subsistence informal economy operates side-by-side with the formal monetised economy, is incorporated. This results in the modification of the conventional full five-sector circular flow income model to produce a six-sector model. The hypothesized causal relation between FD and economic growth is also captured in this framework. As the basic framework of the Keynesian macro model is static in nature (Laidler, 1968) it is modified with the object of developing a dynamic framework that attempts to simplify the complex association between the real economy and the financial sector.

1.8 Organisation of the thesis

The structure of this seven chapter dissertation is outlined here.

This chapter (Chapter 1) introduced the origins of the study, its aims and the rationale for conducting the research. These include the empirical investigation of the relationship between FD and economic growth in MSG countries over the period 1976 to 2010, primarily to provide a sound basis for evidence-based policy formulation. Two research questions (RQs) were posed, along with sub-RQs and two testable hypotheses (H0s). The data, methodology, key assumptions and the conceptual model were also outlined. Prior to summarising the chapter an outline of the organisation of the thesis was presented (in this section).

The next chapter (Chapter 2) reviews and synthesises the existing theoretical and empirical literature on the topic, commencing with a review of the genesis of the finance-growth nexus, followed by reviews of theoretical and empirical studies, finance-growth theories and models, and concluding with the MSG literature. The literature gap was then identified. The rationale for framing H0s and commonly used variables and their expected signs were presented. The two main methodological approaches i.e. growth accounting and regressions, were described and compared before the chapter was summarised.

Chapter 3 discusses the financial and socio-economic developments in the MSG economies. While the key characteristics of the MSG countries are explored, more attention is placed on the analyses of the financial and economic structures of MSG economies. In the discussions PNG is used as a reference point because it is used in

both the panel and time series analysis. A general review of the Pacific region, background to the PNG political economy, a discussion on the Solomon Islands economy, a discussion on the Fijian economy, a discussion of the Vanuatu economy, an analysis of the Australian economy, and an examination of the New Zealand economy constitute the rest of the chapter. The chapter ends with a summary.

Chapter 4 presents the theoretical and methodological frameworks underpinning this study. More specifically, the endogenous growth framework, the panel and time series approaches and the frameworks for unit root, cointegration and Granger-causality tests are analysed. The econometric process of how the theoretical framework is incorporated into the methodologies for estimation is explained in detail with the use of equations. The construction of the conceptual framework for this study forms a major component of this chapter.

Chapter 5 relates to panel data analysis. The chapter is made up of six sections: introduction; descriptive statistics; provision of detailed information on the data sources; discussion of the empirical results; analysis of findings for each of the three sub-RQs; and ends with a summary of the chapter.

Chapter 6 analyses the time series data sets. The chapter constitutes the following five sections: introduction of the chapter, rationale for the test of Granger-causality, basic descriptive statistics on time series dataset, testing the properties of the dataset, diagnostic tests on VECM, analysis of VECM estimations and Granger-causality and ends with a summary of the chapter.

The final chapter (Chapter 7) summarises the empirical findings related to RQs, sub-RQs and HOs and presents the implications in terms of policy and theory by drawing on the materials in Chapters 5 and 6. Contributions of the study to literature and theories are identified. Finally, the limitation of the study and potential direction for future research are presented and ends with a summary of the chapter.

1.9 Summary

Chapter 1 has laid the groundwork for this research. While examining the origins of this study, it became clear that both theoretical and empirical work on the finance-growth

nexus is still very much in progress especially in developing countries. Though many financial and economic developments occurred in the MSG economies over the last three decades, their impact on financial sector development and real economic growth rates have not been empirically investigated on both aggregate (panel) and individual (country-specific time series). To fill in the research gaps, fundamental RQs, sub-sets of RQs and testable H0s were developed and explained. Thus, the overarching aim of this study is to empirically investigate the relationship between FD and economic growth in MSG countries over the period 1976 to 2010. One of the key reasons for conducting this study is to facilitate evidence-based policy formulation.

The properties of the gathered annual time series data i.e. time series and panel together with the empirical approaches employed to analyse the datasets were described. Figure 1.2 provided the flowchart of methodology. One of the key contributions to the literature is the development of a finance-growth conceptual model, which will be developed in Chapter 4. The relegation of definition of key terms to Appendix 2 was explained. Prior to concluding the chapter the study's outline was presented. The next chapter will review the extant literature on finance-growth nexus.

CHAPTER TWO

LITERATURE REVIEW – THEORY AND EVIDENCE

2.1 Introduction

Chapter 1 provided the overall context for this study and highlights the RQs and hypotheses while justifying the importance and scope of the study. The aim of this chapter is to review and synthesize the current state of both theoretical and empirical research and existing knowledge relevant to the RQs. The rest of the chapter is structured as follows. Section 2.2 describes the genesis of the finance-growth nexus issue. Section 2.3 reviews previous studies starting with the theoretical research followed by analysis of the empirical component. Economic growth theories and financial intermediaries are explored in Section 2.4. The literature on limited finance-growth related to MSG economies is examined in Section 2.5. Gaps in the extant literature are identified in Section 2.6 and the rationale for framing the hypotheses in Chapter 1 are further explained in Section 2.7. Though many possible determinants of FD and growth are used in the literature several commonly used variables considered for this study and their expected effects, i.e. positive or negative signs relative to the independent variable (growth), are described in Section 2.8. Panel and time series methodologies used in this study are featured in Section 2.9. The chapter is summarised in Section 2.10.

2.2 The Genesis of the finance-growth nexus issue

The finance and growth relationship is analogous to a puzzle under construction. The initial pieces of the conundrum can be traced back to the first public debate on free banking in Rome in 33 AD and to the rise of mercantilism[16] in England in the 17th and 18th centuries (Arestis & Sawyer, 2005). This was followed by French Physiocracy in the 18th century. Physiocrats identified themselves as pioneers of orthodox classical economic theory and held the view that the economy should be

[16] Mercantilism refers to the system of political economy that strives to build a powerful and wealthy nation to achieve economic nationalism (Baysinger et al., 1980).

left alone to follow its own inherent laws without interference from government (Aspromourgos, 2013). The outgrowth of Physiocrats work has since been termed by Adam Smith as "laissez-faire" - the idea that the economy should be allowed to operate with very little or no government intervention. Thus, the notion of laissez-faire is heavily dependent on the classical theory.

Dubbed the "father of modern economics", Smith introduced the notions of division of labor and the 'invisible hand of the market' metaphor in the 19th and early 20th centuries (Koppl, 1992). The invisible hand metaphor in the context of the neo-classical free market argument means that invisible market forces would counter private individuals' selfishness through competition in the market to bring about the most efficient use of economic resources (Eisler, 2007). For instance, the Arrow-Debreu world of perfect capital markets is based on the notion of 'invisible hand'. Classical theories also revolve mainly around the role of free markets to achieve, restore, or maintain full economic equilibrium (De Vroey, 2012)[17]. Shinkai (1960) states that economic equilibrium prevails under conditions of full employment with no excess capacity and no excess aggregate demand for consumption of final goods and services in an economy at a given time and price level.

Following Smith's work interest in the question of how an economy's financial system affects growth, or vice versa, surged. Bagehot (1873) is one of the early researchers on the role of finance (credit) on growth via his famous treatise *Lombard Street*. Bagehot argued that development in the financial system such as the joint-stock company, limited liability, and banking innovations in the 19th century played a critical role in igniting the Industrial Revolution in Britain (Levine, 1997). As Bagehot (1873) put it, "This efficient and instantly-ready organization gives us (England) an enormous advantage in competition with less advanced countries - less advanced, that is, in this particular respect of credit" (p.13). In other words, he claims that the financial system facilitated the mobilization of capital for "immense works" during the Industrial Revolution.

[17] Alfred Marshall (1842-1924) and Leon Walras (1834-1910) are two towering historical figures of neoclassical economic theory (Vroey, 2012).

Bagehot's views were later reinforced by other proponents like Hamilton (1781). Hamilton argued that 'banks were the happiest engines that ever were invented' for spurring economic growth (Beck et al., 2000). This was followed by Schumpeter (1912) – one of most cited pioneers in the finance-growth literature. In Schumpeter's famous *'Theory of Economic Development'* he propounds that the financial services provided by an efficient bank system were essential for stimulating technical innovation, capital accumulation, and long-run economic growth (Bangake & Eggoh, 2011; Rajan & Zingales, 2001). Levine (1997) explains that the financial services to which Schumpeter refers include: mobilization and allocation of savings; evaluation of investment projects; risk management through trading, pooling, hedging, and diversification; monitoring managers and exerting corporate control; and facilitating transactions. Schumpeter's view is referred to as the '*supply leading hypothesis'* (Patrick, 1966). The common views with their alternative names as used in the literature will be summarised in Section 2.3.

Schumpeter further argued that the bank is a principal agent in a capitalist society that provides credit funds to firms to prosper, and to consumers to purchase goods and services. He claimed that accessibility of bank credit by businesses enabled them to engage in competitive business activities such as purchasing of materials to produce real goods and services. For consumers he argued that by having relatively easy access to funding sources their purchasing power to procure goods and services is sustained and enhanced. Thus, Schumpeter opined that a lack of credit seriously stifles financial sector development and economic progress. Schumpeter's views have maintained their currency in new growth theories such as the endogenous growth theory as will be explained further in the following sections.

2.3 Review of previous studies: theoretical vs. empirical

The theoretical and empirical studies on the finance-growth nexus are reviewed in this section comprising theoretical studies in subsection 2.3.1 and empirical literature in subsection 2.3.2.

2.3.1 Theoretical research

A large body of literature on the finance-growth nexus emerged in the post-Bagehot-Schumpeter-era. Among those early influential contributors are Goldsmith (1969),

Gurley & Shaw (1955), Hicks (1969), Kuznets (1955), Patrick (1966) and Robinson (1952). They were followed by McKinnon (1973) and Shaw (1973) and their adherents (Fry, 1978; Galbis, 1977; Kapur, 1976; Lucas, 1988). An empirical benchmark study by King & Levine (1993a) using EGM models saw the revival of interest in empirical research on the subject in the 1990s. Other more recent studies (e.g. Caporale et al., 2004; Padhan, 2007; Demirhan et al., 2011, among others) has continued to add to the spike in interest in the finance-growth nexus.

Of the above-mentioned economists, Goldsmith (1969), Patrick (1966) and Robinson (1952) are some of the more notable contributors. Robinson (1952, p.86) quipped that "where enterprise leads, finance follows". This view is classified as the *demand-leading hypothesis* where *"*economic development creates demands for particular types of financial arrangements and the financial system responds automatically to these demands" (Levine, 1997, p.688). In fact, this is a counterview to the *supply-leading hypothesis* proposed by Schumpeter, which says that economic growth induces financial development.

Patrick (1966) first identified the difficulty of establishing the link between finance and growth. While building on Patrick's work, McKinnon (1988a, p.390) argued that "although a higher rate of financial growth is positively correlated with successful growth rate, Patrick's (1966) problem remains unresolved: What is the cause and what is the effect? Is finance a leading sector in economic development, or does it simply follow growth in real output which is generated elsewhere?" Goldsmith (1969) also identified the existence of the two constructs of finance and growth when on the basis of data from 35 countries between 1860 and 1963, he concluded that a rough parallelism can be observed between economic and FD.

The works of McKinnon (1973) and Shaw (1973) culminated in the McKinnon-Shaw (M-C) model. The M-C model revolves around the financial repressionist proposition which stresses the importance of interest rates to financial development (Ansari, 2002). Thus, McKinnon and Shaw advanced the concept of 'financial liberalization' in the early 1970s. The new financial liberalization paradigm provides a major new alternative approach to studying finance and economic growth (Levine, 1997) by challenging the old financial repression paradigm (Ang, 2008). The term

financial repression refers to restrictive policies that inhibited the operation of the financial sector (Wachtel, 2003). The new paradigm's views are consistent with the invisible hand of the free market argument. According to Arestis & Sawyer (2005), Mckinnon-Shaw argued that: (1) repression of financial systems, often through the banking system by the government through interest rate ceilings, directed credit programs and other restrictive measures such as high reserve requirements, impedes financial development and retards real output growth; (2) financial markets should be freed from any form of intervention mainly by the state; and (3) allocation of capital (savings) is determined efficiently by the free market through the appropriate institutional channels like banking efficiency.

The stylized facts are that financial repression impedes the growth of financial sector and the real economy. These stylized facts have emerged from the results of running numerous growth regressions[18] involving various indicators of financial development (Blackburn & Hung, 1998). For instance, negative real interest rates on domestic savings due to financial repression can drive money balances to foreign bank accounts, discourage savings and dampen credit market activity as deposit levels drop (Puri & Ritzema, 1999). Generally, the level of interest rates affects the volume of credits in the economy. More specifically, higher credit volume suggests a low cost of funds and lower credit levels suggest a higher cost of funds. Thus, there is an inverse relationship between interest rate and credit. The relationship between savings and capital accumulation is positive where higher capital accumulation necessitates more saving which can be further mobilized (Ang, 2008)[19].

Nonetheless, the neo-structuralist's who emerged in the early 1980s challenged the McKinnon-Shaw school of thought and claimed that financial liberalisation is unlikely to raise growth in the presence of curb markets or non-institutional credit markets (Ang, 2008). This was followed by other economists such as Joseph Stiglitz who have considerable reservations about the benefits of financial liberalization. For instance, Stiglitz (2000) claims that financial repressionist policies of government can reduce market failures and spur growth of the real economy. Such evidence and

[18] See, for example, Atje & Jovanovic (1993); King & Levine (1993); Levine & Renelt (1992); and Roubini & Sala-i-Martin (1992) for some recent compelling evidence

[19] This relationship between savings and capital will be further explored in Chapter 4.

views are critical in guiding policy reforms for supporting financial activity and growth enhancing initiatives. As the theoretical literature demonstrating how changes in economic activity influence the financial system has been comparatively less developed (Levine, 1997), empirical studies have surged in the last two decades.

Subsequently, another view was proposed by Lucas (1988), who dismissed finance as a "badly over-stressed' determinant of economic growth. Development economists (such as Nobel Laureate Gerald Meir) also frequently express their skepticism about the role of the financial system (Chandavarkar, 1992). Moreover, critics have substantially differing views on the subject. However, on aggregate, five common views are evident in the literature: supply-leading; demand-leading; mutual causality; no causation (Al-Yousif, 2002; Demirhan et al., 2011); and the negative view (Lucas, 1988; Mazur & Alexander, 2001). These five views and their alternative names are summarized in Table 2.1.

2.3.2 Empirical literature

As growth models superseded any possible roles of finance in the early stage of modeling growth, FD was not considered to be a possible determinant of growth. However, this has changed in recent years with the evaluation of modern theories of growth and financial intermediation taking into account some of the views proposed by the main economic theories, such as the neoclassical theory. Generally, two approaches are employed in empirical growth studies: (1) accounting; and (2) growth regressions (Barro, 1999). This study is associated with the latter approach.

Although prior studies, starting with Patrick (1966) and others (e.g. Shaw, 1973), produce empirical evidence that the rate of FD correlates with economic growth, results on the causal relationship between finance and growth, particularly for developing countries remain largely mixed in both theory and empirics (e.g. Abu-Bader & Abu-Qarn, 2008; Calderon & Liu, 2003; Demirhan et al., 2011; FitzGerald, 2007; Gupta, 1984; Hurlin & Venet, 2008; Rachdi & Mbarek, 2011)[20].

[20] See, for example, Ang (2008); Eschenbach (2004); Levine (2005); Pagano (1993); and Trew (2006) for a survey of literature on FD and economic growth.

Table 2.1: Five major views prevailing in the finance-growth literature[1]

Major views[2]	Alternative names	Main early proponents	Definition
Supply-leading view	▪ finance-led ▪ supply-following ▪ one-way causality	Hamilton (1781); Bagehot (1873); Schumpeter (1912); Goldsmith (1969); McKinnon (1973); Shaw (1973)	The proposition that FD has a positive effect on economic growth. Or economic growth follows financial development.
Demand-leading view	▪ demand-following ▪ industry-led ▪ enterprise-led ▪ growth-led ▪ one way causality	Robinson (1952); Patrick, (1966)	The proposition that economic growth has a positive effect on FD. Or FD follows economic growth.
Mutual causality view	▪ bi-directional causality ▪ bi-directionality ▪ two-way causality ▪ jointly determined ▪ feedback effect ▪ mutual linkage	Demetriades & Hussein (1996); Greenwood & Smith (1997)	The view that financial development and economic growth are mutually causal. Or there is a two way causal effect between finance and growth.
No causation view	▪ no causality ▪ no cause and effect ▪ neutrality ▪ independent hypothesis	Lucas (1988); Mazur & Alexander (2001); Development economists such as Gerald Meir	The view that FD and economic growth are not causally related or there is neutrality between finance and growth.
Negative view	▪ Impediment view	Ram (1999)	The view that FD is an impediment to economic growth or vice versa. Or financial development and economic growth are negatively correlated.

Notes:
[1] Table 2.1 was developed based on the extant literature.
[2] In the literature, the word view is also used interchangeably with words such as proposition, belief, thesis, hypothesis, phenomenon, argument and response.

As correlation reveals nothing about causation (McKinnon, 1988; Patrick, 1966) attention has recently shifted to the empirical analysis of the causal relationship between finance and growth. The shift in interest towards financial markets and financial structures and their effects on FD leading to growth has added vitality to the discussion (Khan et al., 2003). However, work on the causal relationship between finance and growth is still scarce in developing countries. Al-Yousif (2002) contends that economists hold different views on the direction of causality and that empirical literature on the question is still inconclusive. "There are systematic differences in the finance-growth relationship among countries with different characteristics. For instance, the evidence of finance effects is not as strong among developed countries as it is among less developed countries" (Wachtel, 2003, p.40).

Given the absence of a general consensus on the hypothesised causal link between FD and economic growth, any assertion that FD leads to economic growth, or vice versa, may be an unqualified assumption. Previous studies (e.g. Abu-Bader & Abu-Qarn, 2008, Bell & Rousseau, 2001; Demetriades & Hussein, 1996; Luintel & Khan, 1999, amongst others) support the evidence that finance-growth causality patterns differ between countries. This lends support to recent calls for more country-region-specific empirical studies to throw further light on the finance-growth nexus issue.

Further, the empirical literature provides strong evidence that the financial development and economic growth relationship is country-specific (e.g. Demirhan et al., 2011). As countries undergo different experiences in relation to financial sector development and economic growth individual country-specific studies (such as this study) are important to shed new light on the role of FD in economic growth, or vice versa. Theoretical and empirical studies are reported in the literature for single-country (time series), cross-sectional, cross-sectional time series (panel), case studies and historical analysis at the industry and firm level levels (Liang & Teng, 2006; Levine, 1997). For developing countries, together with the strongly emerging countries, which are sufficiently different in many different respects (e.g. politically, economically and socially) the conduct of region-country-specific empirical studies is warranted and there has been an increase in empirical studies in recent years. For instance, studies targeting fast growing economies such as China, India, Brazil and other small developing countries (e.g. Fiji) have recently emerged.

The revival of interest "to tackle the issue of the strength and causation of the relationship between finance and economic development" (Arestis & Sawyer, 2005, p.7) began with the prominent seminal work of King & Levine in the 1990s. King & Levine (1993a) used endogenous models to explore the merits of financial intermediation in 80 countries over the period 1960-1989. Basing their arguments on the agency costs created by the presence of imperfections in financial markets, they provided evidence supporting the view that FD[21] is positively correlated to growth. The importance of their work was emphasized by Singh (1997), Driffil (2003) and Ang (2008). Nonetheless, as their evidence is based on finance-growth correlation the causal relationship was not formally dealt with (Rajan & Zingales, 2001).

According to Bernanke & Gertler (1989) correlation based arguments may be viewed as an extension to the long-run of the short-run analysis. The existence of various underlying theories has allowed the finance-growth relationship to remain an important debatable subject in the economic literature (Liang & Teng, 2006). As one needs a formal theory in growth economics to argue facts, clarify causal relations and draw out hidden implications (Aghion & Howitt, 2009) relevant growth and finance theories which form the basis for this study are explored in detail in the next section.

2.4 Economic growth and financial intermediary theories

Economic growth and financial intermediary theories depend on economic theories. Briefly, in terms of economic theory or paradigm development, neoclassical theory emerged after the classicals. Both theories advocate the role of traditional sources of growth such as investment, human (H) and physical (K) capital development. The neoclassicals were followed by the Keynesians in the 1930s in response to the total failure by the classicals to solve problems such as unemployment caused by the Great Depression. In the 1960s, the theory of monetarism emerged as a counter theory to Keynesianism. Supply-siders attempt to combine views postulated by monetarism and Keynesianism. Newer versions of these root theories have added vigor to many areas of research in economics and finance. For instance, the post-Keynesian theory advances finance theories such as information asymmetry and the theory of monetarism affects the incentives of individuals to use banking and

[21] The ratios of liquid liabilities to GDP and the ratio of commercial bank paper to central bank credit are used by King & Levine (1993) as financial indicators.

financial services. This has implications for policy and theory. An extensive review of the root economic theories is not warranted here due to the existence of voluminous literature on each theory. However, given their connection to the economic growth and finance theories the root theories will be briefly mentioned where appropriate.

Economic growth theories: Exogenous vs. endogenous

The financial development and economic growth relationship debate has taken many routes in theory with many models (Driffil, 2003). The two growth theories commonly used are: (1) the older or exogenous growth theory; and (2) the newer or endogenous growth theory[22]. The exogenous growth theory argues that growth is the result of external factors (Romer, 1994) while the rapidly expanding endogenous growth theory emphasizes that economic growth is an endogenous outcome of an economic system and not the result of outside. The corresponding models of the two growth theories are the exogenous and endogenous growth models, respectively. The exogenous growth models predict or describe different trends and policies that increase growth while the endogenous growth models predict parallel but balanced growth paths for countries (Evans, 1996).

The post-Schumpeter studies have been reinforced by developments in endogenous growth theory. This is because endogenous growth theory accommodates external policy interventions to influence the long-run growth rate of an economy (Durlauf et al., 2005). In addition, continuous technological progress is required for long-run economic growth and financial sector development. Therefore, the endogenous models "provide a theoretical framework, demonstrating that financial intermediation can have both growth and level effects" (Ang, 2008, p.548). Given the above, the rest of the discussion will focus on the endogenous growth on which this study depends.

Early endogenous growth models have a similar logical structure to that of neoclassical growth models (Kurz & Salvadori, 1999). Endogenous growth theory has roots from Keynesian theory. Though neoclassical growth models form the cornerstone of economic growth literature (Solow, 1956), the major problem with the

[22] EGT is also called the Solow-Swan neo-classical growth model based on the independent works of economists Trevor W. Swan and Robert Merton Solow on the theory. Robert Solow's work in the mid-1950s (for which he was awarded the Nobel Memorial Prize in Economics) contributed substantially towards the modern literature on economic growth (Wachtel, 2003).

neoclassical paradigm is that it cannot explain or rationalise technical progress (Aghion & Howitt, 2009). As financial sector development requires continuous technological progress (Ang, 2008), a theoretical framework that accounts for technological progress and productivity growth endogenously, without decreasing returns to capital and labour, is needed to analyse policies for long-term growth (Aghion & Howitt, 2009).

The first version of the endogenous growth theory is the so-called AK theory" (Aghion & Howitt, 2009, p.13). The AK model is also termed as the endogenous growth model where A denotes technology and K can be thought of as some composite capital and labour input in the production function. There are two classes of endogenous growth models: (1) AK growth models; and (2) research and development (R&D) based growth models. The AK model is one of the four leading growth paradigms besides the neoclassical growth model, the product variety model and the Schumpeterian model (Aghion & Howitt, 2009). Thus, the AK growth model is used as the standard basis for most empirical growth work in the endogenous growth model (Durlauf et al., 2005). A growing body of empirical research on growth since the 1980s have used endogenous growth models (Romer, 1994).

Thus, in Chapter 3, a simplest form of production function i.e. AK endogenous growth function, will be used as the basic theoretical model to capture the potential effect of changes in only two factors (technology and capital) on steady state growth. The early neoclassical growth models including the Harrod-Domar's perfect competitive growth model, focused only on capital and labour, but with diminishing returns to capital and labour. The AK basic model will then be extended into a three-factor input (physical capital, human capital and technology) Cobb-Douglas[23] long-run equilibrium production function without diminishing returns.

Early economic theories mainly focused on how interactions in innovations, particularly exogenous technical progress determine long-run growth rates (Hassan

[23] Charles Cobb and Paul Douglas first modelled the growth of the American economy in 1928 for a 23-year period using a production function with only two factors of production: labour and capital. The results turned out to be reliably accurate. Since then the model has been widely used.

et al., 2011). More specifically, an endogenous growth theory postulates that endogenous (internal) factors such as improvements in technology, efficiency, and productivity are responsible for stimulating growth (Li & Liu, 2005). On the other hand, exogenous growth theory argues that exogenous (external) determinants of growth (such as fixed amount of labour) induced growth. The shortcoming, however, is that both theories deal with real economic growth with no specific mention of FD.

As a result financial intermediation has not been explicitly modeled to see how it affects the long-run economic growth rate (Hassan et al., 2011). Lack of a strong enough theoretical fundament to answer the causal relationship between finance and growth was one key factor behind the non-inclusion of finance in growth models (Eschenbach, 2004). This changed, beginning in the 1990s, with the benchmark empirical study of King & Levine (1993) when financial intermediation was first incorporated into the endogenous growth models as a potential growth inducing factor (Blackburn & Hung, 1998; Diamond, 1984; Eschenbach, 2004). Diamond (1984) and Williamson (1986) were first to identify the reasons for considering financial intermediary variables as endogenous.

The modern literature on the finance-growth link now combines endogenous growth theory and microfinance of financial systems (Grossman & Helpman, 1991; Khan, 2001; Lucas, 1988; Pangano, 1993). As a growing body of empirical literature shows how financial intermediation allocates resources, diversifies risks, mobilizes savings and in the process contributes to economic growth (Greenwood & Jovanovic, 1990; Jbili et al., 1997), the inclusion of financial intermediation (as proxied by various financial indicators) in regression as a possible determinant of growth is justifiable.

Financial intermediary theories

Financial intermediation theories grew out of economic growth theories. Economic theory suggests that financial intermediaries, financial markets and financial products arise to mitigate the effects of market frictions. These frictions include the costs of information acquisition, contract enforcement, and transaction of goods and financial claims (Levine, 1997). Market friction costs create incentives for the emergence of financial intermediaries (Boyd & Prescott, 1986). Traditional theories of financial intermediation thrive on asymmetric information, which is responsible for fuelling

the problems of adverse selection, moral hazard and credit rationing. The costs incurred by lenders for monitoring the behaviour of borrowers by lenders because of imperfect information "provides the crucial link between the real and financial aspects of the economy's development" (Blackburn & Hung, 1998, p.112).

The relationship between the owners of capital and agents also has some bearing on financial intermediation theories. The principal-agent theory attempts to study the potential conflict of interest between the owners of capital (principal) and their agents (employees and management), which occurs when agents engaged in activities for their own personal benefits that may not benefit the principal. Nobel Laureates Joseph Stiglitz and George Akerlof, and other researchers working on asymmetric information and principal-agent theory, have given economists the tools to think about the central role of financial markets in the real economy (Bernanke, 2007). In addition to the costs of monitoring borrowers' behaviour, the principal also incurs compliance and monitoring costs to monitor the behaviour of the agents. To align the incentives of the agents strategies such as linking stock performance to management compensation have been introduced (Jensen & Meckling, 1994).

Traditional economic growth theories have been significantly challenged in last two decades due to the phenomenal rise in intermediation. Several key forces are responsible for the dramatic changes in the way the financial and economic sectors function in the modern era including: advances in information-communication-technology (ICT) (e.g. internet); regulatory changes; emergence of innovative financial products through the process of financial engineering by intermediaries; internationalisation of financial intermediaries; and increased globalization of international financial markets (Gani, 1996). It was predicted that such forces of change would inevitably continue to induce further innovations to the global financial market and institutional infrastructure. "Financial market infrastructure can be defined as: the technology available to financial market participants and intermediaries; the regulation that governs financial market participants and intermediaries; the process used to collect and disseminate information pertinent to financial transactions; the quality and number of financial market participants; and the financial instruments available" (Ralston & Jenkinson, 2014, p.16).

This has affected the traditional financial services such as the allocation of credit to the most productive sectors or uses in the economy. Thus, the effect of ICT advances has ingrained itself deeper in the financial sector landscape in both the developed and developing worlds and in the daily lives of people. Given these transformations in financial infrastructure newer versions of financial intermediation theory have emerged. The new financial intermediation theory has increased the attention given to risk trading and participation costs (Allen & Santomero, 1997). Even the very recent emergence of mobile money, where customers are using mobile phones, the internet and electronic money ('e-money') to buy goods and services, has been significantly altering the way traditional banking systems operate (Greenacre, 2013). In the modern mobile system, the roles played by banks and NBFIs (e.g. merchants) as well as wireless operators and technology enablers, are considered an integral part of the modern financial intermediation process.

Thus, modern ICT systems have enabled consumers to do banking activities through NBFIs such as post-offices instead of relying on the mainstream banking sector. This development has also helped banks and other FIs to provide real-time information to key stakeholders like customers, employees and regulators. Consequently, there have been marked reductions in informational and transaction costs but increased intermediation. These changes are difficult to reconcile with the traditional financial theories that thrive on transaction costs and asymmetric information (Allen & Santomero, 1997). Such trends have been clearly evident in the developing world where mobile banking advanced at a phenomenal rate. New changes to banking mean certain traditional activities of the mainstream banks such as the payment process have become marginalised. This has compelled banks to embark on more innovative approaches of conducting their business. For instance, financial engineering in terms of designing new financial products/services and packaging them to suit the different preferences and risk tolerance levels of their customers, has been one such key innovative development.

In the MSG economies "mobile banking operations" were introduced in the late 2000s. For instance, in PNG, online banking was initiated in early 2000 and mobile banking in early 2010. Online banking uptake was somewhat slower than mobile

banking[24]. The penetration rate or uptake of online banking is consistent with the rate of adoption elsewhere. Predictions of the growth in mobile commerce the world over (Kalakota & Robinson, 2001; Liang & Wei, 2004) has been verified. Given that mobile money schemes around the world continue to evolve, new forms of financial services, such as mobile banking, are predicted to grow at a phenomenal rate and with these advancements new regulatory issues arise. A case in point is Europe. Since mobile banking operations first emerged in 1999 in Europe through the banks, they have been operating in the absence of a regulatory paradigm (Greenacre, 2012). To date no empirical study has attempted to investigate the impact of technology on the banking sector and the real economy in the MSG countries.

Traditionally, the focus was on institutions such as banks, but this is no longer appropriate with focus now increasingly on functionalities. This has challenged the traditional theories of bank regulation. While the practitioners view financial intermediation as a value-creating economic process, the present financial intermediation theory suggests that financial intermediation thrives on the existence of market failures and imperfections (Schottens & van Wensveen, 2003). This implies that if capital markets become perfectly competitive, with no transactions costs, information asymmetries, taxes, rigidities in prices and wages, and insolvency costs, there will be no need for FIs. This would ideally reflect the Arrow-Debreu world with perfect information and no transaction costs (Paolera & Taylor, 1997).

The financial system in rising to ameliorate transaction and information costs (Levine, 1997) serves one primary function: it facilitates "the allocation and deployment of resources, both across borders and across time, in an uncertain environment" (Merton & Bodie, 1995, p.12). Thus, intermediaries "become essential once imperfections or frictions are introduced in the model" (Khan, & Senhadji, 2003, p.90) as "without such frictions, financial markets have little reason to exist" (Bernanke, 2007, p.1). The present theory of financial intermediation does not provide satisfactory answers to the questions of why real-life financial institutions exist, what keeps them alive and what is their essential contribution to national or international economic welfare (Schottens & van Wensveen, 2003). But in practice,

[24] The developments that occurred in the PNG banking sector will be reviewed in Chapter 3.

financial intermediation matters for channelling credit to the most productive sectors, for monetary policy and for the transmission of economic shocks, particularly via the banking channel (Bernanke, 2007). The fast rise of non-bank financing activities and non-bank lenders in recent years has affected the bank lending channel.

Moreover, the departure of market friction, such as information imperfection and credit rationing, has implications for financial intermediation theory: it would conclude that financial intermediation theories are irrelevant. This would suggest that there is no basis for conceptual, policy and practical implications that result such theories. Ultimately, this would mean the realization of the theory of perfect competitive market. This is consistent with the neo-classicals view that perfect competition would produce the best possible outcomes as excess supply and demand are cleared by the market mechanism resulting in no economic losses.

Hence, the self-adjusting process of the free market would ensure the optimal allocation of scarce economic resources to the most productive sectors of the real economy. Consistent with growth theory, the efficient utilization of resources would have the effect of enhancing productivity growth, capital accumulation and long-term growth (Ang, 2008). The capitalism theory of the 1950s and 1960s that emerged in the industrial world and quickly spread to other parts of the world also supports such propositions. However, until such a moment arrives the existing growth and intermediation theories cannot be discarded as the real-world capital markets are far from prefect.

This study argues that the notion of a free market model, such as that of an Arrow-Debreu world exists only in theory due to the presence of market frictions and structural rigidities in prices, income, interest rates and exchange rates in the real world. In short, the benchmark world of perfect competition "is clearly built upon unrealistic assumptions" (Khan & Senhadji, 2003)[25]. Nonetheless, the two common variants of the capitalist model are the liberal market economy" (LME) and

[25] Characteristics of a perfect competitive market include: perfect knowledge; no barriers to entry into or exit out of the market; homogeneous units of output; no need for government regulation except to make markets more competitive; no external costs or benefits; and firms can only make normal profits in the long-run with the possibility of making abnormal profits in the short-run (Hubbard & O'Brien, 2012).

coordinated market economy (CME). On the one hand, neoliberal policies, radical innovation, and new sectors of the economy are advocated by the LME model (Crouch, 2005). The LME model is more applicable to countries such as Australia, Canada, Ireland, New Zealand, the United Kingdom and USA. On the other hand, the CME model advocates the interaction of the social and political institutions in shaping economic action (Crouch, 2005). Despite this, markets in developing countries are not perfectly competitive due to the existence of market imperfections and structural rigidities as the theory of information asymmetry suggests.

Studies have generally concluded that capital market imperfections tend to inhibit growth (Bencivenga & Smith, 1991; Greenwood & Jovanovic, 1990). However, the presence of market frictions and structural rigidities should not be used as an argument for not undertaking empirical studies. As Blackburn & Hung (1998, p.119) put it: "We believe that it is important to continue to construct models of growth that respect the imperfections and institutions that exist in real world economies'. Arguably, however, free market theory continues to serve its role as an ideal market system for the purposes of understanding and improving the workings of the real economy and market mechanisms.

While the role of governments in undertaking activities that would correct market failures and providing social infrastructure capital which the private sector inevitably needs to flourish and expand is arguably considered critical (Musgrave, 1983), government failures have been blamed for triggering and even worsening cases of market failures. As Krueger (1991) puts it, "Whether market failures had been present or not, most knowledgeable observers concluded that there had been colossal government failures" (p.2). Others (e.g. World Bank, 1983a) agree that government failure significantly outweighed market failure in many countries. But the institutional context of the economy in question, particularly the existence or otherwise of good governance (Arestis & Demetriades, 1997), can make the difference between failure and success. Thus, there is critical policy debate about how much government should intervene and, when it does intervene, the best way to do so with minimal social costs (Labonte, 2010).

For developing countries that are plagued with poor governance the presence of huge costs of acquiring information and undertaking financial transactions by market participants is an indication of market inefficiency. As a consequence, monitoring of the activities of financial service providers by regulators, owners of firms and other interested stakeholders are costly. Market failure does not, however, necessarily imply automatic government success. Conversely, government failure does not necessarily equate to automatic market success. An economy's productive capacities such as entrepreneurial capabilities, productive resources and production linkages do not always emerge automatically from the workings of free market forces. This warrants regulatory support by government to support the growth and orderly function of markets. Based on these observations, it can be inferred that the CME model best describes how the mixed economies of the Pacific structurally function.

Friedman (1970) accepted that the market mechanism is not always feasible and no one can avoid political mechanism altogether. Though the role of government is widely debated, delayed or insufficiently timed policy action (mainly when markets appear to fail) has the potential to escalate into a crisis event. The worsening of a crisis event would take place regardless of whether a country claims to adopt the free-market model of neoclassical economics or other types of capitalism (Crouch, 2005). For instance, assume that there is a bank-run in a market-oriented economy with no government guarantees. If there is a lack of deliberate policy action both from within (at the board and management levels) the troubled bank and from outside (by the regulator) the situation could escalate into a bank panic.

A situation of bank panic would lead to bank failure if no action is taken. Consequently, confidence in the banking sector would plummet. The perception of loss of confidence in the banking system and the capacity of the regulatory system to address the crisis could trigger speculative activities. Widespread speculation could potentially culminate in sudden mass withdrawals of deposits by especially large numbers of panicked depositors in fear of losing their deposits from possible bank collapses. If left to the market alone to resolve, this could in turn have negative repercussions on the operations of the other solvent banks within the banking sector. Whilst the collapse of small-to-medium FIs may have negligible systemic impact, the

closure of prominent distressed FIs (e.g. Lehman Brothers in the US during the GFC) has the potential to trigger a domino-effect across the entire banking sector.

A domestic banking system meltdown would spark negative consequences such as increase in interest rates causing declines in credit levels, decline of the stock market, and increase in uncertainty (Mishkin, 1992). Consequently, problems of adverse selection and moral hazard could get worse with resultant declines in aggregate economic activity. Bank panic would then set in with the potential to further triggering a full-fledged domestic financial crisis. "A financial crisis is a disruption to financial markets in which adverse selection and moral hazard problems become much worse, so that financial markets are unable to efficiently channel funds to those who have the most productive investment opportunities" (Mishkin, 1992, p.115). How this is structurally possible will become evident in Chapter 3 when the economic and financial structures and their constituents are presented.

A situation similar to this unfolded in Turkey in 2001 when problems in the Turkish banking system triggered a crisis of confidence in other domestic FIs. The loss of confidence in the entire banking and financial systems led to a massive capital flight. This in turn triggered a severe currency crisis that had the adverse effects of slowed growth and increased poverty levels in Turkey (Demirguc-Kunt & Kane, 2001). The credit rationing theory also shows that increase in market interest rates can be a factor that helps to precipitate a financial crisis (Mishkin, 1992). The economic performance of a country and stability of its economy could be adversely affected as a result of a systemic banking and financial crisis. Such a crisis could be disruptive and costly having an adverse effect on financial system development and growth. Some examples of social and economic adverse effects may include: wide-spread home foreclosures; high unemployment sparked by forced business closures; lay-offs; and a surge in associated social problems. .

According to Demirguc-Kunt & Kane (2001) "Depositors lose access to their funds, good borrowers can lose access to credit and even be forced into bankruptcy, and some sound banks may be driven out of business. Would-be issuers of debt and equity instruments find that markets have dried up. And taxpayers are typically presented with a large bill for mitigating these disruptions" (p 2). The problems

could be worse in economies that have no depositor protection schemes (or financial safety nets) such the Federal Deposit Insurance Commission (FDIC) in the USA. A fully-fledged financial system crisis could fuel broader domestic and international economic crisis due to contagion. This was evident during the 1997-99 Asian Financial Crisis (AFC) and the 2007-08 GFC (Mishkin, 1992). Bank failure and financial crisis are consistent with the monetarist view that narrowly focuses on bank panics and their effect on money supply. Banking theory also supports the notion of deposit insurance.

Moreover, the view that financial crisis is caused by factors such as: the failure of large FIs; a sharp decline in asset prices; deflations or disinflations; disruptions in forex markets; or some combination of these factors, is in line with the Kindleberger-Minsky view. Despite this, the Kindleberger-Minsky view of financial crisis does not supply a rigorous theory of what characterizes a financial crisis (Mishkin, 1992). Many factors[26] are responsible for banking and financial crisis. In the case of the GFC, factors such as trading of complex financial derivative securities (e.g. collateral debt obligations (CDOs)) motivated by excessive corporate greed were singled out by many commentators as a key factor. In modern economies different economic sectors and industries are inextricably intertwined. So the collapse of the mortgage market pulled the strings of other sectors and many other sectors in the economy, including social sectors such as education and health, were affected by the financial turmoil. This had a contagious effect on the rest of the world due to the highly integrated nature of the modern global financial infrastructure and economic system.

Nonetheless, arguments surrounding the merits or otherwise of such stimulus interventionist measures by governments to particularly bail-out huge private enterprises (e.g. the auto industry in the USA) using huge amounts of taxpayers' funds are debatable. For instance, Schwartz (1986) characterizes financial crisis as "pseudo financial crisis" and argues that government interventions are unnecessary, harmful and may lead to a fall in economic efficiency. This is because firms that deserve to fail are bailed out resulting in excessive money growth in the economy

[26] See, for example, Caprio Jr. & Klingebiel (1999) and Mishkin (1997) for a discussion of the underlying causes of banking and financial crisis.

which in turn stimulates inflation (Mishkin, 1992). High inflationary pressures reduce the purchasing power of consumers' disposable income and savings. Asset values would also be reduced. Ultimately, peoples' general welfare and long-term investment decisions by firms would be adversely affected. This is consistent with the views of the NGT and financial theories such as the liberalization theory.

The GFC challenged the world's traditional views on free market capitalist models of economic management. Consequently, the crisis made it difficult for policy makers and regulators to respond with traditional economic tools that are primarily aimed at smoothing business cycles (Afonso et al., 2010). Though, no new alternative system is in sight to replace capitalism, appropriate refinements to the capitalist model have been mooted post-GFC. In fact, reviews and refinements have materialized since the conception of capitalism (arguably in theory since Smith's Wealth of Nations in 1776). On the contrary, policy interventions too have their own drawbacks. For instance, policy tightening in response to signs of an economy overheating could retard growth. Chung et al., (2009) explain that the concurrent occurrence of the following economic symptoms point to an overheating economy: (1) robust economic growth (as measured by high GDP growth rate); (2) exceptionally high inflation level (as captured by an uncontrollable rise in CPI) that tend to exceed the targets set by the central bank; and (3) a strong appreciation of the local currency.

Furthermore, the theoretical argument that an economy would be far better off if the market determines the allocation of resources rather than being redistributed by government is still alive and active. For instance, the view that political intervention may distort the allocation of resources with attention directed to politically favored industries appears to be a common problem in many developing countries. The economies of the Pacific are no exception, with frequent political interferences that disturb the workings of the market. Thus, a balanced approach would be the most preferable option, with appropriate and timely policy support within the framework of open market macroeconomic models yielding better economic outcomes. For instance, "the experience of transitional economies in eastern Europe suggests that law, both the laws on the books and the enforcement of what laws there are, may be an important factor in the efficiency of financial systems" (Driffil, 2003, p.371).

Having an effective governance framework in place, as postulated by governance theory is an equally important factor. The financial system too is framed on laws enacted by government to facilitate orderly operation and growth. The inclusion of the government sector in the circular flow model reflects the important role it plays in regulating the economy. It will also be retained in this study's conceptual finance-growth model in Chapter 4.

In the finance and growth debate, the legal services view supports the role of rule of law and origins of the legal system. Understanding the evolution of legal and financial systems is essential for understanding the process of economic development (North, 1981; Engerman & Sokoloff, 1997). Despite arguments about the importance or otherwise of the regulatory system, one thing is clear: political and legal institutions define the "rules of the game" (Levine & Renelt, 1991). However, the downside to this is noted by Levine and Renelt: "If these 'rules' are uncertain or severely burdensome to economic players, it makes the types of complex exchange that occur in the modern economies very difficult" (p.39). Such governance and legal services' views and their effects on finance and growth in PICs is an area considered ripe for research.

Many countries have recently adopted alternative arrangements such as the public-private partnership (PPP) model where governments and private sector businesses aim to work in partnership to address market imperfections and deliver essential goods and services that the market clearly fails to provide, such as public roads, bridges, ports, and airport facilities. The failure of the market is attributed to constraining factors such as huge cost structures. Additionally, the market may not adequately self-sustain in the provision of certain public goods such as the nation's military. Again, how effective such alternative arrangements operate in the real world remains an open issue. Inherent imperfect conditions characterize the MSG economies, thereby providing scope for government intervention. Economic agents (e.g. businesses firms) in such imperfect market structures become price-makers as opposed to price-takers. Such issues contribute to abnormally high inflation. Scarce economic resources would not be efficiently allocated to productive uses as a result, thus constraining economic productivity, financial development and growth.

In recent decades there have been considerable changes globally in a number of aspects of development for many countries in the developed and developing world. Such changes have been fueled by the inevitable dynamic interplay of the market forces of change, including advances in computing power and information technology as noted earlier. Theoretical, practical, and policy implications are also being induced by such changes. Successfully sequenced, adequately funded and well managed policy interventions have sparked positive changes in terms of allowing the general public have increased accessibility to information. The Australian Government's funding support in recent years to improve affordable internet accessibility services is a case in point.

Evidence suggests that such affirmative policy actions in addressing information asymmetry by the government and private sectors have positively helped the public and market participants to make informed decisions about resource allocation. The resultant net positive effects so far have been that transaction costs and asymmetric information have declined and intermediation has increased (Allen & Santomero, 1997). Allen & Santomero (1997) further note that the modern financial intermediary theory places emphasis on the increasingly important roles of risk trading and channeling of funds to firms by FIs. FIs have been allocating resources to commercially profitable investments in the domestic and international financial markets in diverse asset classes (such as equity, debt, derivatives, properties, hedge funds, etc.) as finance theory suggests.

Due to the highly integrated nature of the global economy, international trade, funds flow and cross border transactions, including mergers and acquisitions, have eventuated with minimal informational and transaction costs. This has made it possible for the construction of a geographically well-diversified portfolio of investments by firms. Consistent with investment portfolio theory, as portfolio diversification in investment serves as an effective risk management strategy, firms' net returns are maximized and overall losses are minimized. This results in investor (consumer) welfare maximization and economic gains. As Demirgüç-Kunt & Levine, (2008a) put it: "Thus, financial systems that ease risk diversification can accelerate technological change and economic growth" (p.10). The reported literature on financial development and endogenous growth theory are generally consistent with

the direction initially advocated by pioneers such as Schumpeter and later by liberal financial regimes like the McKinnon-Shaw (MC) School.

2.5 Finance-growth literature related to the MSG economies

In this section several empirical studies related to MSG countries and the treatment of the MSG grouping as a homogenous entity for the purposes of statistical analysis are examined.

Empirical evidence

To the best of the author's knowledge, there are no cross-sectional, panel, time series or case studies on the causal relationship between finance and growth in the MSG countries in the reported literature. In fact, the majority of previous studies on the finance-growth nexus have concentrated mainly on Asia and Latin American countries (Odhiambo, 2008). There is very little coverage or none at all accorded to the PICs, with the exception of Fiji which has two studies: Gounder (2012); and Waqabaca (2004). By employing a cointegration and error correction model (ECM) for the period 1970-2005, Gounder's (2012) study reveals that FD has made a modest contribution to growth. This result is in line with the *supply-leading hypothesis.* On the other hand, by using a bi-variate auto-regressive (bVAR) framework for the period 1970-2000, Waqabaca's (2004) study finds that there is a positive relationship between finance and growth with the direction of causation running predominantly from economic growth to financial development. This result is in favour of the *demand-leading hypothesis* and is consistent with results found for countries which have less sophisticated financial systems.

A number of studies investigating the macroeconomic determinants of growth using cross-country data for PICs are also found in the reported literature. However, these studies did not investigate the relationship between economic growth and financial development, and only focussed on growth. The following two panel data based studies also include the MSG economies: Yang et al., (2013); and Gani (1998). Yang et al., (2013) examined the growth performances of five PICs namely, Fiji, PNG, Solomon Islands, Vanuatu, Samoa and Tonga. They found that disadvantages arising from geography do not impede investment and trade and concluded that "economic and other policies can make a difference in speeding up growth in the Pacific" (p.34).

Gani's (1998) work examined the macroeconomic determinants of growth using panel data for seven PICs namely Fiji, PNG, Solomon Islands, Western Samoa, Tonga, Vanuatu and Kiribati for the period 1980-92. The empirical results revealed that capital, labour, inflation, money supply and exports are statistically significant positive contributors to PICs' economic growth, but government spending was not a significant factor. An avenue for future research was proposed by Gani (1998): "While cross-section analysis has uncovered some of the macroeconomic factors determining the economic growth of PICs, a country-specific analysis will perhaps provide better insight into the contribution of the macroeconomic factors to economic growth" (p.748-749). To fill this gap a time series analysis is performed in Chapter 6 with PNG as a unit of analysis. Of the four MSG countries PNG was selected based on real GDP, landmass and population as will be seen in Chapter 3.

The above-mentioned studies also use an endogenous growth model. Because the panel studies do not investigate the issue of financial development and economic growth relationship, FD is not included as a possible determinant of growth. Though the time series studies for Fiji examined the issue of finance-growth nexus the results remain mixed. Thus, the inclusion of FD as a possible determinant of growth and the investigation of the causal relationship between FD and growth in the MSG economies in this study fills the gap in research.

The treatment of MSG countries as an homogenous entity

The four MSG countries constitute a relatively homogenous entity as they belong to the same Melanesian grouping with much in common, albeit with differences, in areas such as size and resource endowments (Huges, 2003). Though the demarcation of regions remains a contentious issue, whether economic, administrative or historical criteria are used (Smit, 1996) the South Pacific region is made up of small island nation-states that have similar economic (e.g. open economies with similar consumer patterns), administrative, geographic (e.g. similar climate), and social (e.g. similar cultural patterns) structures[27]. Melanesian countries and economies are therefore treated as an homogenous entity in many recent studies, all of which rely on the endogenous growth model. For example, Yang et al., (2013) in their study of

[27] Several key characteristics that make the MSG countries an homogenous entity are discussed in Chapter 3.

growth performances in five PICs; Lahari (2011) in examining the prospects of Pacific Island currency and monetary union; and Feeny (2005) in examining the impact of aid on fiscal performance.

Given the above, this study also treats the MSG countries as an homogenous group and uses an endogenous growth model (EGM). This suggests that the discussions on policy implications are valid for each of the MSG economies. The use of a relatively homogeneous group enhances the power of tests and sample selection bias is not induced (Temple, 1999). Additionally, it is important for a valid econometric demand analysis to be aimed at an homogenous group as this also lessens data compatibility problems (Pesaran et al., 1988). As a result, broad generalizations are minimized and reasonable inferences for all the members of the group can be drawn (Brock & Durlauf, 2001).

Many previous panel studies implicitly treat structurally different economies as homogenous entities. This gives rise to empirically flawed evidence resulting in the formulation of misguided policy options. The long-term growth prospects of the countries could be adversely affected due to the adoption of poor economic policies. However, one of the key factors differentiating this study from many previous panel studies is that this study uses a relatively homogeneous group. However, the formation of a "homogenous panel" does not automatically equate to the absence of any variation. In fact, there are and will always be subtle differences in any homogenous panel studies because no individual country or region is exactly the same in every aspect to another. For instance, variances are more evident in macroeconomic variables such as inflation for each country in panels classified to be homogenous. Wage and unemployment rates also differ. Such differences and sources of biases will be diagnosed and addressed through the use of appropriate remedies (e.g. the use of PCSEs as estimator) in the sections to follow.

2.6 Identification of literature gaps

As stressed earlier, the interest in recent empirical work on the causal link between FD and growth was rekindled by Levine in the 1990s. Hence, Levine's works and the extant literature establish areas for further research. In their work covering eighty

countries over thirty years on stock market development and long-run growth Levine & Zervos (1998) stated:

…"researchers should attempt to build models of and develop data on the links between growth and the different components of the financial system: banks (private and public), nonbanks (mutual funds, private pension funds, insurance companies, and others), stock markets, bond markets, and derivatives markets" (p.335).

This is consistent with the definition of the financial sector adopted in this study; i.e. that the financial sector is made up of three key components: banks, NBFIs and the capital market. Additionally, (to the best of the author's knowledge) there has been no attempt made to date to examine empirically how developments over the last three decades in the economies of MSG countries have impacted FD and economic growth, or vice versa. As noted earlier, an additional gap for research in the PICs was proposed by Gani (1998) who suggested that:

"While cross-section analysis has uncovered some of the macroeconomic factors determining the economic growth of PICs, a country-specific analysis will perhaps provide better insight into the contribution of the macroeconomic factors to economic growth" (p.748-749).

The small financial sectors of the Pacific economies do comprise financial markets, institutions, instruments and agents, complex financial derivative securities like financial futures and options are non-existent. Only less complex financial products are designed, offered and traded, mostly over-the-counter (OTC) i.e. they are not traded by FIs via formal exchanges. For example, only forward exchange agreements (FEA) and forward rate agreements (FRA) are offered OTC by most commercial banks and other authorized FIs in the small open economies of the Pacific. FRA, FEA and various combinations of such derivative financial securities are offered to clients interested in hedging their foreign exchange rate exposures (with FEA) and interest rate risk exposures (with FRA).

The impact of FD (through financial markets and financial structures) on economic growth has not been examined adequately to date, in both the developing and developed economies. This could be due to problems such as paucity of reliable data and the diminished size of financial markets (notably bond markets, equity markets, commercial paper, venture capital, foreign exchange markets and the derivatives

market) in many countries (Wachtel, 2003). This is why considerable attention has recently been placed on the role of financial structures and markets, and their relationship to growth (Khan & Senhadji, 2003). Essentially, interest tends to revolve around how capital markets affect financial sector performance, and how financial sector activities in turn affect real economic growth rates. The financial market structure of PNG (which will be described in Chapter 3) will be used as a reference for other MSG countries throughout as they have similar market structures.

Moreover, previous studies (which have not included MSG countries) have not adequately examined the relative importance of the role played by financial sector development (e.g. Ahmad & Malik, 2009). Hence, region-country specific empirical work such as this study that investigates the possible factors that may influence financial development and growth process, or vice versa, are warranted. The hypotheses to be tested are presented next.

2.7 Rationale for framing the statement of hypotheses

The unresolved issue of whether finance is a leading factor in economic development, whether it simply follows growth in real output, or whether they jointly influence each other has remained an important topic of debate in the economic literature. To date most research has aimed at explaining how the financial system affects growth (Driffil, 2003). After providing a comprehensive review of the finance-growth nexus literature (Levine, 1997, p.689-70) concludes that "broad cross-country comparisons, individual country analyses, and firm level instigations point in the same direction: the functioning of financial systems is vitally linked to economic growth". Such views are consistent with the views of the World Bank (1989) when it recognized that the finance-growth relationship has important implications for economic policy formulation particularly for developing countries. On the basis of such reasoning, the first hypothesis i.e. $H0_1$ which attempts to test the *finance-leading growth hypothesis* using the panel dataset for MSG countries was formulated.

This approach can be contrasted to studies that attempt to independently determine how growth affects FD and the hypothesized causal impact between finance and growth. Driffil (2003) further states that "The question of whether finance plays a

causal role or merely follows economic development remains an open one" (p.363). Shaw (1973) and others also recognized that despite the positive correlation between higher rate of financial growth and real growth the causality issue first identified by Patrick remains unsettled. Additionally, although many studies have found an association between finance and growth "the direction of causality remains an issue of debate" (Dabós & Gantman, 2013, p.2).

Empirical evidence demonstrating the importance of finance for growth has culminated in an explosion of research identifying and examining the determinants of financial sector development beginning with Schumpeter, followed by others (e.g. McKinnon, 1973; Shaw, 1973; King, 1993a,b; Levine, 1997). Furthermore, though there is a burgeoning empirical literature on finance and growth nexus (Levine, 2004) there have been relatively few single-country time series studies (Eschenbach, 2004). This led to the framing of the bi-directional causality hypothesis i.e. $H0_2$ in Chapter 1 to test the hypothesised finance-growth causal link in PNG.

In the case of the *growth-leading finance hypothesis* an increase in economic growth would lead to an increase in FD. This is valid only if unidirectional causality running from growth-to-finance prevails. A number of leading advocates of this view include: Robinson (1952) with the argument 'where enterprise leads finance follows'; Kuznets (1955) arguing that financial markets develop on the back of economy maturity; and Lucas Jr (1988) who states that "the importance of financial matters is very badly over-stressed" (p.6). In the case of the *finance-leading hypothesis* an increase in FD would lead to an increase in economic growth. This is valid only if unidirectional causality running from finance-to-growth prevails. Empirical studies such as Odhiambo (2008), Waqabaca (2004) and others mentioned in Chapter 2 support the *finance-leading hypothesis*. Additionally, a recent study by Gounder (2012) examining the finance-growth link for Fiji also shows that stronger economic growth leads to higher growth of credit or financial sector development.

The bi-directional causality hypothesis suggests that FD and economic growth co-evolve or are jointly determined. This hypothesis is valid if bi-directional causality exists between finance and growth. One of the pioneers who postulated a two way causal relationship between finance and growth is Lewis (1955). Such findings of

mutual causation emerged in subsequent studies starting with Patrick (1966), followed by others including Greenwood & Jovanovic (1990) and more recently in Khalifa Al-Yousif (2002). To date the validity of the positive link between FD and economic growth continues to be tested with new datasets from different countries and regions of the world using differing econometric approaches. In line with such empirical studies, this study tests the finance-leading growth and bi-directional causality hypotheses for the MSG countries with new panel and time series datasets for the studied period. The theoretical justification and behavior of the key variables and dummies used in this study are presented next.

2.8 Commonly used variables in the empirical studies

Economic theory and empirics suggest a wide range of possible determinants of an economy's rate of growth (Durlauf et al., 2005). As many growth determinants have been proposed as there are countries, and as discussed earlier, FD has been identified as one possible determinant in the modern finance-growth literature. The inclusion of several other variables thought to influence growth rate in finance-growth studies ensures the robustness of empirical results (King & Levine, 1993). Following Levine et al., (2000) a set of variables that controls for other factors associated with growth and for assessing the strength of an independent link between FD and national output is used[28]. Examples are the use of: economic policy variables such as *INF* as indicators of macroeconomic stability; structural variables like *TRAD* to capture the degree of openness of an economy; and social policy variables like *IMR* that attempt to appraise the impact of population dynamics on growth.

The explanatory variables used here are selected on the basis of their usage. The expected relationships between the dependent variable (either finance or growth) and the explanatory variables are based on theory and empirics. The expected signs will be compared against the estimated coefficients in Chapters 5 and 6. The time-variant explanatory variables used in this study are explained next[29].

[28] Many possible determinants of growth are explained by Durlauf et al., (2005).
[29] The terms financial indicator, financial proxies or financial measure are used interchangeably.

(a) Economic growth (measured by real per capita GDP)

The principal objective of economic policy is to boost the rate of economic growth. It is hoped this will in turn boost general standards of living of the masses[30] via increases in real per capita income. Essentially three economic growth indicators are used in the empirical growth literature: (1) real per capita GDP or just real GDP; (2) capital accumulation; and (3) productivity growth (Levine, 1997). Studies have shown that lower real per capita income or high income inequality lowers growth (Temple, 1999). The level of and changes in GDP per capita are constantly used by policy makers as measures of the level of and changes in national well-being (Hamilton, 1997). For instance, in a study by Odhiambo (2008), the real GDP per capita is used as a proxy for economic growth to examine the direction of causality between financial development and economic growth in Kenya. Despite the conceptual and measurement problems associated with using GDP[31] as indicator for growth, its use is supported by the new endogenous growth theory on which this study relies. Thus, real per capita GDP *(RGDPC)* (which measures the ratio of real GDP to total population in an economy) is employed as an indicator for growth.

(b) Measures of financial sector development

Due to the absence of finely-tuned superior measures many indicators of financial development have been proposed in the literature. There is also no single aggregate index to measure overall development in the financial sector (Gounder, 2012). Though this study utilises four commonly used FD measures, no common index is computed and much of the original information in our gathered dataset is retained. In line with the financial sector structural composition definition this research targeted FD measures that mainly capture credit market or financial intermediary activity generated by the operation of FIs. This is because financial development is assumed to occur as a result of increased financial intermediation (Maswana, 2006). Banking and market liquidity measures serve as good predictors of economic growth, capital accumulation and productivity growth (Rachdi & Mbarek, 2011).

Generally, there are four categories of financial indicators: financial depth; stability of financial institutions; accessibility; and efficiency (Čihák et al., 2013). This study

[30] The question of whether growth raises welfare remains largely unsettled (Temple, 1999).
[31] See, Bagstad & Shammin (2012) and Stiglitz et al., (2010) for common criticisms of GDP.

uses four commonly used financial proxies more aligned with financial depth to operationalise the FD variable: financial system deposits to GDP *(FSD)*; liquid liabilities to GDP *(LL)*; domestic credit to private sector credit to GDP *(DCP)*; and private credit by deposit money banks and NBFIs to GDP *(PC)*. The use of four financial measures makes this study quite different from previous studies where only one variable is usually employed. The use of more than one financial measure is supported by Dabós & Gantman (2013, p.5) "It can be contended that using only one indicator for financial development could limit the relevance of our results". The four financial measures, which will each be used once in four different estimations with the same set of controls, are described next.

Financial system deposits to GDP (FSD)

The first financial measure is the ratio of demand, time and saving deposits by banks and NBFIs to GDP (*FSD).* An increase in domestic savings due to an increase in deposits would boost investment demand as more loanable funds are advanced by the intermediaries to borrowers at more affordable interest rates. Increased productivity of investments would lead to increased private corporate sector output. This would in turn lead to increased real output growth. Therefore, mobilization of savings would enhance credit lending activities of FIs and this would boost intermediary activities.

As more credits are extended to the private sector, more productive investments would abound with resources being transferred from surplus units (savers) to deficit units (borrowers) to fund positive net present value (NPV) investment projects, as finance theory suggests. Here, as both the banks and NBFIs undertake financial services such as risk management and information acquisition, their aggregate activities are captured by *FSD*. Thus, *FSD* is expected to have a positive effect on growth. When *FSD* is used as a dependent variable the predicted effect of growth on *FSD* is also positive.

Liquid liabilities to GDP (LL)

The second financial measure is the ratio of liquid liabilities of the financial system to GDP *(LLY).* Liquid liability is a general measure of the size of the FIs relative to the size of the economy (Demirguc-Kunt & Levine, 2001) and it is frequently used as an overall measure of the degree of financial sector development (King & Levine,

1993a). Luintel & Khan (1999) also used *LL* instead of broad money (M2), which is generally considered as the standard measure of FD. This is because the M2 ratio mainly measures the extent of monetization rather than financial depth. This can be misleading as in developing countries monetization can be increasing without financial development occurring (Luintel & Khan, 1999). Thus, the expected relationship between *LL* and growth is a positive one. When *LL* is used as a dependent variable the assumed effect of growth is also positive.

Domestic credit to private sector credit to GDP (DCP)

The third financial measure is the ratio of domestic credit to private sector to GDP *(DCP).* Private sector credit excludes credit issued to government agencies and public enterprises or issued by the central bank as it generates increases in investment and productivity to a much larger extent than public sector credit. This is because private sector credit comes with strict evaluation of project viability by lenders thereby improving the quality of the loans. A good loan to good borrowers has the effect of reducing incidences of nonperforming loans or defaults. The expected relationship between *DCP* variable and growth is positive.

Private credit by deposit money banks and NBFIs to GDP (PC)

The last financial measure is the ratio of private credit by banks and NBFIs to GDP *(PC).* Private credit to GDP is a standard measure of financial intermediary development (Beck & Demirguc-Kunt, 2009; Ross et al., 2000). Most empirical studies operationalise FD through total credit to the private sector by banks and NBFIs as a percentage of GDP (Dabós & Gantman, 2013). The private credit measure has a clear advantage over other measures such as interest rates or monetary aggregates (M1, M2 or M3) in that it more accurately represents the volume of funds channeled to the private sector (De Gregorio & Guidotti, 1995). "Therefore, the ratio of bank credit to the private sector to GDP is more directly linked to investment and economic growth" (De Gregorio & Guidotti, 1995, p.434). Again as is the case with the *FSD* measure, credits issued by the central bank, governments and agents of governments are not included. Thus, the expected sign of *PC* on growth is a positive one and the presumed effect of growth on *PC* is also positive.

(c) Other control variables

Many factors are deemed as potential determinants of economic growth and financial sector performance. Omission of these factors could bias the causal relationship between finance and growth (Akinlo & Egbetunde, 2010). Given this problem a set of controls need to be included in regressions to avoid simultaneous bias (Gujarati, 1995). Hence, to determine whether the relationship between financial indicators and growth remains strong, the effects of the following variables will be controlled.

Government spending (GOV)

Government spending to provide valuable social infrastructure, such as public roads, to complement private investment is highly controversial. Some studies (e.g. Kormendi, 1983) argue that government spending to support the private sector is beneficial to economic growth. Others (e.g. Barro, 1991) argue that to fund this spending government consumption taxes would be increased and more debt would be incurred, thereby distorting allocation of resources and increasing inefficiency. The share of government consumption to GDP is often used as a proxy for government size. Government spending variable is considered as an endogenous factor in growth models (Heilemann & Findeis, 2012). Blanke et al., (2003) argues that "public consumption does not tend to contribute to growth directly, but it needs to be financed with distortionary taxes which hurt the growth rate" (p.829). Government size variable can have a negative impact upon the growth rate (Scully, 1989) and economic theory discourages the heavy involvement of government. Thus, the predicted relationship between public expenditure and growth is negative and a negative relationship is also expected with finance.

Gross capital formation (GCAP)

As in King & Levine (1993) the ratio of gross domestic investment to GDP *(GCAP)* is used to measure the rate of physical capital accumulation. Theoretically, gross capital formation either directly affects economic growth through increasing capital (physical) stock in the domestic economy (Plosser, 1992) or indirectly via technology promotion (Renelt, 1992). *GCAP* is expected to have a positive association with economic growth as well as with finance.

Openness to trade (TRAD)

This variable is considered as a sectoral variable. The endogenous growth theory and diverse studies, consider openness as one of the possible determinants of economic growth process. The relationship between trade openness and growth is a highly debated topic in the theoretical growth and development literature (Yanikkaya, 2003). As empirical growth studies have used different measures to examine the effects of trade openness on growth, the definition of openness too also varies. However, one commonly used measure of openness is the sum of exports and imports as percentage of real GDP. This proxy is used (denoted as *TRAD*). A positive association between trade openness and growth, and also with finance is expected.

Inflation rate (INF)

Inflation (measured by the annual percentage change in CPI) is one other variable that can affect growth. High levels of inflation are bad for several reasons: the effect of financial development on economic growth is significantly reduced in high inflation environments (e.g. Rousseau & Wachtel, 2002); it may contribute to financial system underdevelopment as it may distort and complicate financial contracting (Demirguc-Kunt & Levin, 2001); and it may produce smaller, less active, and less efficient banks and markets (Boyd et al., 2001).

In addition, unstable rates of inflation also adversely affect both consumers and businesses. For consumers, high inflation erodes the purchasing power of income, and for businesses, it increases the cost of capital, retards spending and creates uncertainty in investment decision-making process particularly the pricing of future long-term contracts. Overall, high values typically reflect the degree of macroeconomic stability (Bruno & Easterly, 1998). This may be more common in lower income countries with less developed financial sectors (Rioja & Nalev, 2004). Given the above, the effects of *INF* will be controlled. Thus, the expected effect of inflation on growth and finance is negative.

Life expectancy (LE)

Life expectancy is often used in growth regressions though its role is not justified by a well-articulated theory (Temple, 1999). In the growth literature many studies use mainly school enrollment ratios, literacy rates or estimated years of schooling in the

labor force as measure for human capital stock (Kyriacou, 1991). As human capital also figures prominently in the literature as a determinant of growth (Dabós & Gantman, 2013) its effects have to be controlled. This study uses *LE* as a proxy for human capital stock as data for the above measures were not readily available. The idea is that, on average, an educated, skilled and perhaps highly salaried consumer will experience a higher life expectancy as they will afford better health care and more nutritious diet[32]. A skilled population is assumed to have access to quality education and training, which are compensated by higher competitive wage employment structures. In the endogenous growth model, the notation K_t for capital is often assumed to comprise both physical and human capital as in Lucas Jr (1988) where the physical and human capitals are reproducible with identical technologies. Capital, however, includes 'private' physical capital as opposed to public capital[33]. Consistent with this approach, physical capital is not proxied by a different measure in this study. The relationship between *LE* and growth is assumed to be positive and a positive relationship is also predicted with finance.

Infant mortality rate (IMR)

Labour force participation (LFP) rates are not readily available in the MSG countries. When LFP rates are not available population growth rates are used to proxy for LFP (e.g. Kyriacou, 1991). Given the use of per capita GDP in this study, to avoid problems such as simultaneity bias, population growth rates were not used and instead *IMR* is used as a proxy. The popular belief is that population growth is economically harmful though this is not well supported by evidence (Temple, 1999). Standard neoclassical theory also postulates that the growth rate of population has a negative correlation with the level of output per capita. As increase in population growth rate is conjectured to have negative effects on growth and finance the predicted relationship with IMR is negative.

Foreign direct investment (FDI)

FDI plays an important role in emerging markets as these economies are generally lacking in terms of technology as well as capital to fund projects (Buckley et al., 2002). Hence, FDI provides a source of financing and facilitates the transfer of

[32] The LE trends in the MSG countries will be examined in Chapter 3.
[33] See, for example, Gramlich (1994) for discussions on the role of public capital in growth.

technology and managerial know-how. Most studies support the view that FDI positively affects domestic consumption, which leads to higher economic growth (Bosworth et al., 1999). The expected sign for FDI relative to growth is positive and a positive effect is also assumed with finance.

Foreign aid

As will be seen in the next chapter, many of the countries in the Pacific depend on overseas development assistance (ODA) foreign aid from developed countries to developing countries. Studies have shown that there is a negative association between ODA and real economic growth. "Analyses of the Pacific development widely agree that despite large aid inflows, living standards for most islanders have only improved slightly, if at all, since independence" (Freitag, 2011, p.1). Thus, the expected sign relative to growth is negative and a negative relationship is also expected with finance.

Dummy variables

Two dummy variables are used to capture specific unobservable effects of: (1) the 1997-99 AFC *(denoted by D1)*; and (2) 2008-11 GFC *(denoted by D2).* These two incidences of financial crisis of national, regional and global importance occurred during the period examined. Due to the rapid phase of integration of global economies with deep trade links such key economic events have the potential to affect the medium-to-long-term growth prospects of countries around the world. The two dummy variables are used to account for any structural change effects on FD and economic growth in the MSG economies by major financial crises events that occurred in the reviewed period. They take on the value one for the years that the *AFC* and *GFC* occurred and zero for other years. The predicted sign for the dummy variables on both growth and finance is negative.

A total of ten variables i.e. *RGDPC, FD (*proxied by *FSD, LL, DCP* and *PC), GOV, GCAP, TRAD, INF, LE, IMR, FDI* and *AID* will be used in the subsequent statistical analysis in Chapters 5 and 6. Data sources, definitions for these variables of interest, variable measurements, and the expected effects of the variables relative to dependent variable growth *(RGDPC)* are summarised in Table 2.2.

Table 2.2: Data sources, measurement and expected signs of variables

Variable and *(codes)*[a]	Source of data	Measurement	Expected signs[b]
[c]*(i) Economic growth proxy*		*Independent variable*	
[d]Real per capita GDP (*ln*[e]*RGDPC*)	UNDATA	Ratio of real GDP to total population.	Positive (+)
(ii) Financial proxies		*Explanatory variables*	
Financial System Deposits *(FSD)*	World Bank	Ratio of demand, time and saving deposits by banks and NBFIs to GDP.	Positive (+)
Liquid Liabilities *(LL)*	World Bank	Ratio of liquid liabilities of the financial system to GDP.	Positive (+)
Domestic Credit *(DCP)*	World Bank	Ratio of domestic credit to private sector credit to GDP.	Positive (+)
Private Credit *(PC)*	World Bank	Ratio of private credit by banks and other financial institutions to GDP.	Positive (+)
(iii) Set of control variables		*Explanatory variables*	
Government spending *(GOV)*	World Bank	Ratio of government consumption expenditure to GDP.	Negative (-)
Gross Capital Formation (*lnGCAP)*	World Bank, IMF	Ratio of gross capital formation (investment) to GDP.	Positive (+)
Trade *(TRAD)*	World Bank	Ratio of the sum of exports and imports to GDP.	Positive (+)
Inflation *(INF)*[f]	World Bank	Inflation rate (difference of consumer price index (CPI)).	Negative (-)
Life expectancy *(LE)*	World Bank	Life expectancy at birth in years as a proxy for human capital development.	Positive (+)
Infant Mortality Rate *(IMR)*	World Bank	Infant mortality rate per 1000 live births as a proxy for population growth rate.	Negative (-)
Foreign Direct Investment *(FDI)*	World Bank, IMF	Foreign direct investment (FDI), net inflows to GDP.	Positive (+)
Aid Assistance *(AID)*	World Bank[g]	Net development assistance and official foreign aid received (constant 2010 US$).	Negative (-)
D1 (AFC)	Dummy variable	To capture the effects of the 1997/1999 Asian Financial Crisis (AFC).	Negative (-)
D2 (GFC)	Dummy variable	To capture the effects of the 2007/2010 Global Financial Crisis (GFC).	Negative (-)

Notes: (a) Variable codes in (parentheses) are *italicized* throughout; (b) the expected effects between the dependent variable and the explanatory variables; (c) the variables are partitioned into three parts: (i) economic growth indicator; (ii) financial proxies; and (iii) eight explanatory variables plus *D1* and *D2* which take on the values of 1 for effects otherwise zero; (d) Real GDP at 2010 constant prices in billions of US dollars (USD); (e) variables with the *ln* prefix are log transformed; (f) with the exception of *INF* which is an index and the two dummy variables, all the other variables are ratios and hence are not in any unit of measurement; and (g) the World Bank data were drawn from Beck, (2010).

2.9 Methodologies used in the existing empirical literature

Conceptually, the empirical literature follows two main approaches: (1) growth accounting and (2) regressions (Vila, 2005). As explained in Chapter 1, after starting with a parsimonious specification of the growth equation in the form of the AK or endogenous growth model (EGM) an extended model will be developed in Chapter 4. The extended model will be incorporated into an estimable econometric specification. The two general econometric methodologies that empirical studies in growth-finance nexus apply are: (1) the cross sectional modelling or panel approach; and (2) the time series modelling approaches (Shan & Jianhong, 2006).

The use of two approaches depends on whether the type of data employed is pure cross-country, panel, or time series. Growth equations in the style of Barro (1991) are typically employed in the pure cross-country and panel analyses while time series analyses mainly adopt a VAR framework or an error correction model (ECM) (Ang, 2008). A number of variants of these methodologies exist. For example, for times series analyses VAR is widely used when the dataset is not cointegrated. With cointegrated time series datasets VECM is usually applied. The application of the generalized linear (GL) regression method is also common. This study differs from previous studies in that it employs both panel and time series approaches. However, both approaches, like any other methodology, suffer from biases. Several main biases associated with the panel approach and their corresponding remedies will be summarised in Chapter 5. The recently developed econometric technique of Im-Pesaran-Shin (IPS) panel unit root test will also be used to test the macroeconomic properties of the panel data.

For the time series approach, Ram (1999) suggests that future research on the FD and growth topic should include a greater focus on specific individual country studies. Padhan (2007) states that "Modeling the dynamic relationship among time series variables could be well established through various time series techniques" (p.743). Thus, the econometric techniques of Augmented Dickey-Fuller (ADF) for unit root, and Johansen and Juselius (JJ) for cointegration will be applied to test the time series properties of the dataset. This testing will help determine whether to employ the VAR or vector error correction method (VECM) estimation procedure. The Granger-

causality analysis will also be performed to test the hypothesized causal relationship between FD and economic growth.

Though a large number of growth studies on developing countries employ the cross sectional modelling framework, the time series approach is also used for country-specific empirical studies. Based on a survey of recent developments in the finance-growth literature by Ang (2008) it is evident that the methods of VAR and Granger causality, VECM and ECM are commonly used for time series studies. For the panel analyses, random effects (REs), fixed effects (FEs), and instrument variable (IV) with generalized methods of moments (GMM) are widely applied. In addition, the OLS and GL are often used as estimators. However, as none of the reviewed studies used the REs within the framework of GS methodology with PCSEs as the estimator, this study employs this procedural set to estimate the panel specifications.

2.10 Chapter summary

This chapter reviewed and synthesised the extant literature on finance-growth nexus. After covering the genesis of the finance-growth nexus issue, where the early works of Bagehot (1873) and Schumpeter (1912) laid the groundwork in this area of research, the extant literature was appraised. The five major views in the finance-growth literature, which are tested with new datasets and robust approaches in this study, were summarised (Table 2.1). This was followed by discussion on the theories related to financial intermediary and economic growth. The endogenous growth theory and the financial intermediary theories which this study relies on were described. The rationale for the formulation of the H0s posed in Chapter 1 was presented.

Gaps in the literature based in particular on Levine & Zervos (1998) and Gani's (1998) studies were identified. Furthermore, the variables of interest, their measurements plus their expected relationship relative to the dependent variable based on theory and empirics were presented. Finally, the two commonly used econometric approaches i.e. panel and time series which are applied in this study were explained. The selection of methodology depends on whether the data employed is pure cross-country, panel, or time series. Growth equations typically employ pure cross-country and panel analyses while time series analyses mainly

adopt a VAR framework or an error ECM. In Chapter 5 the REs modelling framework with PCSEs as estimator will be used. In Chapter 6, the final methodology either VECM or VAR will be determined with the tests of unit root and cointegration.

CHAPTER THREE

FINANCIAL AND SOCIO-ECONOMIC DEVELOPMENTS IN THE MSG ECONOMIES

3.1 Introduction

This chapter supplements the literature review presented in Chapter 2 by providing specific background and context for the MSG countries. Chapter 3 is structured as follows. Section 3.2 describes the geographical setting. Governance and legal structures are discussed in Section 3.3. An overview of the MSG economies and their financial sectors is given in Section 3.4. International trade and issues related to economic integration are discussed in Section 3.5. The key financial and socio-economic developments that prevailed in the MSG countries during the last three decades are explained in Section 3.5 and Section 3.7 summarises the chapter.

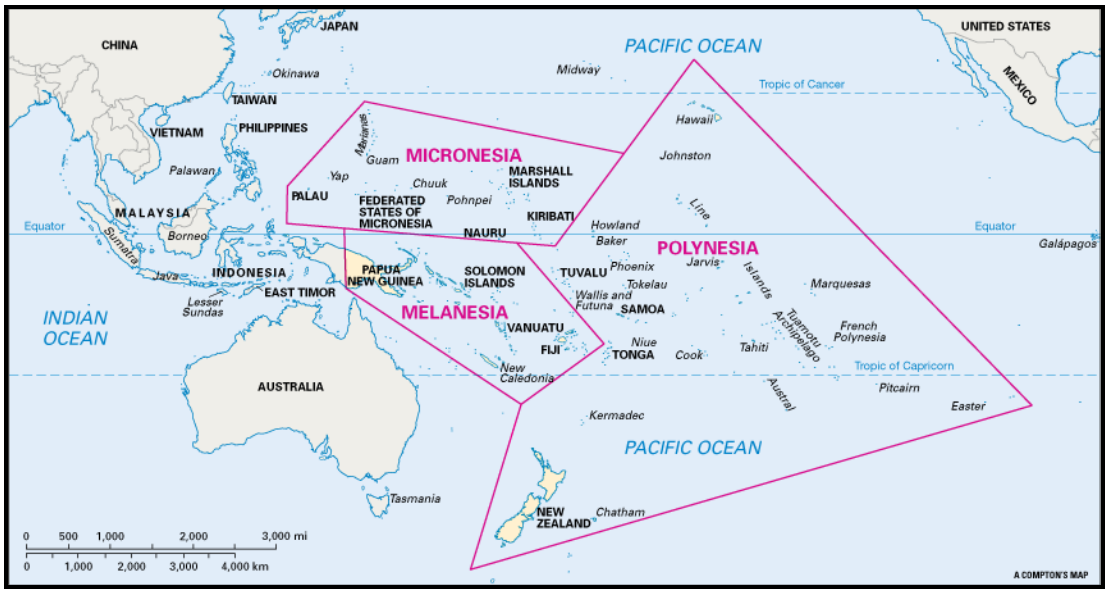
3.2 Geographical setting

The geographical setting of the PICs stretch from the Mariana Islands in the northwest through Micronesia and PNG in Melanesia to New Caledonia and Tonga in the south and French Polynesia in the east as shown in Figure 3.1. The PICs are located south of the Tropic of Cancer and are widely dispersed over the vast Pacific Ocean. The Pacific region comprises around 20,000 to 30,000 small islands[34]. These islands make up 22 small island nation-states and territories of their own, with an approximate combined total population of 10 million in 2010 (Bedford & Hugo, 2012), 550, 562 square kilometres of land and 29,523 square kilometres of sea (Dalzell et al., 1993). By international standards Pacific countries and territories range from being small to very small and are often considered as microstates[35].

[34] With Australia and New Zealand the region is referred to as Oceania.

[35] Those island countries with populations of less than two million persons are classified as microstates Wood (2010). Fiji, Solomon Islands and Vanuatu are classified as micro-states.

Figure 3.1: The geographical setting of the Pacific region



Source: Britannica (2014)

While the issue of smallness is subjective, some studies suggest that a country's population is the primary measure of a country's size with GNP the secondary measure (e.g. Srinivasan, 1986). This study, however, opted for real GDP as the primary measure of a country's economic size. This is because real per capita GDP is one of the key proxies for economic growth used in growth studies besides capital accumulation and productivity growth as stated in Chapter 2. Based on factors such as cultural and racial lines these diverse island countries and territories are further categorised into three major sub-regional groupings: Melanesians; Polynesians; and Micronesians. These groupings, and the respective countries and territories they comprise, are shown in Figure 3.1. For instance, PNG, Fiji, Solomon Islands, Vanuatu and New Caledonia make up the Melanesian grouping[36].

As the Pacific region is so diverse it is not practical to deal with all of these small island countries in-depth and thus, this study is restricted to the MSG countries. In Russell's (2011) words, "Melanesia is dominated by relatively large, high islands, containing more than 98 percent of the total land area of all Pacific islands and about

[36] The Micronesian islands are: the Federated States of Micronesia, Marianas, Nauru, Wake Island, Guam, Palau, the Marshall Islands and Kiribati. The Polynesian islands are: Hawaiian Islands, Rotuma, Midway Islands, Samoa, American Samoa, Tonga, Tuvalu, the Cook Islands, French Polynesia and Easter Island.

82 percent of all Pacific islands population" (p.38). However, New Caledonia is excluded from this study as it remains a French colony.

A few past studies on growth related topics involving the MSG countries have treated them as belonging to an homogenous group (e.g. Lahari, 2010; Yang et al., 2013). This study also does the same and in doing so addresses the dangers of drawing statistical inferences based on panel studies that implicitly treat different economies as homogenous entities (Demetriades & Hussein, 1996). Statistical analysis of homogenous groups results in drawing reasonable statistical inferences. This in turn leads to valid conclusions. Thus, it is expected that this study's findings will result in valid policy conclusions. Table 3.1 provides the year of independence, the names of the former colonial powers and land mass for the MSG countries.

Table 3.1: MSG countries: year of independence and landmass

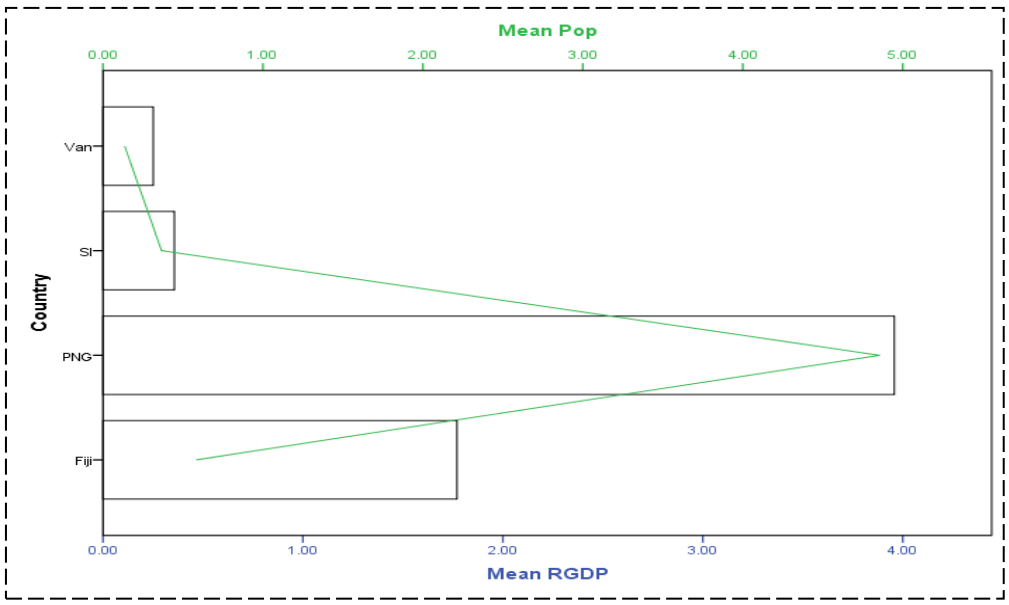
Item	PNG	Fiji	Solomon Is	Vanuatu
Capital	Port Moresby	Suva	Honiara	Port Vila
Independence year	1975	1970	1978	1980
Colonial power(s)	Australia	Britain	Britain	French/Britain
Landmass (km^2)	463,000	18,300	28,900	12,200

Source: Beck & Demirgucc-Kunt (2009); Stewart (2006); UNDP (2014); Costa & Sharp (2011).

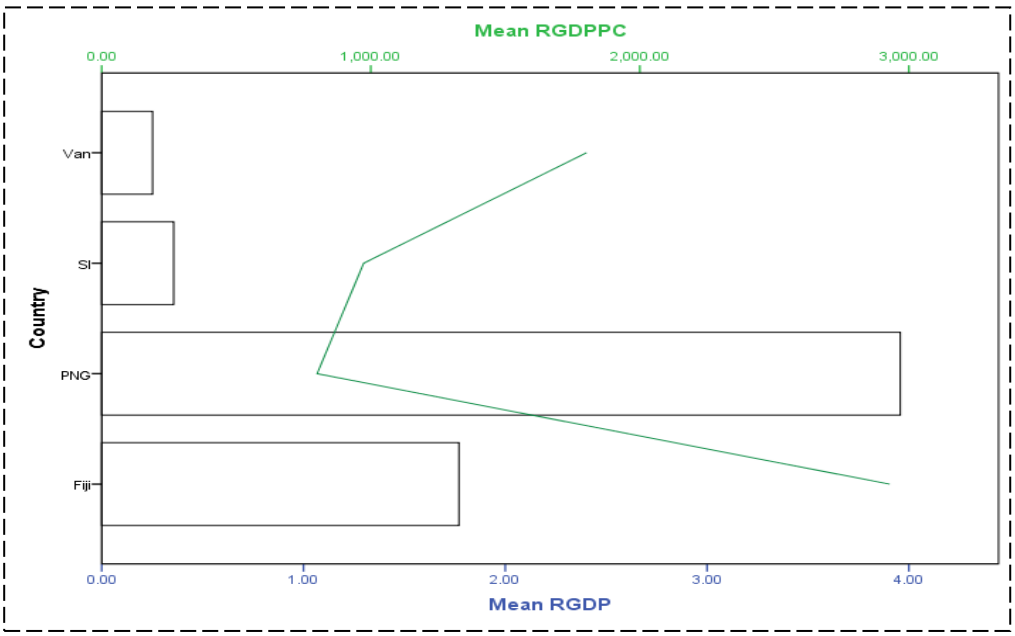
Among the PICs, PNG remains the largest in terms of landmass (463,000 km^2), population and real GDP (Costa & Sharp, 2011). Fiji is the leader in terms of real per capita GDP. This is because the distribution of real per capita GDP depends on real GDP and the size of the population, and Fiji has a relatively low population of close to one million (in 2010) compared to PNG's more considerable population of 7.5 million people (in 2010). According to Chand (2004), in 2011 Vanuatu topped aid per capita with US$ 157, followed by Solomon Islands with US$ 137, PNG next with US$ 39, and Fiji last with US$ 32. Using the mean values, the size of the MSG economies in terms of population, real GDP (bars and blue labels) and real per capita GDP are illustrated in Figure 3.2. The GNP (or sometimes GDP) per capita measure is used to determine whether a country falls into the low, lower-middle, upper-middle and high-income brackets. In the case of the MSG countries, Fiji clearly leads the way as it falls in the lower-middle income category.

Figure 3.2: Size of MSG economies by population, real GDP and real per capita GDP

Panel A: Population and Real GDP (mean values): 1976-2010



Panel B: Real GDP and real per capita GDP (mean values): 1976-2010



Source: Developed with the dataset sourced from Word Bank, IMF and UNDATA.

As shown in Panel A, though the PNG economy is the largest in terms of population (represented by the green line with green labels) and real GDP (as shown by the bars) it is the least in terms of real per capita GDP as shown by the green line in Panel B. As shown in Panel B, Fiji has been the leader for the last three decades followed

distantly behind by Vanuatu. When compared to other developing economies in the EAP region the PNG economy is relatively small in terms of real GDP and population. Notable characteristics common to PICs are summarised in Table 3.2. The MSG countries are characterised by the presence of a dual economy, where a formal sizable monetised economy and an informal semi-agricultural (subsistence) economy co-exist.

3.3 Governance and legal structures

In this section governance and legal structures of MSG countries are explored.

3.3.1 Governance and the public sector

The MSG countries transitioned to democratic regimes in the 1970s. These countries adopted constitutional democratic governments inspired by the Westminster model where their respective constitutions require the election of members of parliament through universal suffrage (Costa & Sharp, 2011). In PNG and Vanuatu elections are held every five years while in Fiji and Solomon Islands the electoral cycle is four years. Under the Westminster model, the prime minister is elected by the parliament as the head of government and the prime minister in turn appoints the cabinet. The Governor General, who is also elected by parliament, is the head of state for a period of between four in Fiji and Solomon Islands and five years in PNG and Vanuatu.

The naming of the office of Head of State as 'president' makes Fiji more like a republic. Fiji was declared a republic and suspended from Commonwealth membership in 1987 when the second coup occurred. Fiji has had four coups in the past two decades: two in 1987 led by Sitiveni Rabuka; one in 2000 led by George Speight; and one in 2006 led by Frank Bainmaramara. Ethnic divisions between the indigenous Fijians and Indo-Fijians have been blamed for the successive coups. Since 2006 Fiji has been under military rule. In September 2014 Fiji returned to democratic rule when it held its first democratic elections in eight years. Vanuatu, like Fiji, has a republic type of political model where the Head of State is called the president. The MSG headquarters is located in Port Vila, Vanuatu.

Table 3.2: Some key characteristics of the MSG countries

Characteristics	**Source**
▪ PICs are lower-middle income countries (LMICs) with the exception of low income Vanuatu and are open economies.	Browne (1989)
▪ Dualistic nature of the economies i.e. the co-existence of formal monetized economy and the informal economy.	Author
▪ Highly vulnerable to the vagaries of natural disasters such as cycles.	Tavola (2012)
▪ Vulnerable to the volatilities in international commodities prices and heavy reliance on trade (exports and imports).	Reddy (2010)
▪ Each country in the Pacific region claims a 200 mile Exclusive Economic Zone (EEZ).	Costa & Sharp (2011)
▪ Highly dependent on overseas aid assistance (AID), FDI, tourism and remittances.	Bertram & Raymond (1985)
▪ Illiquid capital markets with high levels of market frictions e.g. high transaction, monitoring and currency conversion costs.	Demirgüç-Kunt & Levine (2004)
▪ Worsening law and order related problems particularly in PNG and Solomon Islands.	Chand (2004)
▪ High income inequality and low rate of income growth.	Chand (2004)
▪ Limited opportunities for economic diversification due to barriers imposed by smallness and distance (isolation).	Armstrong & Read (2003)
▪ High levels of political instability, poor governance and rising levels of fraud and corruption in countries like PNG.	Dinnen et al., (2006)
▪ Lagging social and economic indicators and poor economic infrastructure.	Haque & Packard (2014)
▪ Heavy dependence on agriculture, tourism and natural resources.	Haque & Packard (2014)
▪ Culturally and linguistically diverse environments where one third of the world's languages are found in the Pacific.	Dinnen et al., (2006)
▪ High levels of unemployment, low levels of skill human capital and high urban-bound migration.	Haberkorn (2008)
▪ High urban population growth with high fertility rates with PNG registering some of the highest rates in the Pacific.	Haberkorn (2008)
▪ Poor record of attainment of the Millennium Development Goals (MDGs).	Haberkorn (2008)
▪ Low levels of technological advancement and capital base with heavy dependence on agriculture.	Haberkorn (2008)
▪ All the MSG countries are independent small states with their own local currencies and exchange rate regimes.	Wood (2010)
▪ Active banking sector where firms depend heavily on bank credit.	Demirgüç-Kunt & Levine (2004)
▪ High national debts; chronic budget deficits; balance of payments problems; and heavy dependence on imports.	Reddy (2010)
▪ Limited land area, scarcity of natural resources and geographical fragmentation pose serious problems.	Taylor et al., (1989)
▪ Members of the Pacific Islands Forum (PIF) with 14 Pacific islands and Australia and New Zealand.	Freitag (2011)

Source: Developed by the Author from sources as indicated.

The size of the public sector in these island economies is large and it represents a substantial component of the MSG economies. The public sector is a major employer as between 15-20 percent of the formal employment is found in this sector. This leads to criticisms that scarce public resources are soaked up in overblown bureaucracies. Even in developed economies such as Australia the public sector represents a significant component of the economy (Sciulli & Sims, 2008). This is why the public sector in both the developed and developing world over the last two decades has undergone significant reforms to get the size right and make it more effective.

Many developing countries have had to rely on international financial institutions such as the World Bank, ADB and IMF for financial loans to support the public sector. Obligations to reform the economy and a number of its key sectors, such as the financial and public sectors, constituted conditions for the release of such funds. Though reforms have taken place in the MSG countries like PNG a piecemeal approach to instituting reforms had resulted in non-achievement of the intended objectives (Sause, 2003)[37].

The systems of government and governance structures in the MSG countries are fragile and ineffective. Such inherent weakness in governance structures provides an environment conducive for socio-economic problems such as the ethnic conflict in Solomon Islands, to develop and flourish throughout the Pacific. Good governance has positive effects on economic growth (Russell, 2011). On-going political instability and risks of ethnic violence have threatened national unity and caused international isolation for Fiji. The interplay of such issues makes governance standards in the MSG countries more unpredictable or volatile.

3.3.2 Legal structures

Rules and regulations, together with institutions such as the courts that enforce them, form an integral part of the economic infrastructure. Studies have shown that the judicial system can positively influence FD by protecting the rights of creditors and

[37] See, for example, Sause (2003) and Barcham (2002) for details on PNG public sector reforms and Knapman & Saldanha (1999) for public sector and governance reforms in the Pacific particularly for Solomon Islands and Vanuatu.

minority shareholders through efficient and impartial enforcement of contracts (e.g. Dimirguc-Kunt & Levine, 2001). Improvements in contract enforcement lead to lower transaction costs, thereby enhancing equity and debt contracting (La Porta et al., 1997). Regulatory and licensing burdens in developing countries remain obstacles to creating an attractive business climate. Demirguc-Kunt & Levine (2001) demonstrate a strong positive link between the legal and regulatory system and the underdeveloped financial system that countries with poorly operating legal systems tend to have less well-developed financial systems.

Countries with underdeveloped bank-based financial systems are more likely to have French civil legal origins (Dimirguc-Kunt & Levine, 2001). The MSG countries have underdeveloped systems though they had Britain as their colonial power and all have a British common law origin. For instance, as stated by Dinnen et al., (2006, p.88), "The origins of PNG's modern criminal justice system lie in the period of rapid institutional modernisation immediately preceding independence in 1975". The independence of the three arms of government - judiciary, executive and the legislature - is articulated in the constitutions of the respective MSG countries. Though the regulatory frameworks governing private sector investments have been liberalised (Knapman & Saldanha, 1999) there are no separate commercial court systems in the MSG countries to specifically deal with complex commercial litigations.

Confidence in the legal system has positive effects such as public and investor confidence in the management of the overall economy. Thus, legal origin is one exogenous factor considered in growth studies attempting to establish determinants for growth. It can be inferred that inherent weaknesses in the legal and judiciary systems in the MSG countries is one of the factors responsible for the under-development of their financial sectors. In the reviewed literature no empirical study either refutes or confirms this assertion. While legal origin is not included as a factor in this study, it is still important to understand the regulatory and legal structures in the MSG countries because of their influence on financial sector development and economic growth.

3.4 MSG Economies and their financial sectors

The structures and composition of the MSG economies and their financial sectors is analysed in this section, starting with an overview in subsection 3.4.1. This is followed by country-specific analyses: PNG in subsection 3.4.2; the Republic of Fiji Island in subsection 3.4.3; Solomon Island in subsection 3.4.4; and Vanuatu in subsection 3.4.5. More detail is provided for the PNG economy because (besides its inclusion in the panel data analysis) it is further examined under the time series component of this study. In addition, it is important to point out here that attention will be placed on the PNG economy in developing the structures. Given the similar economic and financial sector arrangement in all the MSG countries, when the financial sectors of its three MSG counterparts are examined reference will be made to the PNG structure.

3.4.1 Structures of the MSG economies and their financial sectors

As the structure of a country's financial sector is dependent on its economy, the structures of the MSG economies are presented before discussing their financial sectors.

(a) Structure of the MSG economies

At independence many PICs established open trading economies (Freitag, 2011). Since independence, government policies of the MSG countries have continued to advocate the maintenance of an open economy. This openness will be captured in the conceptual model developed in Chapter 4. By virtue of their membership of the IMF and WTO[38] the MSG countries are obliged to make commitments to open up key sectors of their economies, such as their financial services sectors. Like many developing countries, the MSG economies are dual in nature. This duality is due to the co-existence of a large informal semi-agricultural sector and a sizable formal monetized economy (DFAT, 2014). The bulk of the population in the majority of the PICs lives in rural areas and draws their livelihoods from subsistence farming. Based on 2001 data the proportion of the total population dependent on the agricultural sector has been highest for PNG (87%) followed by Solomon Islands (84%), Fiji (80%) and Vanuatu (79%) (Chand, 2004).

[38] The MSG countries are active members of WTO.

Given the significance of the informal economy the conventional five-sector income model that is based on the macroeconomic theory of open economy will be modified by incorporating the informal economy as a sixth sector and by further incorporating Levine's (1997) theoretical approach to finance and growth framework this study's conceptual model will be developed. The openness of the MSG economies will be represented by the overseas (foreign) sector in the model.

The operation of an official exchange rate regime facilitates international trade and flow of funds between an economy and the rest of the world. Of the varied types of exchange rate regimes available the pegged (governments fixing their country's currency to another currency) and floating (where market determines movements in exchange rate) exchange rate regimes are found in the MSG economies. A pegged regime is used in Vanuatu, Solomon Islands and Fiji where they peg their currencies to a trade weighted basket of currencies of its major trading partners[39] (Jayaraman, 2004) while the floating regime is practised in PNG. The economic circumstances that led to the conversion from fixed exchange rate to floating exchange rate regime in PNG in September 1994 will be discussed in Section 3.2.

However, no exchange rate regime is immune from balance of payments (BOP) crisis or shocks. Hence, many countries in the Pacific region, including those studied, like other developing nations elsewhere have confronted chronic adverse BOP positions over the years. This has forced their respective governments to seek help from international financial institutions such as the World Bank and IMF to correct their BOP crisis (Gani, 1996)[40]. Such financial borrowings have made the recipient countries heavily indebted to their lenders.

In the MSG countries the monetary authority is vested in the central banks while the fiscal authority is exercised by the government. However, like the situation in many developing countries the alignment between fiscal and monetary policy remains a significant challenge. Of the six PICs which have independent national currencies four are the MSG countries and the remaining two are Samoa and Tonga (Jayaraman

[39] For instance, the Fijian dollar is pegged to a basket of the US, Australian and New Zealand dollars, the euro and the Japanese yen (Jayaraman, 2004).
[40] Gani (1996) discusses problems such as the GOP crisis that have confronted many PICs.

& Choong, 2009). To give an idea of how much each local unit is worth against one US dollar, the average rate for the period of study in local currency unit (LCU) for each country was computed[41]: PNGK 1.74; FJD 1.50; SBD 3.88; and VUV 110.32[42]. Overall, the productive sectors where the Pacific has a comparative advantage are tourism, fisheries and agriculture (Angelo, 2011). Enhancing the performance of these sectors to boost economic productivity and output remains a formidable challenge for the MSG countries and their governments.

(b) Structure of the MSG financial sectors

Government policies of the MSG countries advocate the maintenance of more liberalised and competitive financial services sectors. The financially open MSG economies are less developed than some of their peers. They are also relatively small in global terms. "The banking and financial sectors of the Pacific island microstates are relatively small, and largely domestically funded and unsophisticated" (Wood, 2010, p.5). The formal domestic financial sector structures are structurally similar to the one that will be developed for PNG in the next section.

In terms of financial regulation all the MSG countries have a single, all-embracing financial regulator in their respective central banks: the Bank of PNG (BPNG); the Reserve Bank of Fiji (RBF); the Reserve Bank of Vanuatu (RBV); and the Central Bank of Solomon Islands (CBSI). These monetary authorities, besides the conduct of monetary policy as their core function, assume a wide range of regulatory functions such as licensing and supervising of banks and NBFIs. This regulatory regime can be contrasted to the Australia's "twin-peaks" model of regulation where APRA is responsible for all prudential regulation while ASIC is responsible for business regulation, market conduct and supervision. The RBA has overall responsibility for monetary policy, the payments system and financial system stability. Nonetheless, recent global events such as the GFC have indicated that no single financial structure provides immunity against the underlying causes and risks that trigger financial or banking sector crisis.

[41] Data for the exchange rates were obtained from Beck et al., (2010).
[42] PNG Kina and toea (PNGK) was introduced in 1975; Fiji dollar (FJD) was introduced in 1970, Solomon Islands dollar (SBD) was introduced in 1977; and Vanuatu vatu (VUV) was introduced in 1981.

In recent years the central banks have also actively promoted financial inclusion policies such as financial literacy to ensure low-income households have access to affordable financial services by virtue of their membership to the Pacific Islands Financial Inclusion Working Group (PIWG). PIWG was formed in 2009 by the central bank governors of Fiji, Samoa, Solomon Islands, Vanuatu, Papua New Guinea, Tonga and Timor Leste. PIWG is administered by the Alliance for Financial Inclusion (AFI) and supported by the Pacific Financial Inclusion Programme (PFIP). PFIP is jointly managed by the UN Capital Development Fund (UNCDF) and the United Nations Development Programme (UNDP) and funded by the Australian government, the EU and the New Zealand government. PFIP operates out of the UNDP Pacific Centre in Fiji and has offices in PNG and the Solomon Islands.

The financial services sector in each MSG economy is well regulated under their respective prudential regulatory frameworks. While the MSG central banks use relevant laws to govern the operations of their financial institutions, their functions, powers and responsibilities are specified in their respective central bank acts. For example, the Central Bank Act 2000 (as amended) governs the operations of the BPNG and BPNG administers the Banks and Financial Institutions Act (BFIA) 2000 (as amended) to in turn govern the operations of banks and other FIs. The central banks also have responsibility for systemic stability and payments supervision.

As previously discussed, the financial system is composed of several components including FIs, central bank and regulatory bodies and financial markets. This applies to the MSG economies and by fully incorporating these key components, the structure of the PNG financial sector will be explained in the next section. Again, as a very similar financial sector structure to that of PNG characterises the financial sectors of its MSG counterparts, reference will be made to the PNG structures when the financial sectors of its three MSG counterparts are examined. The four financial proxies employed here are assumed to capture the effects of the interaction of the components of the financial sector as there is deep interaction amongst them.

The prudent regulation of the financial sector is considered critical to achieve and maintain systemic stability. In practice, a wide variety of regulatory and supervisory models are found in different countries around the world. According to Wheatley,

(2011) "while global regulatory structures may converge and diverge, the common, fundamental objectives remain the same - the protection of investors, and maintaining a safe and sound market" (p.6). As Bebenroth et al., (2009) argues "it still remains an open question as to what accounts for a "first best" in banking regulation and supervision" (p.184). It is therefore not surprising that different countries have chosen different regulatory regimes.

Though whether an economy is bank-based or market-based has no overall empirical support (Ang, 2008), the key question remains: what category in terms of either bank-based or market-based do the MSG countries' financial structures fall into? According to Demirguc-Kunt & Levine (2001)[43] based on the structure and level of development of their financial systems different countries can be broadly categorized into one of the following groups: (1) under-developed and bank-based; (2) under-developed and market-based; (3) developed and bank-based; and (4) developed and market-based.

Demirguc-Kunt & Levine's (2001) study used newly collected data on a cross-section of up to 150 developing and developed countries to illustrate how financial systems differ around the world. To determine whether a country was bank-or market-based and the status of development of the market structure or the banking sector, they computed key measures such as the size, efficiency, and level of activity of the stock markets, banks and FIs. Based on these crude measures the sampled countries' financial systems were classified as underdeveloped if a particular country had poorly developed banks and markets.

Though there is no empirical study in the reported literature to date (to best of author's knowledge) that investigates whether the studied countries are bank-based or market-based, it can be inferred that the MSG economies are bank-based and underdeveloped. By international comparisons the countries sampled in Demirguc-Kunt's study were characterized by small and underdeveloped equity markets. These markets were less active, illiquid, segmented and inefficient relative to their

[43] Though the work by Demirguc-Kunt & Levine (2001) is the first systemic examination of financial structure and economic development since Goldsmith's work in 1969, none of the MSG countries were included.

domestic banks. In the absence of active markets the commercial banking sector plays a more important role in the real economy in terms of funnelling credit to the private sector. Demirguc-Kunt & Levine (1996) also contend that research on the link between finance and growth focuses significantly on FIs, as in the vast majority of the developing countries the central banks and banks compose the majority of the financial services sector.

According to Fry (1997) "A key stylised fact about financial systems in developing countries is that they are denominated by commercial banks" (p.754). Evidence shows that as countries develop financial sectors tend to become more market-based. The MSG economies are characterized by inherent structural rigidities and market frictions resulting in high transaction and information costs. PNG's economy and its financial sector are discussed next.

3.4.2 PNG's economy and its financial sector

The developments that occurred in the PNG economy during the period studied and the structure of the PNG economy is explored first. This is followed by an analysis of the PNG's financial sector and its components plus a review of the developments encountered by the financial sector throughout the period studied.

(a) Economy: structure and developments

Prior to independence the predominant activity in many PICs was agriculture (Browne, 1989). PNG's local economy depended heavily on copra and rubber, and the bulk of the readily available cheap labour worked in copra and rubber plantations (Gregory, 1981). Mining companies were established to exploit several raw materials and these companies together with missionaries and the Australian government brought about enormous change in the indigenous way of life (Gregory, 1981). The advent of colonial administration triggered positive effects on the indigenous socio-economic system with the emergence of many other economic activities such as the operation of informal small businesses (Strathern, 1979). It was during this pre-independence period that the foundation for the dual economy in PNG slowly took shape. The other three MSG countries underwent a similar process.

PNG's open economy status after independence was marked by the introduction of its own currency (kina and toea) and the adoption of a fixed exchange rate regime where the local unit was pegged to the Australian dollar. This openness will be represented by the overseas sector in the conceptual framework. The PNG economy is deeply trade dependent on primary exports and manufactured imports. The co-existence of a large informal semi-agricultural sector and a sizable formal monetized economy makes the PNG economy a dual one. The formal economy is dominated by large-scale resource projects particularly in the non-renewable resources sector (copper, gold, petroleum, oil and gas), the agriculture sector (tea, coffee, rubber, copra and palm oil), and the fisheries and forestry sectors. The resources sector accounts for nearly two-thirds of PNG's total export earnings, while the commodities sector generates on average between 20 to 30 percent (BPNG, 2010).

The high dependency on resource revenues by governments and local communities is described by Filer (1998) as 'resource dependency syndrome'. Additionally, the heavy reliance on mineral resources and agricultural commodities makes the smaller PICs highly susceptible to uncertainties associated with world commodity prices where the prices are determined by the interplay of market forces. As these small Pacific economies are not a single major supplier of any of these commodities they have no control over price determinations. According to Kim et al., (2003), the existence of limited competitive diversification opportunities in imports and exports further makes small developing countries more susceptible to sudden fluctuations in terms of foreign demand shocks, international trade, and highly volatile capital flows. MSG economies are therefore no exception. In addition, higher inflationary pressures caused by rises in import prices (imported inflation) coupled with domestically-induced (cost-push) inflation affect these economies.

The PNG economy experienced a period of relative macroeconomic stability after independence up to the 1990s. During the intervening years successive governments made no serious attempt to introduce any major economic reforms. However, in the 1990s the economy was in a bad state due to a broad range of factors: sudden loss of

government revenue due to the forced closure of Bougainville Copper Mine[44] in 1989 (May, 2004); currency depreciation, rising public debt and fast depletion of foreign reserves (Biggs, 2007), which led to a poor credit rating (Sause, 2003); a regional crisis, a series of natural disasters, deterioration in good governance, adoption of bad policies, and the lack of political willingness by political leaders (Hess, 2001; Barcham, 2002; Standish, 2002).

The deterioration in macroeconomic conditions which nearly led to the collapse of the economy resulted in loss of public and investor confidence. However, during this turbulent economic period no single case of bank run or FI failure occurred. The businesses and FIs weathered the crisis well in the absence of any form of government guarantees or support. In an attempt to shore up public and business confidence the Chan Government devalued the local currency in September 1994. Arguably, this was a step towards financial market deregulation. After the devaluation the fixed-exchange rate regime that PNG formally adopted after independence was dropped in favour of the flexible exchange rate system. Though PNG continues to operate under this regime, BPNG periodically intervenes in the interbank market using monetary tools and reserves to avoid excessive fluctuations in the exchange rate. This in turn instils confidence in currency management. Arguably, due to interventions in the forex market PNG does not have a purely float exchange rate regime but rather a managed float.

Further, the national government sought much-needed financial assistance from the IMF and WB to avert the prospect of PNG being declared a 'failed state'. According to Hughes (2003, p.19) "Papua New Guinea has received $US1.3 billion from the World Bank and $US 800 million from the Asian Development Bank". In 2002, the net public debt (inclusive of both domestic and foreign debts) remained at 72 per cent of PNG's GDP (Awili[45], 2007). The new Somare Government formed after the 2002 national elections (which also got re-elected for a second straight term of five-years after the 2007 national elections) made some modest progress in meeting national debt servicing obligations. The funds to retire the debt came mainly from

[44] The Bougainville Copper mine then owned by Rio Tinto was one of the world's largest open pit copper and gold mines at the time of its operations.
[45] Awili is the author of this study.

the receipts of favourable commodity prices i.e. coffee, oil, gas and copra, coupled with enhanced fiscal responsibility on the part of the national government.

Whilst debt servicing is an important national obligation the key question of whether the massive borrowed funds over the years have been prudently managed and invested, or not, by successive PNG governments to grow the economy remains an open question. It is indeed surprising that during the height of the economic crisis in the 1990s, the Chan-led Government made no attempt to introduce any reforms. This is in contrast to other countries such as Japan that restructured their regulatory regimes to manage economic crisis in the 1990s (Bebenroth et al., 2009). Nonetheless, the need for structural reforms in PNG was recognized when the new Morauta Government came into power in July 1999 after a vote of no confidence.

Under Morauta's leadership the government embarked on an ambitious program of economic and institutional reform. The structural reform program targeted three key areas: (1) improving economic management including government debt and fiscal policy restructuring; (2) restoring integrity and efficiency of institutions; and (3) privatising and developing public sector assets. Of these three areas, the first aimed at improving transparency, accountability and the creation of environment conducive for business activity (Daton & Abraham, 2009). The second focused on improving good governance practices, which would lead to effective and efficient delivery of goods and services in the civil service (Sause, 2003). The third area focused on a number of crucial market-oriented financial and economic restructuring programs, which were aimed at enhancing financial sector regulation and the role and independence of the central bank (Barcham, 2002).

The sequential and gradualist approach of corporatization with the objective to eventually privatize (either partially or fully) non-profitable state-owned-enterprises (SOEs) (for example, Telekom PNG, PNG Power, Post PNG, PNG Ports Corporation, and Air Niugini, among others) also came under the government radar. Such reform approaches are consistent with practices elsewhere as the theory of evolution advocates. The reforms targeting SOEs were aimed at ensuring that they were run on a more commercial basis free from political interference. It was hoped this approach would increase transparency, boost operational efficiency and enhance

profitability in the SOEs. Therefore, privatization policy initiatives become part of the third reform program under the financial sector reform agenda.

To facilitate the implementation of the privatization policy, the Independent Public Business Corporation (IPBC) was created as a statutory regulator by the government in 2000. IPBC was charged with the primary statutory responsibility to rehabilitate and corporatize the generally moribund state-owned business entities with the view to making them become more competitive for eventual privatization. Ultimately only the government-owned bank - PNGBC - was successfully privatized in 2000 when it was sold to a banking competitor, Bank South Pacific Limited (BSP). The Morauta Government's reforms were supported with financial and technical assistance by the IMF, World Bank, external donors and development partners such as Australia. After the 2002 national elections when the Morauta Government lost its dominant role in PNG politics the ambitious reform efforts were discontinued. The non-reformist Somare-led government, which formed after the elections and remained in power after the 2007 national elections until 2010, introduced no new structural reforms and did not pursue any of the previous government's reform initiatives.

The question of whether the Morauta Government's relatively short-lived reforms played any role in establishing the foundation of economic and financial structural transformation in PNG remains open to debate. It is clear that the brief financial sector reforms were aimed at improving the efficiency, transparency and productivity levels of the total financial system. The government envisaged that by reforming the total financial sector a more sustained and inclusive growth would eventuate, leading in turn to improvements in overall living standards. Though this policy approach seems to be in line with the *supply-leading hypothesis* there is no empirical evidence to back this up. As summarised in Table 3.3 several developments unfolded in PNG during the period examined. These developments both directly and indirectly impacted the country's financial sector and the real economy. However, the extent and nature of the impacts on financial sector development and real output growth have not been empirically investigated to date by researchers, regulators and policy makers alike, which has motivated the conduct of this research. The financial sector of PNG is examined next.

Table 3.3: Major events: Developments, reforms and crises in PNG

Estimated period of effects	Events
Between 1976 and 2010	World commodity price fluctuations; tripling of the population to over six to seven million; and less reliance on aid.
Around the 1980s	Second oil price shock in the 1980s and subsequent global recession.
Between 1990 and 2000	Effects of the forced closure of the Bougainville Copper Limited (BCL) mine operations; reductions in statutory minimum wages; rising public debt; lower levels of foreign reserves; introduction of World Bank-sponsored Structural Adjustment and Stabilization Programs (SASP); economic crisis that led to significant changes such as the devaluation of the local currency and the subsequent adoption of the floating exchange rate regime in 1994; introduction of structural reforms e.g. macroeconomic, fiscal, governance and financial sector reforms; drive to privatise a number of state-owned enterprises (SOEs). This saw the sale of state-owned bank - PNGBC; and the effects of the mid-1997 Asian financial Crisis (AFC).
Beginning in 2000	The commissioning of the local stock exchange - Port Moresby Stock Exchange (POMSoX); introduction of value added tax (VAT); opening up (deregulation) of several key sectors of the economy such as the communications and air transport sectors. In the mobile phone market new competitive foreign businesses such as Digicel - an Irish-owned mobile phone network provider entered the sector; socio-political reforms including the passage of integrity of political parties and candidates bill to achieve climate of political stability; regulatory changes to develop the domestic securities market and financial intermediary framework. In PNG and other PICs the debt and the equity markets make up the securities (debt and equity) market. Note that other securities markets such as the derivatives market are non-existent with only negligible over-the-counter (OTC) activity is found in forward exchange rate (FER) and forward interest rate (FIR) markets through the financial institutions (as shown Figure 3.2). Non-financial markets such as the commodities markets were not covered by this reform; emergence of financial innovation (e.g. introduction of electronic banking (e-banking) services in the banking industry, mobile phone banking and internet banking); brief deregulation exercise by the central bank (BPNG); attempts to reform the outdated international trade policy framework; and comprehensive review of the public debt portfolio.
Between 2006-2009	Global commodities boom; external economic shocks due to food and oil price upsurge and financial crises such as the GFC.

Source: Batten (2010); Feeny (2005); Wood (2010); BPNG (2010) and based on Author's own knowledge of developments in the PNG economy.

(b) Financial sector: structure and developments

Government policy in PNG advocates for the maintenance of an open financial services sector regime. Though the PNG financial sector is the biggest in the region it is still relatively small in global terms. PNG's all-encompassing financial regulatory framework was mentioned earlier. As outlined in Chapter 2, the financial system is composed of the financial markets, central bank and regulatory bodies, FIs, financial instruments, and market participants. Rapid modernisation of financial systems around the globe due to forces of change such as advances in information-communication-technology (ICT) and internationalisation of financial institutions and markets in the last two decades enabled the emergence of a host of financial products and services. Such products and services range from simple traditional products to more complex financial instruments such as derivatives securities.

The financial landscape both globally and locally has undergone significant changes in the last twenty years. For instance, the MSG countries have witnessed striking structural changes to their domestic financial landscapes and the way in which the financial services sector and real economy function. Table 3.4 describes the changes encountered by the PNG financial sector from post-independence to 1990, and 1991 to 2010. Other MSG countries encountered similar financial sector developments that were experienced by PNG in the period examined.

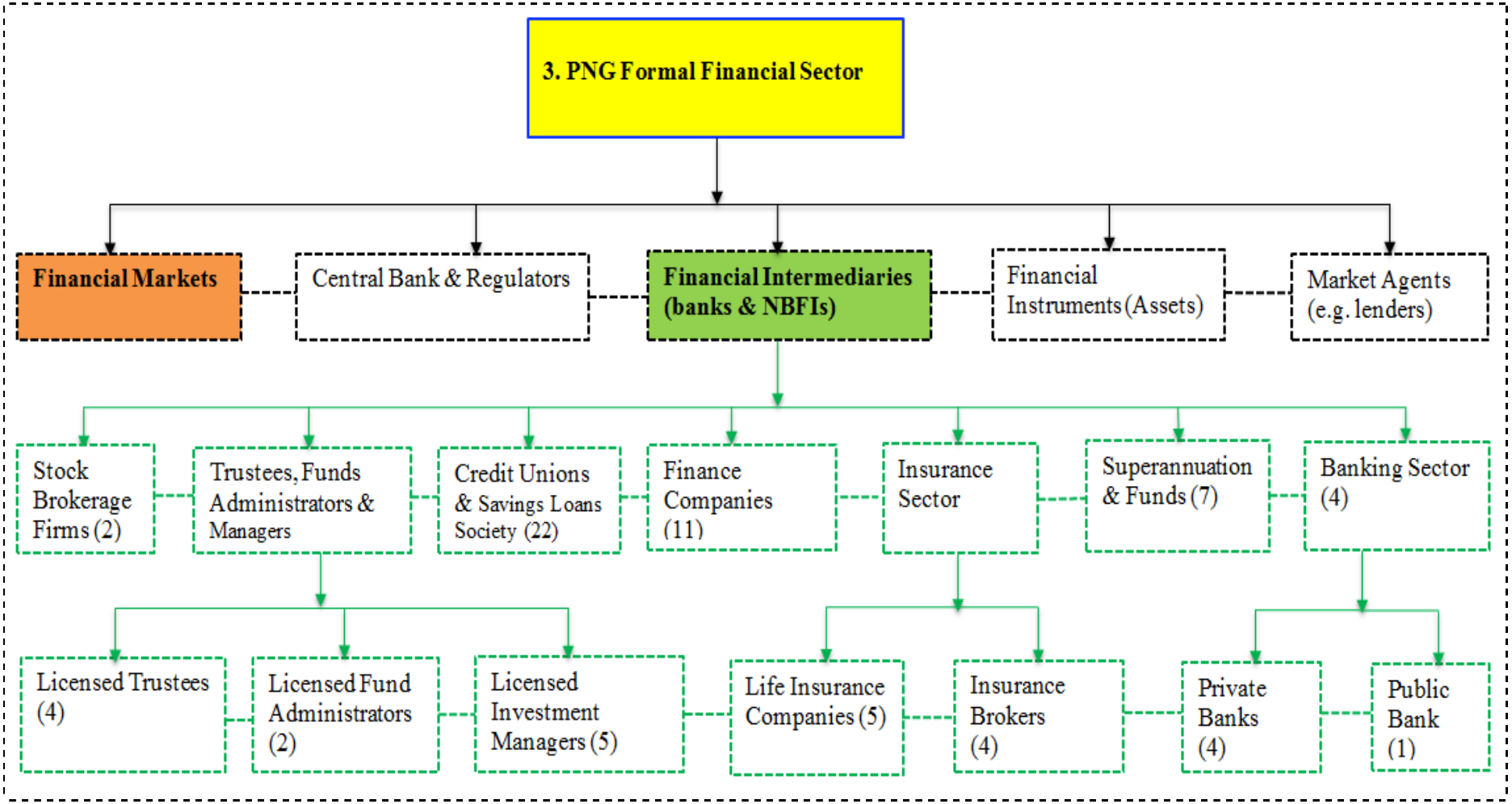
The PNG formal financial sector structure is developed by incorporating the essential components of the financial sector as shown in Figure 3.3. Again, the other three MSG economies have similar financial sector configurations. Other regulatory bodies such as the Securities Commission of PNG (SCPNG) are included in this structure as they also support BPNG to enforce relevant laws, such as the Securities Act 1997, that govern the establishment and operation of stock markets and practices relating to the offering of securities to the public. The key functions of a financial sector, such as savings mobilisation, were captured in Panel B of the theoretical framework. The designation of the PNG domestic financial market in Figure 3.3 is to indicate that the financial sector will be marked with number 3 (in yellow) in the conceptual model in Chapter 4. The numbers in brackets indicate the number of FIs that were in operation at the time of this research. For instance, *"Finance Companies (11)"* indicates that 11 licensed finance companies were in operation.

Table 3.4: PNG financial sector development highlights

Post-independence (1975) to 1990	**1991 to 2010**
Financial system in infant stages.	Financial sector led by the banking sector experienced an average growth of 11% p.a.
More labour intensive e.g. tellers.	More capital intensive: electronic banking e.g. ATM, EFTPOS and internet, mobile/phone banking.
Less branch-agent networking.	Increase in branches, agencies and international money transfer agents such as Western Union.
Highly regulated and less open.	More towards prudential supervisions, deregulation and allowing more competition.
Non-listed private banks with one state owned bank.	Due to introduction of POMSoX BSP became the first bank to be listed on the local exchange.
Foreign owned banks except PNGBC (state owned).	Banking consolidation occurred with BSP's acquisition of PNGBC.
Less sophistication in financial products and services.	Increase in sophistication due to advances in technology and innovations.
Funds and assets under management were less.	A substantial increase in funds/assets under management due to the broadening of financial sector.
Full banking services.	Banks are locally incorporated and offer full banking services.
Limited number of NBFIs and banks.	A significant increase in the number of NBFIs and increase in number of banks.
No micro-finance institutions (MFIs).	Emergence of MFIs. To date MFIs operating as licensed finance companies.
No documented case of a FI failure.	No FI failure despite external economic shocks such as GFC.
No stock brokerage firm.	Emergence of brokerage firms: BSP Capital and Kina Securities.
Securities markets were in an infant stage.	Growth in securities market specifically the government debt market via long-term inscribed stock and short-term treasury bills market and equity market via the establishment of POMSoX.

Source: Based on Author's knowledge of the PNG financial sector.

Figure 3.3: Structure of the PNG financial sector



Source: Developed by the Author in line with the financial sector structural definition this study adopts with information obtained from BPNG (http://www.bankpng.gov.pg).

Of the four private commercial banks - ANZ, Westpac, Maybank and BSP - the largest in terms of market share, revenue and assets is BSP. To date BSP remains the largest nationally-owned publicly-listed company on the local POMSoX by three key measures: revenue, market share (around 55% of the deposit market) and assets. This is followed by Westpac (around 20 percent) and ANZ (around 19 percent). Maybank - the smallest of banks - accounts for the balance (around six percent) (BPNG, 2010).

Though all four commercial banks are locally incorporated they are foreign-owned with the exception of BSP, for which the majority shareholding is in the hands of PNG citizens. BSP significantly improved its competitive position in the PNG banking sector after the acquisition of PNGBC as described earlier. The only state-owned bank in PNG is the National Development Bank (NDB)[46] which started operations in 2000. Though NDB specialises in managing lending portfolios to support the growth of SMEs and the informal economy with funding infusions from the government it is yet to apply for a banking license. This means that to date it operates as a licensed FI. Additionally, as NDB does not accept deposits from the public, the deposits market in PNG is controlled by the four commercial banks. The existence of one or two development financial institutions such as agriculture and development banks compared with commercial banks is a common feature in developing countries (Fry, 1997).

In PNG's superannuation and retirement industry, the National Superannuation Fund (NASFUND) is the largest private sector superannuation (accumulation) fund, followed closely by Nambawan Super. Compulsory superannuation contributions in PNG were introduced in 1982. Employees are required by law to contribute a minimum of five percent of their salary to a superannuation fund while employers with over 20 persons are required to contribute seven percent. It is also mandatory that the investment, fund administration and trustee functions of the superfunds are outsourced to independent service providers. The legislation that governs operations of the superfund industry in PNG is the Superannuation (General Provisions) Act 2000. Similar legislation exists in other MSG countries.

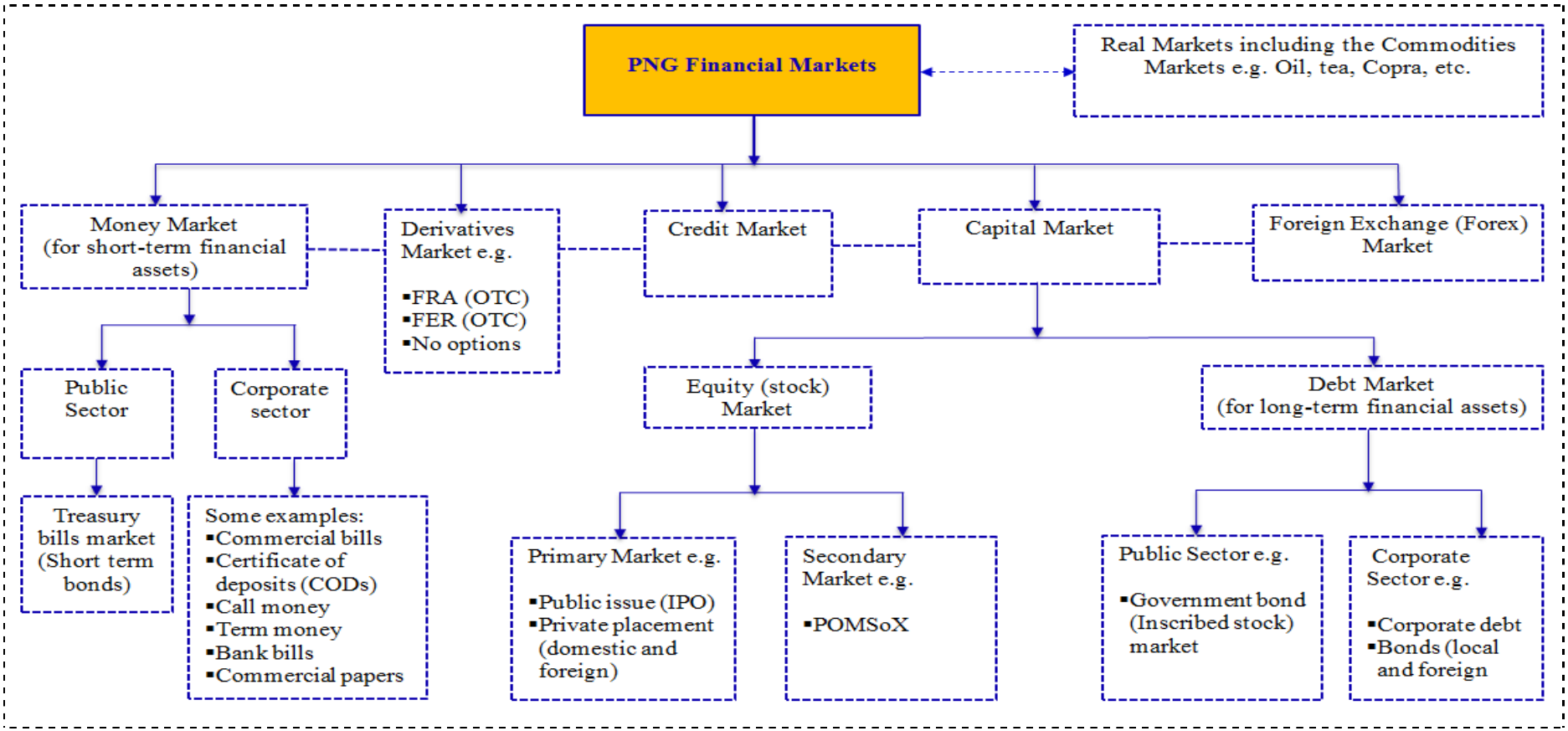
[46] Prior to 2000 NDB was called the Agricultural Bank of PNG.

Financial markets as another important component of the financial sector, is highlighted (in brown) in Figure 3.3. Financial markets include the capital market, comprising equity and fixed-income markets, the credit market, and foreign exchange (forex) market, as well as the new and growing markets for "derivative" securities such as futures, options, and swaps (Merton & Bodie, 1995). An expanded version of the financial market with its structural parts for the PNG economy is given in Figure 3.4. As the economic, financial and market structures for the MSG economies' are reasonably similar, the one developed for PNG will be used as a reference. Obviously, the financial markets of the Pacific are underdeveloped to an extent where they do not provide adequate support for the private sector (Holden et al., 2004). "Pacific island financial markets are not strongly or directly integrated into, or exposed to, international financial markets" (Wood, 2010, p.5). The credit market is an exception due to the heavy involvement and dominance of the banking sector in terms of deposit collection and the channelling of private credit to the productive uses or sectors of the real economy.

The capital markets in the developing economies are characterized by issues such as informational imperfections, structural rigidities, market segmentation and illiquidity (Afonso et al., 2010). Consequently, such markets are considered inefficient and the role of equity markets in the financial intermediation process between the household and business sectors remains small. In the case of Fiji, for instance, according to Chand (2002) the Fijian stock market[47] appears to be relatively inactive in terms of both the number of listed companies and volume of daily trading. In developing economies with underdeveloped financial markets the domestic equity market constitutes a negligible component of the funding source (Choi & Lee, 1996). As a result, the major source of funding for the private business sector comes from the formal banking sector. For instance, the IMF in its 2011 financial system stability assessment of PNG (IMF, 2011) reported that PNG's economy is characterised by a high concentration of banking systems with a lack of secondary markets.

[47] Of the PICs only Port Moresby Stock Exchange (POMSoX) and Fiji with South Pacific Exchange (SPSE) have formal stock exchanges of their own. Electronic trading platforms were introduced recently in these exchanges: SPSE in 2010 and POMSoX in 2009, respectively.

Figure 3.4: Financial market structure of PNG



Source: Developed by the Author with information obtained from BPNG and the extant literature.

The banks' role in accepting deposits from the surplus units (savers), and in turn on-lending to deficit units (borrowers) on the basis of the levels of deposits, can be singled out as the most significant traditional deposit seeking activity. Even in economically more advanced countries such as Australia, where equity markets are active and efficient FIs are present, the domestic credits provided by the banking sector are still heavily relied upon (Hassan et al., 2011). Given the significant roles that banks play in the credit market via the process of saving-investment intermediation, as the Keynesian and Shaw models also theorize, they are further explored in Chapter 4 to build the theoretical model. There is also deep interaction among capital markets, FIs and market participants. Such interaction makes it possible for the design of mix of customized financial products and services by FIs to meet the different liquidity needs and risk tolerance levels of market participants.

In regards to the PNG domestic debt market the government securities market emerged in early 2000 mainly in terms of the short-term treasury bills and the government long-term bonds (or inscribed stock) markets. This happened when the central bank off loaded short-term treasury bills to the active secondary players such as licensed stock brokers. The two licensed stock brokers (as shown in Figure 3.3) who are members of the local exchange (POMSoX) that BPNG initially contracted to participate in this secondary short-term government bond issuance exercise were the BSP Capital and Kina Securities Ltd.

Three key reasons for transferring short-term treasury bills to private players are: (1) to boost growth of the secondary debt market; (2) to manage financial risks associated with foreign borrowing i.e. to reduce excessive interest expenses and increase domestic borrowing capacity; and (3) to concentrate on the core business of conducting monetary policy, regulating the financial sector and supervising the payments system (both domestic and international) (Awili, 2007). The third aim reflects BPNG's vision: *The Bank of Papua New Guinea is a Contemporary Central Bank and Regulator employing best practice in Development of Monetary Policy, Financial Sector Supervision and Payments System*.

As part of the PNG government's domestic debt portfolio management strategy the long-term government debt market has in recent years surged due to the transference

of short-term debt to long-term with the issuance of more inscribed stocks. Most of the domestic firms, such as the superfunds, invest in government securities i.e. in the long-term government bonds and short-term treasury bills. Because there is no secondary market for debt securities in the Pacific most of the holders of debt securities hold them until maturity (Jayaraman & Choong, 2009). Consequently, the commercial bond markets are very thin and underdeveloped. After 2010 a medium-term debt management strategy was developed to facilitate growth of the domestic debt market, however, this will not be covered in this thesis as it is outside the period studied.

Given the analytical difficulty in reconciling the financial market and the real market, the link between the two constructs - finance and growth - is assumed to be interdependent (as shown in Figure 3.4). It is assumed that the effects of the small financial markets in the MSG economies are captured by the financial sector development, while the effects of the real market are captured by the growth in real GDP. Labour markets are also part of the real market. Due to the significant role that the real market plays, especially in terms of facilitating the flow of goods and services from producers (private sector) to consumers (household sector), it is included in the circular flow of income model. This is in line with the theory of monetarism which postulates that the level of real income in the long-run is determined by the interaction of the forces of supply and demand in all the markets i.e. factor markets including labor markets and financial markets. The conceptual model that will be developed in Chapter 4 will also incorporate this structural link between the economy and the real market.

In developing countries the presence of illegal exchange rates gives rise to forex black markets. Consequently, studies use a black market premium variable to specifically account for the effects of the difference in value between official exchange rates and illegal exchange rates. This variable has been omitted here because of data constraints. A limited number of authorized FIs actively participate in the forex market and its activities are closely regulated by the central bank. In PNG the four commercial banks and two NBFIs (i.e. First Investment Finance and Moni Plus Ltd) were authorised forex dealers while six other NBFIs were authorised to collect and change foreign currencies.

After the GFC in 2008 the NBFIs have been referred to as 'shadow banking institutions'. During the height of the crisis, the shadow banking sector came under heavy criticism from the IMF and other regulatory bodies for a lack of regulation. Interest in subjecting the NBFIs to full prudential regulatory oversight, similar to how the authorised deposit-taking institutions (ADIs) are regulated, has surged after the GFC. Regulatory changes were afoot at the time of this research in developed countries such as Australia to bring the NBFIs under the same regulatory spotlight as the highly regulated commercial banks.

3.4.3 The Republic of Fiji Island's economy

Fiji's economy is also an open one, and again, this openness is represented by the overseas sector in the conceptual framework. Fiji is the most developed country in the Pacific region and has a more liberalised financial sector. The duality of Fiji's economic configuration, like its other three Melanesian counterparts, will be captured in the conceptual model. Due to its geographical location and quality of its infrastructure, Fiji plays the role of administrative centre for the region, with the headquarters of several regional organisations like the Pacific Islands Forum Secretariat (PIFS) located there.

Nonetheless, according to Reddy (2010) several key socio-economic developments that affected Fiji's growth performance over the period analysed include: natural disasters; chronic budget deficits leading to high government debt of 52% of GDP; high fiscal spending and less capital spending; political instability due to a series of military coups; adverse global and regional economic shocks such as GFC; erosion of preferential market access and expiry of trade agreements; slow progress on economic and structural reforms; declining infrastructure and lack of economic diversification; strong international competition particularly from Asian economies; and legislative changes such as minimum wage regulation. In addition, long-term problems include: low investment; uncertain land ownership rights; and government's lack of clear direction in development (Singh et al., 2010).

Fiji's economy is dependent on five key productive industries: agriculture, particularly the sugar and cane industry; forestry; fishing; garment manufacture (textile, footwear and clothing); and tourism (Reddy, 2010). Agriculture has

traditionally been the backbone of Fiji's economy, like its counterparts, with sugar cane as the main crop. Sugar cane in Fiji is grown on small farms leased by predominantly Indo-Fijian farmers from indigenous Fijians. The tourism sector is the next biggest contributor accounting for around 20 percent of Fiji's GDP. Remittances also constitute a significant part of Fiji's economy (Chand, 2004). Throughout the period examined a broad range of factors including those identified above adversely affected Fiji's productive sectors, the financial sector and the broader economy in general. According to Watters (1969) the Fijian economy is also weak in technical development, training and education is poor, and rural communication is inadequate.

Fiji also has an open financial services sector regime. Jayaraman & Choong (2009, p.147) state that "Fiji's financial sector comprises three major sectors, namely the banking system, insurance industry and non-bank financial institutions". At the time of this study, Fiji's banking system consisted of five commercial banks: Australia and New Zealand Banking Group (ANZ); Westpac Banking Corporation (Westpac); Bank of South Pacific (BSP), which is headquartered in PNG; Bank of Baroda (BOB); and Colonial National Bank. All these banks are foreign owned private banks. There are three non-bank licensed credit institutions, two life insurance companies, eight general insurance companies, five insurance brokers and a state-sponsored pension fund known as Fiji National Provident Fund (FNPF) (Jayaraman & Choong, 2009).

One notable exception though is that Fiji had to discontinue quantitative restrictions (such as fixing credit limits and controlling deposit and lending rates) in the early 1990s, which had been introduced in the late 1980s as part of its financial sector liberalisation program (Jayaraman & Choong, 2009). Fiji's financial sector structure is similar to that developed for PNG (see Figure 3.3). Fiji's suspension of membership to the PIF since 2009 following their military coup was lifted by the PIFS leaders after its democratic election in September 2015. This also enabled Fiji's readmission into the Commonwealth.

3.4.4 Solomon Islands' economy

The Solomon Islands economy is also an open one, represented in the conceptual framework by the overseas sector. Solomon Islands also has an open financial services sector regime and dual economy, which has been taken into account in developing the conceptual model. Like its MSG counterparts, a vast majority of the population (around 80%) of Solomon Island's population depend on subsistence farming and fishing for their livelihood. Important cash crops and exports include copra, timber, palm oil and fisheries. Logging is the mainstay of the economy accounting for around 44% of the country's GDP. Exploitation of the rich fisheries offers the best prospect for further export and domestic economic expansion.

Tourism is another important sector, particularly diving. However, growth in tourism is hampered by lack of infrastructure, transportation limitations and security concerns. Conflicts in mid-2000 had adverse effects on the economy. Solomon Islands also depend heavily on foreign aid. The principal aid donors are Australia, New Zealand, the European Union, Japan and the Republic of China (Taiwan). To avoid repetition structure of the Solomon Island's financial sector is not discussed further here as its configuration is in many respects similar to that of PNG.

Notable socio-economic developments that prevailed during the study period are: the second oil price shock and subsequent global recession; a series of financial and balance of payments crises between 1980 and 1990; ethnic conflict between 1999 and 2004 that led to consequences such as corruption, downward economic spiral and deterioration of law and order; on-going world commodity price shocks; on-going political instability and corruption; heavy reliance on foreign aid; the advent of financial and banking innovation i.e. electronic banking services, phone and internet banking; external economic shocks due to food and oil price upsurge; financial crisis such as the AFC and the recent GFC plus economic and public sector reforms (Kabutaulaka, 2001; Knapman, 1999).

3.4.5 The Republic of Vanuatu's economy

The Vanuatu economy is also an open one and this openness is represented by the overseas sector in the conceptual framework. A vast majority of Vanuatu's

population (around 80%) is dependent on subsistence agriculture just its other MSG counterparts. The main agricultural exports are copra, beef, cocoa and kava[48]. As for its three Melanesian counterparts this heavy dependence on the agricultural sector gives rise to duality in its economic configuration, which is shown in the conceptual model. Similar to Fiji, Vanuatu's tourism sector is an important contributor to its GDP. The majority of tourists come from the two advanced neighbouring economies in the region: Australia and New Zealand.

Successive Vanuatu governments since 1997 have implemented a comprehensive reform package with the assistance of the ADB. This restructuring was aimed at right sizing the public sector and encouraging foreign investment. As Vanuatu's recurring budget and trade deficits are largely funded by overseas aid the donor community was also behind the push for reforms. The main donors are Australia, France, the EU, New Zealand and Japan. Figure 3.5 shows the aid dependency trends over the years 1974 to 2004. Vanuatu also has an open financial services sector. Again Vanuatu's financial sector structure will not be discussed separately its configuration is comparable to that developed for PNG.

The offshore finance centre established in Port Vila in the early 1970s is used as a tax haven by international bankers and trust companies. This suggests that one main source of income for Vanuatu's economy is the financial services sector. Notable socio-economic developments that prevailed throughout the period of study are: comprehensive economic, public sector and governance reforms starting in the 1990s; macroeconomic instability and corruption; rapid external debt growth between the mid-1980s and mid-1990s; and the financial crises of the AFC and GFC (Knapman & Saldanha, 1999).

3.5 International and intra-regional trade

The MSG economies and other Pacific islands adopted open trading environments at independence. A global free trade and investment environment is desirable for the continued growth and sustenance of the PICs. This is because the Pacific region remains highly reliant on trade outside the region with relatively little intra-trade

[48] Kava is a traditional ceremonial plant used for medicinal purpose.

(around 2% of total exports) (McGregor et al., 1992). In fact, any open economy needs the international sector for its survival as it is the key channel through which international trade (export and import) and flow of funds is possible. The inclusion of the overseas sector in the circular flow model reflects this significance. It will also be retained in the conceptual model, where international trade is proxied by exports plus imports to GDP ratio *(TRAD).*

Trade and investment, both in and outside the Pacific region has been driven by the market forces of demand and suppl. Governments have introduced tariffs and other quantitative import restrictions over the years as a way to generate government revenue. For many years trade within and outside the region operated without a formal regional trade integration framework (Yamazawa, 1992). A loose form of institutional framework for economic cooperation and trade facilitation for the region came into existence when the Pacific Island Countries Trade Agreement (PICTA) was signed in August 2001 by nine PICs[49] (Narsey, 2004). Though a number of inter-island trading arrangements have been signed over the years, trade within the region remains negligible due to limited and similar export range and the diversified imports of the islands (Freitag, 2011).

A number of impediments affecting increased intra-trade in the Pacific region have been identified: distance and isolation issues; no region-wide free trade agreement; exchange rates that are not aligned, as rate alignments are necessary to produce cross-border investment; and the absence of a formal integration framework (Yamazawa,1992). To date there has not been any serious attempt by successive MSG governments to coordinate macroeconomic policies though talk of pertinent regional issues such as a regional single currency has occasionally been mooted with no serious policy support for the idea.

3.6 Regional economic integration

Since the creation of the European Union (EU) under the Maastricht Treaty in 1993 regional integration has been sought as a pathway to rapid development by several

[49] The aim of PICTA was to establish a free-trade area between 14 of the Pacific Forum countries. PICTA entered into force in April 2003 after six PICs ratified the agreement and as of 2013 it had been signed by 12 Pacific states.

groups of developing countries (Freitag, 2011). In the Pacific little regional integration occurred despite the establishment of the South Pacific Commission (SPC) in 1947 to promote the objective of economic integration (Browne, 1989). Later in 1971 the South Pacific Forum (which changed its name to PIF in 1999) was formed to enhance cooperation between the independent countries of the Pacific.

PIF has membership to international groupings such as African, Caribbean and Pacific (ACP) Group of States where issues related to sustainable development, poverty reduction and greater integration into the world's economy are discussed. In 2005 the PIF agreed on a "Pacific Plan" based on the four pillars of economic growth, sustainable development, good governance and security to pursue regional cooperation and integration efforts (Russell, 2011). In the absence of a formal integration framework the Pacific Plan to some extent fills this gap. The issue of regional economic integration, however, is passively discussed in the region.

The lack of formal integration framework, however, has not prevented the PICs from at least promoting the agenda of integration. The MSG countries and other island states have attempted sectoral initiatives in sectors such as air transport, shipping, fisheries and the environment, and a currency union has also been mooted (Freitag, 2011). The process of economic integration based on the EU experience involves five stages of progressive integration (Capannelli, 2011): a free trade framework; a customs union; a single market; a common currency; and a political union. There is no indication that Pacific economies are at any stage of this sequence and so the chances of economic, and ultimately political integration, remains remote. This is disappointing, because PICs need to integrate more with the global economy to improve on their wellbeing (Chand, 2004).

3.7 Trends in socio-economic developments

The status and performance of eleven socio-economic indicators of development during the period studied in the MSG countries are analysed in this section. The discussions are not in order of any particular significance.

Human capital development

There are four categories of human development indicator's (HDI) (Kelley, 1991): (1) very high human development; (2) high human development; (3) medium human development; and (4) low human development. Only Fiji is found in the second category (high) and Vanuatu in the third category (medium). PNG and Solomon Islands are in the last category (low). This shows that the MSG countries have a long way to go in developing their human resource capital base. One significant drain on skilled human capital development in the region is what is termed 'brain drain'. A study by Negin (2008) revealed that 652 Pacific born doctors and 3,467 Pacific Islands born nurses and midwives were working in Australia and New Zealand. While these figures only include health workers the statistics could be more if other skilled professions such as engineering were considered. This trend is likely to continue in the future. Though human capital development is usually proxied by measures such as secondary school enrolment rate, due to paucity of data for such measures *IMR* will be used instead.

Labour mobility

Beginning in the 1980s both skilled and semi-skilled labour in the Pacific has become more mobile. In the period prior to independence, unskilled workers from PICs such as Vanuatu and Solomon Islands were pressed into service in the sugar industry in Australia under indentured labour schemes (Chand, 2004). It is argued by Chand (2004) that there is a strong case for facilitating accessibility to industrial country labour markets (such as the two neighbouring industrial countries of Australia and New Zealand) particularly for unskilled workers from the Pacific, as it will have positive effects on poverty alleviation efforts via remittances, raise worker productivity through skills transfer and deepen economic, political and cultural ties between the labour sending and receiving nations.

In recent years the Australian and New Zealand governments have introduced the seasonal workers program. Under this program temporary unskilled workers from the Pacific are brought to Australia and New Zealand to work in the horticultural industry for up to seven months a year to meet shortages of labour (Russell, 2011). Regional labor market integration is one of the key components in the drive towards integration into the global economy as this has the potential to ensure livelihoods are

sustainable. This is more so for the MSG economies as they do not have privileged access to labour markets in rich-countries such as Britain, Australia and New Zealand as some other PICs do.

According to Chand (2004) "Countries with strong links with their former colonial rulers/administrators such as those governed under the Compact of Free Association with the US (this includes FSM, Palau and Marshal Islands) and in free association with New Zealand (this includes Cook islands, Niue and Tokelau) have large transfers from their rich country partner as well as access to their labour markets" (p.7). Skilled labour shortage and high wages also affect the MSG economies. Labour mobility within the Pacific region itself is very minimal. However, the trend of both skilled and unskilled labour movement in the region and outside cannot be established due to limited availability of data. Internal migration within each country in the form of rural to urban migration has increased at an alarming rate during the period of study. This has the potential to threaten social stability particularly in the face of limited growth in employment opportunities (Chand, 2004).

Generally, unemployment rates in the MSG countries are on average higher than their growth rates. This indicates that economic growth in these economies has not been able to absorb new entrants into their labour force. Additionally, due to rapid population growth and limited availability of natural resources together with the effects to natural disasters such as cycles and floods which have adversely affected their subsistence way of living many people in the Pacific have looked to increased labour mobility and migrant worker schemes as a source of income (Russell, 2011).

Foreign aid

Though Australia and New Zealand are to date the biggest donors, Japan, China and the EU are also major donors to the PICs (Russell, 2011). Figure 3.3 shows foreign aid *(AID)* or official development assistance (ODA) as a percent of GDP for the MSG countries over the period studied. Though there is considerable variance in the levels of aid dependency in the MSG countries the overall trend is that ODA is on a sharp decline. This could be largely attributed to the wider trend where ODA to developing countries has been on a downward trend over the years. Recent global events such as GFC made accessibility to development finance by developing

countries difficult. Domestic developments in the PICs also affected aid flows. For instance, aid was cut to Fiji by major donors such as Australia and New Zealand due to the coups since the late 1980s.

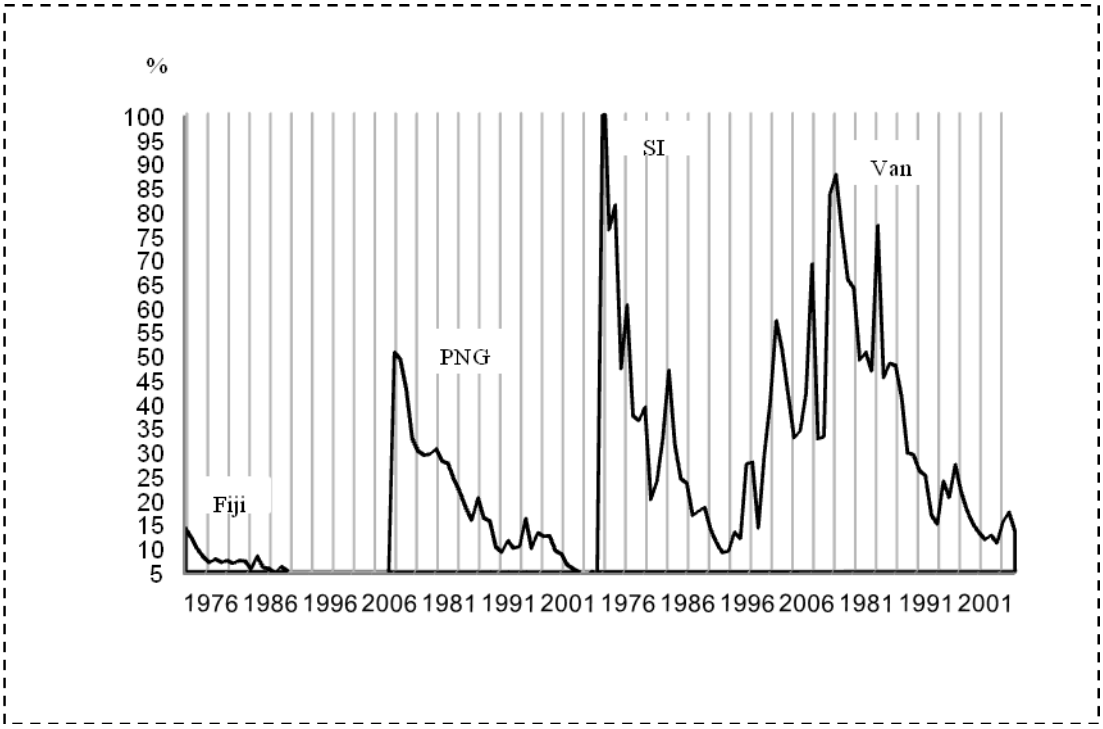
Aid to PNG has plummeted significantly over the years. This could be partly due to PNG's reliance on massive revenue receipts generated by the booming mineral sectors, coupled with favourable commodities price receipts, and also partly due to borrowing (from both domestic and overseas sources) to finance budget deficits. Solomon Islands experienced a steady decline in ODA from independence until the 1990s when it needed more aid assistance to sustain its operations at the height of its ethnic conflict. ODA to Vanuatu also has declined since its independence in the 1980s. The MSG countries aid dependency trend in the period examined is shown in Figure 3.5.

Donors have historically taken an active interest in the provision of basic services, such as health and education, in PICs that lack the capacity and resources to do this on their own (Chand, 2004). Nonetheless, the question of whether ODA has improved the general standard of living in the recipient countries remains a hotly debated topic. According to Freitag (2011) "Analyses of the Pacific development widely agree that despite large aid inflows, living standards for most islanders have only improved slightly, if at all, since independence" (p.1). Despite arguments against aid, such as dependence syndrome, given the limited natural resource endowments in the MSG countries, the declining trend of assistance programs by major donors is a cause for concern for these countries.

Life expectancy (LE)

The Pacific Island communities over the years have undergone different stages of demographic and demiological transitions. According to Taylor et al., (1989) life expectancy and population have increased steadily and slowly in the Pacific over the last three decades due to: declining mortality as a consequence of an increased resistance to epidemic infectious diseases (such as tuberculosis, dysentery, polio, measles); application of public health measures to control communicable diseases; provision of medical services; and government and donor support during periods of natural disasters such as famines.

Figure 3.5: MSG countries' AID dependency trend: 1976-2010



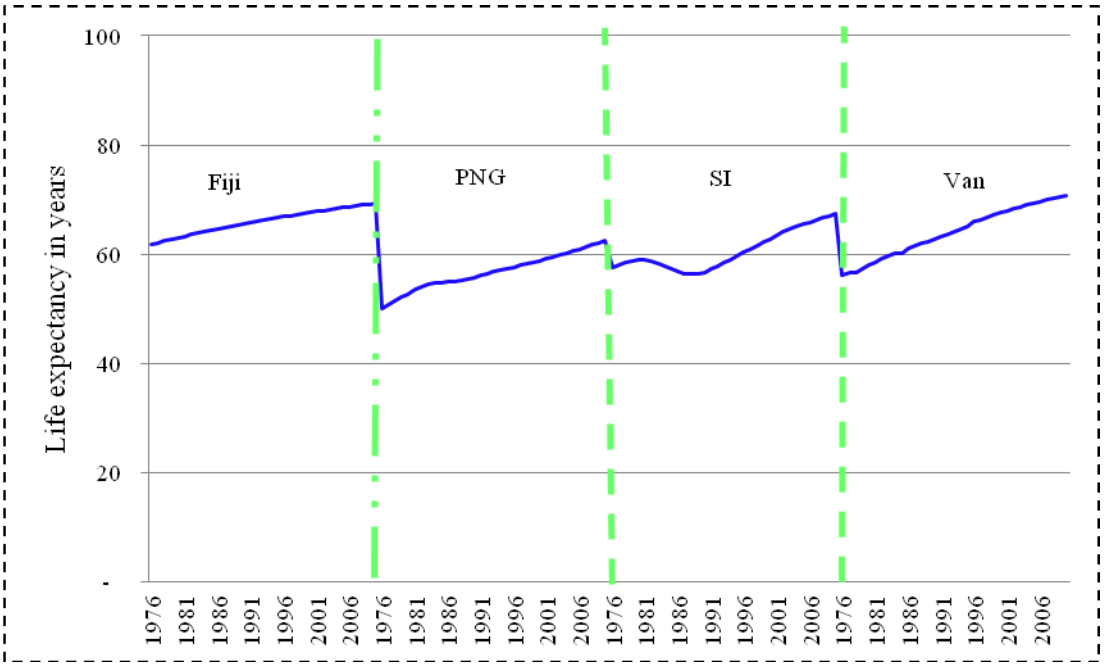
Source: Developed by the Author with data from World Bank.

The trend in *LE* for the MSG countries is shown in Figure 3.6. The general trend is that *LE* at birth has improved since the 1970s. Though Fiji initially led the way with a relatively high *LE* (above the sixties), in recent years Vanuatu has taken the lead with its LE making inroads into the seventies. PNG lags behind, followed by Solomon Islands. *LE* in 2010 (in years) in order of highest to lowest is as follows: 71 in Vanuatu; 69 in Fiji; 67 in Solomon Islands; and 62 in PNG.

Though positive progress has been made by governments in the region to ensure people have access to basic medical services, factors such as location and the harsh topography continue to hamper the effective delivery of basic medical services. This is further compounded by the phenomenal growth in population. As the population increases, the demand for medical services also rises, placing excessive pressure on health budgets. This results in a situation where despite advances in medical technology many curable diseases, such as malaria, continue to kill many people in countries like PNG.

According to the World Health Organisation (WHO) (2000) high blood pressure and obesity, caused by high intake of sugar, fat and salt from processed goods are fast becoming key risk factors for heart disease, strokes and cardiovascular related diseases in the Pacific. The fast rise of new diseases such as HIV/AIDS that is spreading at an alarming rate in countries like PNG is also another major challenge for governments. Many PICS face growing health problems, high levels of joblessness, increasing environmental threats, increasing levels of poverty, and population pressures ADB (2009a). On the back of such challenges big improvements in *LE* in the MSG countries are not expected any time soon.

Figure 3.6: MSG countries' life expectancy trend: 1976-2010



Source: Developed by the Author with data from World Bank.

Infant mortality rate (IMR)

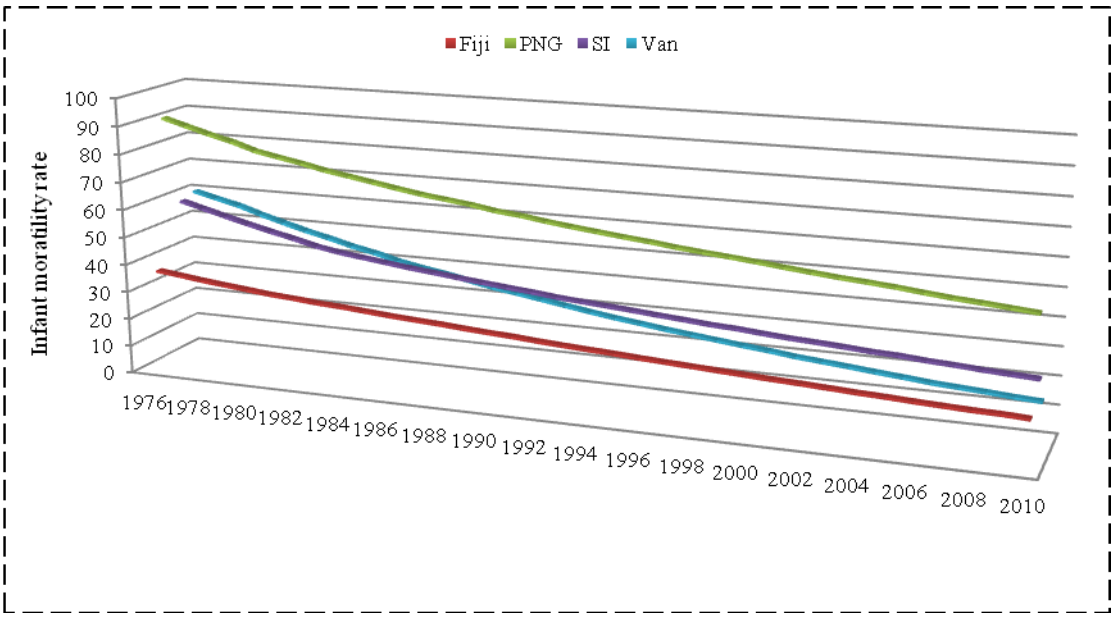
By definition, infant mortality rate (IMR) is the number of deaths of infants under one year old per 1,000 live births. Children are much more likely to die during the first year of life than they are at older ages. IMR in the MSG countries has fallen dramatically since the 1970s as shown in Figure 3.7. However, the *IMR* in the region is still high compared to other countries and region. PNG recorded the highest number of infant deaths (in the 50s) followed by Solomon Islands (in the 20s) as shown in Figure 3.7. Though goal four of the Millennium Development Goals

(MDGs) is to reduce child mortality (children under five) by two-thirds between 1990 and 2015, all of the PICs were reported to be not on target to reach this goal. Though maternal mortality rates are not explored here, this mirrors the trend of *IMR*.

Literacy rates

The Pacific is one of the most linguistically diverse regions of the world, where one third of the world's languages are found (Table 3.2). A majority of the languages are spoken in PNG alone, where there are well over 700, which is nearly 20% of the world's total (Foley, 1986). Though English is a second language it has become the main official language used in government, education, media and commerce in many PICs (Lumelume & Todd, 1996).

Figure 3.7: Infant mortality rate in the MSG countries



Source: Developed by the Author using data from World Bank

Vanuatu is the exception for MSG countries as given its joint British-French colonial past it has both English and French as its official languages. Other national languages are also spoken by the majority in the MSG countries such as Pidgin in PNG and Solomon Islands, however, these are only practiced on an informal basis. As definitions of literacy vary, with no commonly accepted definition, literacy levels

in this context refer to spoken and written English language in the countries examined.

Adult and youth literacy rates in the MSG countries, as well as in other developing countries including those in the Asia Pacific region, have steadily improved over the years (Figure 3.8). Despite these improvements, literacy rates for women and girls continue to lag behind. Central Asia tops the list with over 98% literacy rate, followed by Central and Eastern Europe (over 96%), and East Asia and the Pacific region is third with well over 85%. For the MSG countries, the rates for adults, in terms of females and males, as well youths also vary substantially. In terms of adult and youth literacy rates Fiji leads (in the 90-99% range), followed by Vanuatu (in the 90-95% range), Solomon Islands (in the 85-90% range), and then PNG lags behind (in the 65-75% range) (ADB, 2013). With the introduction of adult literacy programs, particularly targeting women in recent years in countries like PNG, positive improvements are expected in the years ahead.

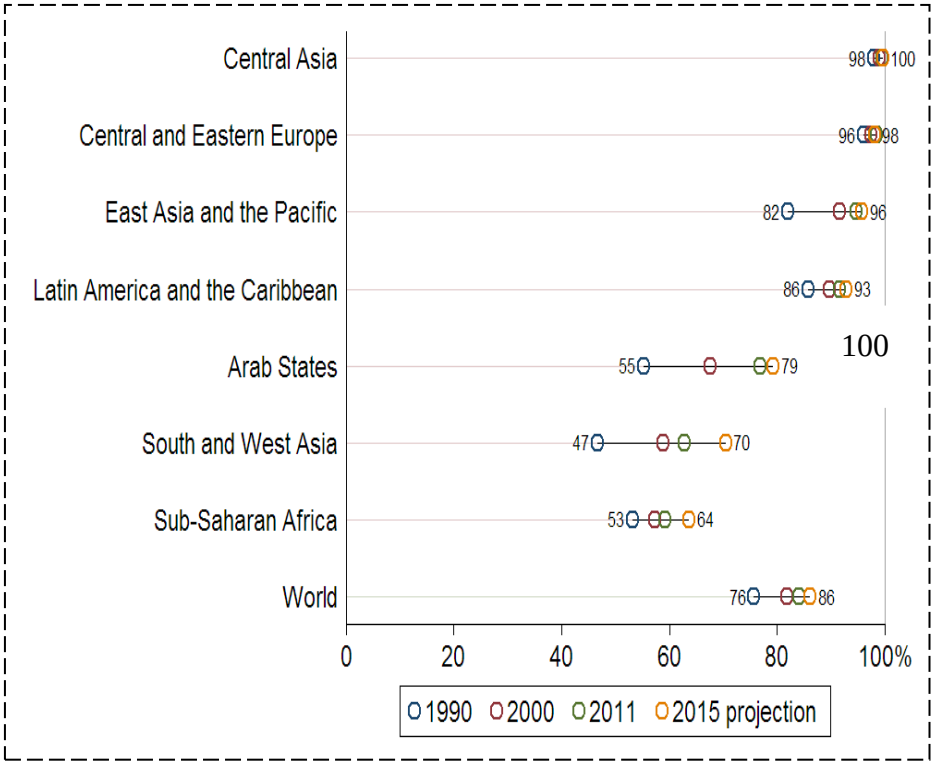
Population growth

For Fiji the majority of the population (around 56%) are indigenous Melanesians followed by Indo-Fijians (around 36%) (Teh et al., 2009). The remaining (9%) is composed of Asians (especially Chinese), Europeans, Polynesians and Micronesians. Unlike Fiji, in PNG, Solomon Islands and Vanuatu the overwhelming majority of the population (around 98%) are indigenous Melanesians. The remaining population comprise mainly Asians (especially Chinese), Polynesians and Micronesians.

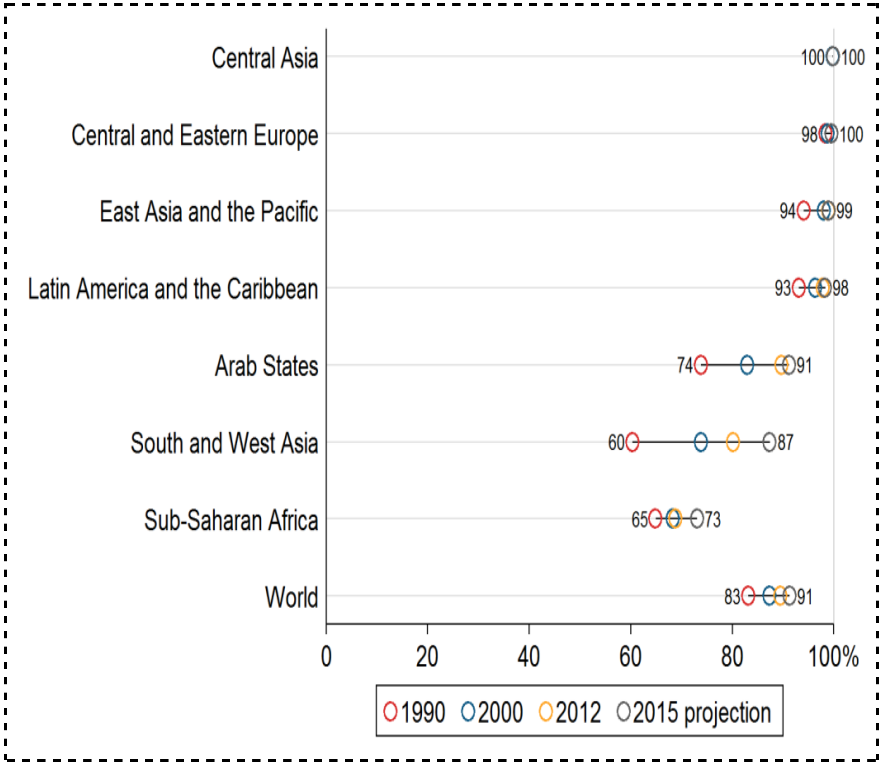
The lack of a long-term urban development policy framework and national population policies in most of the PICs is a grave concern. This is not to say that PICs have never developed any policies, but rather those that were developed in the 1990s were short-term in nature. This suggests that the undertaking made by Pacific governments in the Cairo World Population Conference in 1994 to vigorously address unsustainable levels of population growth in general, and urbanisation in particular, in the region in the long-term was politically expedient rhetoric with no subsequent implementable and sustainable policy outcomes and solutions (Haberkorn, 2008). Though PNG has a population policy, the explosive growth in population in recent years has challenged the effectiveness of this policy framework.

Figure 3.8: Literacy rates

Panel: Adult literacy rate, 1990-2015



Panel B: Youth literacy rate, 1990-2015



Source: Adapted from UNESCO (2014).

High population growth rates in the MSG countries are due to the increasing population momentum attributable to high fertility rates and declining mortality rates (Booth et al., 2006). The comparison of population sizes and per capita income for the MSG countries were shown in Figure 3.2. The low levels of formal sector employment in these countries with high fertility rates means there is excess supply of labour (both skilled and unskilled). This leads to socio problems such as high urban crime in countries like PNG[50] and high unemployment, in particular high levels of disguised unemployment. Increases in population have resulted in an excess supply of labour. This has created enormous policy challenges for MSG governments. Overall, economic growth rates in each of the MSG countries have not been able to match their respective population growth rates. This suggests that per capita income growth has been slowing over the last three decades in these countries. *IMR* is used to proxy labour force[51].

Corruption

Studies have shown a strong positive link between corruption and underdeveloped financial systems (Demirguc-Kunt & Levine, 2001). High levels of corruption at the political and bureaucratic levels and its effects have been well-documented in the Pacific. For instance, a study by Hodge et al., (2011) on the link between corruption and instability in the Pacific found that corruption hinders growth through its adverse effects on investment, human capital and political instability. Corruption also erodes institutional strength and civil trust (Nelson, 2010). Singh (2012) also found that the MSG countries have experienced instability because of corruption and argues that all four of Fiji's coups were linked to corruption.

The high incidence of corruption in the countries analysed is captured in the Corruption Perceptions Index (CPI). Based on CPI data from 1995 to 2010 the regression coefficients are as estimated by Transparency International (2010): -0.032 for PNG; -0.030 for Solomon Islands; 0.1500 for Vanuatu; and although not given for Fiji it is presumed to be positive. According to Transparency International, the coefficient provides an insight into the trend, where a high negative coefficient

[50] PNG has one of the highest population growth rates of around 2.76 percent per annum.
[51] Population growth rate is not used to avoid problems such as simultaneity bias as real per capita GDP is proxied for economic growth.

reveals a serious deterioration of the perceived probity in the country or vice versa. As PNG's CPI is very high it can be interpreted as a nation with high perceived level of corruption, followed by Solomon Islands. Economic prosperity has generally been attained in politically stable and less corrupt environments (Chand, 2004).

Overall, corruption, political instability, high population growth rates, increasing health problems, sea level rise, and weaknesses in law enforcement pose huge developmental challenges for countries in the Pacific. Due to limited availability of data the effects of corruption have not been controlled.

Economic infrastructure development

Physical infrastructure, such as reliable transport i.e. ports, wharves, jetties, roads, bridges links, and secure access to energy and other support economic infrastructure such as telecommunications, are critical preconditions for accelerating private sector-led growth in the PICs (World Bank, 2014). MSG countries have a long way to go in addressing significant gaps in their economic infrastructure. Although in the recent years governments in countries like PNG have significantly increased spending on large public capital investments, limited capacity has constrained effective implementation of projects. As will be shown in Chapter 4, physical and human capitals are key factors in a production function for an economy. However, physical capital will not be used due to paucity of data.

Climate change

Starting in the 1990s the issue of sea level rise due to global warming has emerged as one of the key development challenges facing the people and governments of small PICs. Of all the challenges PICs face climate change poses the single greatest threat to livelihoods, security and well-being of the peoples of the Pacific (Angelo, 2011). For instance, rising sea levels are already causing extensive environmental harm and cultural tensions over the relocation of people in the Carterat Island in PNG. Accordingly, the challenge remains for the PICs and their governments to take adaptation measures to reduce vulnerability and increase resilience to climate change impacts (Zhuang et al., 2009). This is vital for the long-term future of the MSG countries and other PICs.

Millennium Development Goals (MDGs)

Finally, in 2000, 189 nations (which included the MSG countries) made a collective commitment to free people from extreme and multiple deprivations. This pledge subsequently turned into the United Nation's (UN) charter on the following eight MDGs (Feeny & Clarke, 2008): (1) Eradicate extreme poverty and hunger; (2) Achieve universal primary education; (3) Promote gender equality and empower women; (4) Reduce child mortality; (5) Improve maternal health; (6) Combat HIV/AIDS, malaria and other diseases; (7) Ensure environmental sustainability; and (8) Develop a global partnership for development. However, not one single PIC is on track to achieve all the MDGs by the deadline of 2015 (AusAID, 2008). In 2015 a new policy framework called the Sustainable Development Goals (SDGs) will be adopted to replace MDGs when it expires.

3.8 Chapter summary

This chapter complemented Chapter 1 by providing additional information about the Pacific region and countries studied. Geographically, PICs are widely dispersed over the vast Pacific Ocean (refer Figure 3.1). The treatment of MSG countries as belonging to an homogenous group for the purposes of statistical analysis was highlighted. Given that PNG is the large PIC in terms of real GDP, population and landmass, it was selected as a unit of analysis for the time series analysis component of this study. In terms of governance, the MSG countries practice constitutional parliamentary democracy where their respective constitutions require the election of members of parliament (representatives) through universal suffrage. Main common characteristics of the MSG countries such as the dualistic nature of their economies were presented (Table 3.2).

Attention was placed on the PNG economy when the structure and composition of the MSG economies and their financial sectors were examined. Given that PNG will be included in both panel and time series analyses, and that the economic and financial sector configurations of MSG countries are similar, only the PNG structures were developed. When economies and financial sectors of the other MSG countries were discussed reference was made to those developed for PNG. Trends in financial and socio-economic developments in the MSG countries throughout the reviewed period were analysed. It is hoped that the growth of the economy will help

improve socio-economic indicators such income inequality. The current discussions in this and previous chapters have provided the context for the development of this study's conceptual model in the next chapter. The research methodology and frameworks adopted in this research are explained next.

CHAPTER 4

FRAMEWORK OF ANALYSES AND METHODOLOGY

4.1 Introduction

This chapter aims to (1) develop the conceptual framework for this study; (2) specify the panel and time series econometric methods applied in the analysis; and (3) present the framework for unit root and cointegration tests. Many recent studies investigating the relationship between FD and economic growth make use of both panel and time series approaches on a stand-alone basis. This study will follow this trend by employing both approaches. The chapter is structured as follows. The conceptual framework for this study is constructed in Section 4.2. Theoretical neoclassical growth theory is reviewed in Section 4.3 as it forms the cornerstone of growth literature. The methodological framework is discussed in Section 4.4. The frameworks related to unit root and cointegration tests under both the panel and time series methodologies are specified in Section 4.5. The chapter is summarised in Section 4.6.

4.2 The conceptual framework

It is difficult to precisely identify and demarcate the boundaries of a financial system. However, according to Ang (2008) financial systems can be broadly categorised into four key components: (1) FIs comprising mainly banks; (2) the non-bank financial intermediaries (NBFIs); (3) the capital markets; and (4) the regulatory bodies such as central banks, which oversee and supervise the operations of the intermediaries. This classification is captured in the research direction proposed by Levine (1998) on which this study builds. In the real-world there is deep interaction amongst key parts of the financial sector. FIs can be categorised into three major groups (Ross et al., 2000): (1) central banks – comprising the central bank and other institutions that perform the functions of the monetary authorities; (2) deposit money banks – comprising banks that have liabilities in the form of deposits transferable by check or otherwise usable in making payments; and (3) NBFIs such as pension funds and insurance companies.

Financial structure refers to a mixture of financial instruments, financial markets and intermediaries operating in an economy, which have the potential to affect economic growth (Demirgüç-Kunt & Levine, 2004; Driffil, 2003). The importance of the real goods market cannot be ignored as there is deep interaction amongst the capital market, FIs and real goods market. The well-known Hicksian IS-LM framework attempts to explore the interaction between money and real goods markets (Laidler, 1968)[52]. Given the significant role that real markets play, particularly in terms of facilitating the flow of real goods and services, it is captured in the circular flow model and will be retained in the conceptual model.

Bhattacharya & Sivasubramanian (2003) suggest that FD ideally should relate to the variety of intermediaries and markets available, how well they mobilise resources, manage risks, and facilitate the flow of information and transactions, such as trading and investing of financial securities. FitzGerald (2007) further argues that FD involves the establishment and expansion of institutions, instruments and markets that support investment, financial sector development and growth processes. A vast range of financial contracts are provided by the FIs, either over-the-counter (OTC) or via capital markets, to accommodate the different liquidity preferences and risk tolerance levels of consumers. Though developed countries such as Australia have a similar economic configuration, they differ significantly in terms of their sophistication in the design, packaging and delivery of financial products and services.

Although technical differences between the definitions of FD and financial structure exist, this study treats the financial system as tantamount to the financial structure. This is because they are highly interrelated despite studies of financial systems placing more emphasis on the role of financial markets. In unsophisticated financial sectors like those found in the MSG economies, the financial structure is equated to the financial sector with no real significant differences between the two.

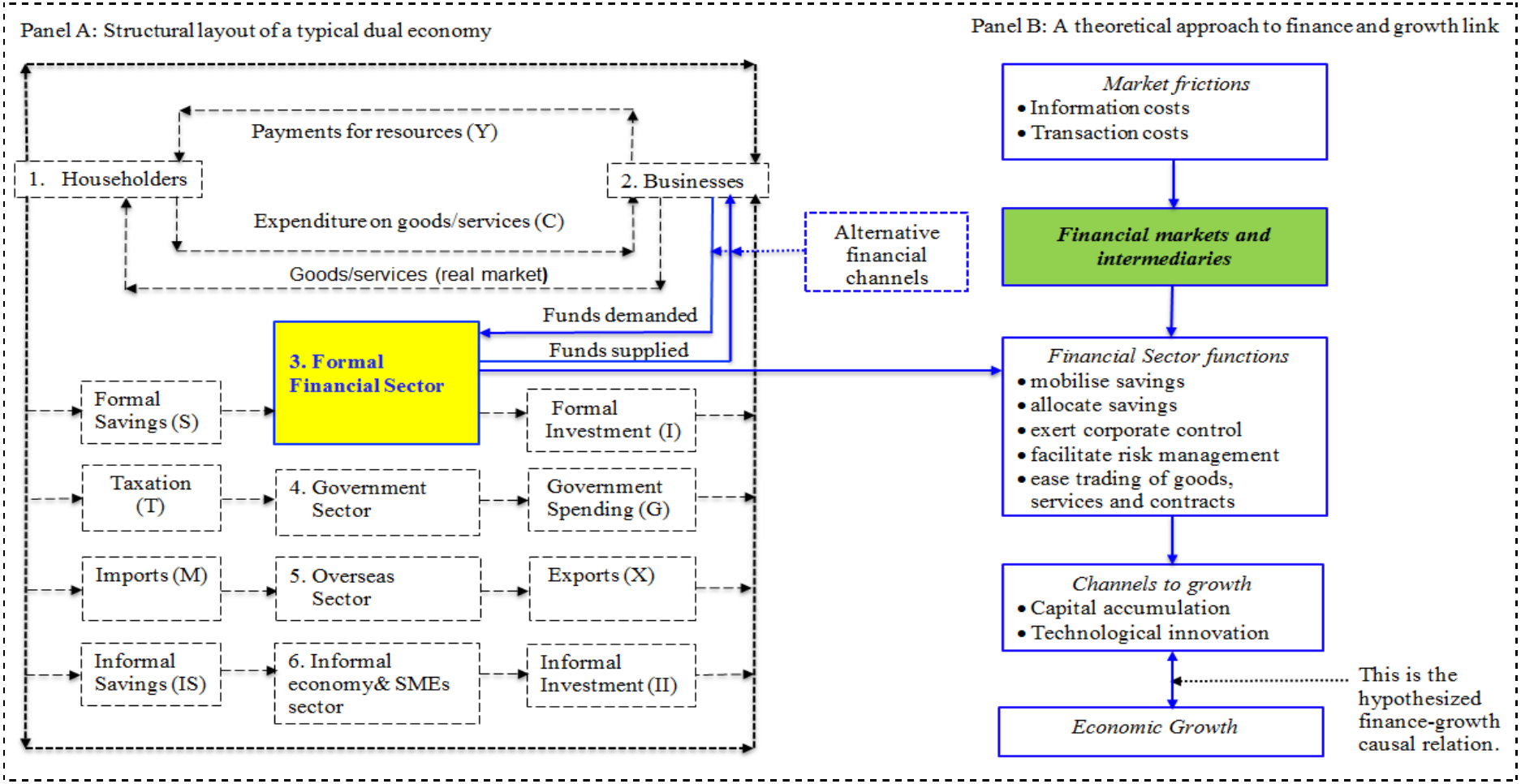
[52] The interaction between the money market and the real market is the central analytic difficulty of macroeconomics (Laidler, 1968). The financial market structure in the context of the PNG economy was illustrated in Chapter 3 (see Figure 3.4).

Having found there is no generally accepted conceptual framework for the finance-growth nexus the framework shown in Figure 4.1 has been developed for this study. Panel A illustrates the 'Structural layout of a typical dual economy' of the type common in economies of many developing countries. Panel B, which is adapted from Levine's (1997) theoretical approach to finance and growth, shows 'A theoretical approach to finance and growth link'. The combination of Panels A and B provides this study's conceptual model. The framework also attempts to illustrate the hypothesised causal relationship between FD, payments for resources (Y) and the dynamic interactions among strategic sectors and components within the financial system. The model attempts to show the economic and financial system structures with their vital sectors and components. The arrows indicate the hypothesised dynamic interactions, behavioural relationships and linkages. More precisely, → means dependent upon or linked to and ↔ indicates linkages and interdependencies between sectors. In the interest of brevity the propositions, economic relationships and competing finance and growth theories that are implicit within the model are not shown. It is on the basis of such behavioural economic relationships and dynamic linkages that the RQs, sub-RQs and the H0s have been formulated.

The model is based on the full five-sector income model originated from John Maynard Keynes' (1936) *The General Theory* within the framework of a market-oriented macroeconomic theory of open economies. The five sectors are: (1) households, (2) private business, (3) financial[53], (4) government, and (5) overseas. With these sectors the aggregate demand (AG) for an economy at a given time and price level is composed of: consumption (C) by households; investments of firms (I) in their productive capacity; government spending (G); and the external sector represented by exports (X) and imports (M). The injections: investments (I); government spending (G); and exports (X), and leakages or withdrawals: savings (S); taxes (T); and imports (M). Withdrawals are spending by households which do not flow back into domestic firms. Under equilibrium, the sum of injections (I+G+X) and leakages (S+T+M) should be equal i.e. I+G+X = S+T+M. Thus, the model is represented by the following identity when in equilibrium: AG = C + I + G + (X – M).

[53] The structure of the PNG economy and its financial sector will be analysed in Chapter 6.

Figure 4.1: Conceptual framework for the finance-growth nexus



Source: Panel A developed by the Author by modifying the circular flow of income model and Panel B adapted from Levine (1997, p.691).

The formal financial sector (in yellow) and financial markets (in green) were graphically expanded with their respective components in Chapter 3. Financial sectors perform a number of important functions. These functions are summarised by (Levine, 1997) in his theoretical approach to finance and growth which are reproduced in Panel B of the conceptual model. However, "Financial institutions and markets around the world differ markedly in how well they provide these key services (Čihák et al., 2013, p.5). The household sector *(represented by 1)* is the main source of supply of savings to the private business sector *(denoted by 2)*. As the financial system remains a key conduit for reallocating surplus funds across economic agents thereby allowing household savings to be used by firms and households (Allen & Gale, 2001) credit activities are linked to the financial sector *(designated by 3)*.

Governments depend on the vital sectors of the economy to effectively run the affairs of a country. In market-based economies governments play significant roles through effective intervention in shaping the operation of financial and economic systems through reforms and fiscal controls (Neal & Shone, 1976). As the finance-growth mix is complex, government intervention in the form of reforms could affect the relationship (Akinlo & Egbetunde, 2010). Studies (e.g. Lawrence, 2006) also argue that the degree of government involvement in the financial sector determines the level of contribution that FD makes to growth. Though the domestic credit market constitutes a significant component of the funding source in the MSG countries as outlined in Chapter 3, according to Cho & Kim (1995) when the credit market operates without well-functioning equity markets there is scope for government involvement in the economy. The MSG countries are faced with this situation as their equity markets are small, segmented and illiquid.

As Keynesian economic theory suggests, government intervention is needed to correct or compensate the perceived market frictions such as informational and transaction costs. As such the government sector is retained in the developed model *(shown by 4)*. The foreign sector represents the international economy whilst the other four primary sectors constitute the domestic economy. As the small island economies are relatively open, this external sector *(denoted by 5)* plays a vital role in

facilitating international trade and funds flow. As stated earlier, the variable *TRAD* will be used as a proxy for openness.

Furthermore, the conventional five-sector model reflects the capitalist open economic model found in most advanced economies. However, the informal sector[54] that forms a large part of developing economies and operates side-by-side with the modern cash economy is not captured in the circular income model. The informal economy was initially observed and studied in developing countries, and later in developed countries (Gerxhani, 2004). Though there is limited research on the size and contributions of the informal, a study by Schneider (2002), involving 110 countries to establish the size and measurement of the informal economy, found that on average the size of the informal economy (as a percent of GNI in 2000) in developing countries is a staggering 41% followed by 38% in transition economies and 18% in OECD countries.

The presence of the informal economy makes the developing economies dual in nature (Gounder, 1999). Though the size, causes and consequences of the informal economy are different for different types of economies (Schneider, 2002) it plays an increasingly important role in providing employment opportunities, generating income and broadening the tax base of governments in many developing countries around the world. Governments have realised its importance and have attempted to support its growth through policy and budgetary interventions. For instance, in PNG the government enacted the Informal Sector Development and Control Act in 2004. Word Bank (2007) describes PNG as having a highly dualistic economy with narrow formal monetised and an informal sector dominated by the subsistence activities of the majority of the population in rural areas. The same holds for the three MSG countries and other PICs.

Given the dual nature of the economies of many developing countries, the conventional five-sector circular flow model has been modified by incorporating the informal sector (*denoted by 6*). With the incorporation of the sixth sector, the savings and investment of a typical developing economy is made up of formal savings (S)

[54] In previous studies the informal socio-economic system of PNG has been classified as between primitive communist and primitive capitalist (Epstein, 1968).

and formal investment (I), plus the informal savings (IS) and informal investment (II) coming from the informal economic activities as shown in Figure 4.1.

Nonetheless, the existence of market failures and rigidities, for example, in prices and incomes, totally contradicts the classical's view of a world of free-competitive markets for resources, credit funds and goods. This can be contrasted to a pure laissez-fare economic system where there is non-intervention by the state as classical economic theory advocates. The correction of market failures and need for the provision of public goods argument provide scope for governmental intervention. Governments intervene directly through fiscal operations and indirectly through monetary policy operations. The monetary interventions are pursued independently on behalf of the state by monetary authorities. In most cases this regulatory authority is the reserve bank, or its equivalent, as regulatory regimes differ from country to country. For instance, Australia has a twin-peaks regulatory framework where ARB conducts monetary policy while APRA regulates the financial system.

Regular intervention by government to support the functions of the market, instead of allowing the markets to function independently uninterrupted to allocate resources to the most productive uses and sectors of the economy, could be equated with a mixed economic model. The efficient functioning of the markets may be disturbed by such interventions. This is in sharp contrast to a pure capitalist market economy where the market decides the key economic decisions of: what goods and services to produce and in what amounts; how these goods and services are going to be produced; and for whom these goods and services will be produced or distributed to.

Furthermore, the structural channels and sectors illustrated in this study's conceptual model reflect how the triggering of a fully-fledged financial crisis could be possible. Conversely, the model also shows how economic crisis or systemic instability could in turn lead to financial crisis. This is generally in line with the theory on bank failure and economic growth. This scenario prevailed in the well-documented 1997-98 AFC when a banking system crisis in Thailand triggered a domino-effect across the South-East Asian economies. It was also evident in the 2008-09 GFC, which was caused by the bursting of the mortgage market bubble in the USA.

The economy of the USA, though not perfect, comes close to operating under such a capitalist economic model. In the small economies of the Pacific government intervention in almost every sector of the economy is the norm. Arguably, such practices are consistent with the views of early development economists (such as Adam Smith) who argued that governments intervene to provide "social overhead capital" or infrastructure (Tatom, 1991). Governments also undertake activities to compensate for market failures. Despite arguments in favour of intervention, debate exists between market failure and government failure.

Besides government's heavy involvement in the economy, monetary regulators also intervene in domestic foreign exchange markets. Regulatory interventions are in most cases purposely instituted by the central banks with the objective of stabilising highly volatile exchange rates among other reasons. As many developing countries depend heavily on the export of agricultural commodities and minerals, large adverse fluctuations in international commodity prices cause the exchange rates of those affected countries to be more volatile. As most of these small developing economies have free floating exchange rate regimes, international developments (such as price shocks) adversely affect their exchange rates. Volatile exchange rates have a negative bearing on other macroeconomic indicators such as the reserve levels, underlying inflation rates, interest rates, and hence economic growth rates.

As FD is driven by supply and demand determinants, in the case of discouraged supply or depressed demand for financial sector funds, demanders of funds may turn to external alternative non-financial sector channels of finance. Alternative sources of finance are shown in the conceptual model. In developing countries the main alternative non-financial sector source of finance comes from the informal sector where the interest rates are exorbitantly high. This gives rise to issues such as the operations of loan sharks, pawnbrokers and predatory lending practices as the rates are mostly unregulated. Three common methods of measuring total production are the production, income received, and expenditure methods. A production function in the form of the commonly used Cobb-Douglas production function will be used here. The usefulness of this conceptual model is that it provides a simplified picture of a dual economy commonly found in the MSG and other developing countries.

Prior to developing a quantitative equation to test the hypotheses proposed in Chapter 1 and further justified in Chapter 2 (Section 2.7), a relevant theoretical framework needs to be identified to establish a theoretical grounding for the functional growth equation. This framework is developed in the next section.

4.3 The theoretical neoclassical framework

The development of growth theories and significance of the basic *AK* model were explored in Chapter 2. By drawing from Jappelli & Pagano (1994), the relationship between capital flows and growth can be examined using a simple modified endogenous *AK* growth model of the form:

$$Y = AK \qquad (1)$$

where the dependent variable *Y* is economic growth; *A* is a positive constant that reflects the level of technology; and *K* can be thought of as some composite of capital stock and labour input. Thus, *Y* is a linear function of the aggregate capital stock *(K)*. The endogenous growth model is anchored on a number of basic assumptions (Jones, 1998)[55]: a closed economy i.e. no international trade; technology is Hicks-neutral with no exogenous technological progress; no population growth; and the production of a single homogenous good that can be either consumed or saved.

One other central feature of the NCGM is the assumption of diminishing returns to the two reproducible factors of production: capital stock and labour. According to Maswana (2006) production functions can be seen as a reduced form for either a framework in which the economy is competitive with external economies, as in Romer (1990) or one in which *K* is assumed to be a composite of physical and human capital, as in Lucas Jr (1988) where the physical and human capital are reproducible with identical technologies.

Though studies suggest considering everything as *"K"* (e.g. Barro et al., 1995), a broad concept of capital that incorporates both human and physical components

[55] See, Jones (1988) on the significance of assumptions in model construction and development.

should be considered. To date no broader concept of capital has been developed both theoretically and empirically. Consequently, this study supports the view that *K* is a composite of physical (*K*) and human capital (*H*), which are both included in production functions to determine the basic determinants of the level of output. The rationale behind this is that an economy will grow only if its investment rate is relatively high as physical capital accumulation exerts positive influence on the level of output as postulated by the endogenous growth theory.

A number of highly simplified assumptions, such as a closed economy, will be relaxed later. The relaxation of assumptions by permitting variables that capture real-world practices, for instance international trade *(TRAD),* to enter a specific regression ensures that the model is more realistic as opposed to a mere theoretical abstraction. This necessitates the modification of the previous simple *AK* production function (equation (1)) that attempts to capture the effects of changes in only two combinations of production goods (capital and technology) on steady state growth.

To test the validities of the hypotheses formulated for this study the original Solow NCGM model, which was tested and augmented by Mankiw et al., (1992) (popularly known as MRW), is relied upon. According to Ulasan (2011) "The framework provided by MRW is the workhorse in the empirical cross-country growth literature and most of the studies in this literature are based on MRW" (p.2). Thus, the MRW framework is considered an appropriate benchmark specification for growth empirics due to its impressive success[56]. The MRW framework basically shows how to significantly improve the explanatory power of NCGM by augmenting its production function with appropriate shift variables like human capital (Rao et al., 2010).

In the MRW framework real output is assumed to have the following three-factor input Cobb-Douglas long-run equilibrium aggregate production function:

$$Y_t = F\,(K_t, H_t, A_tL_t) \qquad t \in \{1, 2, \ldots, T\} \qquad (2)$$

[56] For instance, Gounder (2012) also uses the MRW framework to analyse the issue of FD and growth in Fiji as mentioned in Chapter 2.

Equation (2) can be further expanded in the following form:

$$Y_t = K_t^{\alpha} H_t^{\beta} (A_t L_t)^{1-\alpha-\beta} \qquad \alpha \text{ and } \beta \in (0, 1) \qquad (3)$$

where actual output at time *t* is a function of: physical capital stock (K_t); human capital (H_t); technological change or total factor productivity (A_t); and labour (L_t). The number of effective units of labour is represented by A_tL_t. The parameters α (output elasticity between the output and physical capital) and β (output elasticity between the output and human capital are estimated from empirical data. To yield constant returns to scale, α β must sum to one. One of the major limitations of the neoclassical model augmented with human capital is the lack of precise explanation of the parameter $(1- \alpha- \beta)$ related to labour, as labour and human capital are included as different inputs in production functions as in equation (3). As the parameter values are constant, their values are determined by the available level of technology. It is important to also note that healthy labour market conditions boost domestic demand which is good for the economy.

The Cobb-Douglass production function is a basic function in growth models. Within a 23-year period (1899 to 1922) the growth of the American economy was first modelled by Charles Cobb and Paul Douglas in 1928 using a production function with only two factors of production - labour and capital. The results were reliably accurate in spite of the exclusion of many potential growth-inducing factors and this model has been widely used in the literature ever since. The process of economic growth for a particular economy depends on the shape of its production function. One critical feature of the Cobb-Douglass aggregate production function is that if one effective input does not remain constant or grows faster, a trend is not induced (Jones & Scrimgeour, 2005).

The number of effective units of labour (A_tL_t) results from capital accumulation without trend in the level of technology and labour. This level (balance) condition implies that technological change must be purely capital-augmenting. This means the

previous assumption that technological progress is Hicks-neutral[57] and not exogenous is relaxed in favour of Harrod-neutral technological progress. In addition, the efficiency parameter in equation (3) above allows for an exogenous Harrod-neutral technological progress to prevail in a steady state growth environment. For example, a study by Levine (1997) focuses on the rate of technological innovation in the provision of financial services within an environment of stead-state growth.

There is also compelling evidence, as in Uzawa (1963), that only production functions with Harrod-neutral technological change are consistent with steady state growth. Both exogenous and endogenous economic growth literature are of the view that technological innovation is another significant determinant of growth. To boost innovation in technology savings mobilisation is required. However, growth theories deal with economic growth as a function of human capital, innovation, and physical capital accumulation with no specific mention of financial development (Ang, 2008).

As described in Chapter 2, the relationship between savings (investment) and capital accumulation is positive and the process of financial intermediation, through an efficient capital market, ensures that savings (capital) are allocated to the most productive uses. According to King, Robert Graham & Levine (2004) better savings mobilisation enhances accumulation of capital stock, boosts technological innovation, improves resource allocation mechanisms and accelerates economic growth. Thus, a well-developed financial system has a positive impact on economic performance by enhancing financial intermediation via reductions in information, transaction and monitoring costs (Maswana, 2006).

On the aggregate, the cumulative effect of net borrowing and lending activities between (1) the borrowers of funds (the deficit units), and (2) the lenders of funds (the surplus units) intermediated by FIs plays an important role in the domestic secondary money (liquidity) creation process as postulated by the Keynesians and the Shaw (1973) model. This is why the savings-investment intermediation process

[57] Though this remains a very restrictive theorem in the growth literature, it is the major thrust of the 'Steady State Growth Theorem' which states that if a neoclassical growth model exhibits steady state growth, then technical change must be labour augmenting (Jones, & Scrimgeour, 2005). The question of how long it takes to reach steady state remains an empirical question (Fielding, 2007).

has been recently included in endogenous finance-growth models. As noted earlier, better savings mobilisation stimulates investment activities which in turn results in accumulation of physical capital stock. Given this positive relationship between investment and accumulation of capital stock, physical capital stock (K_t) accumulates according to the following equation[58]*:*

$$K_t = I_t^K + (1-\delta^P)\, K_{t-1} \tag{4}$$

where K_t is the physical capital stock; I_t^K denotes gross investment in physical capital; δ^P is the depreciation rate of physical capital*;* and K_{t-1} is the lag of capital stock. The value of capital, which is assumed to depreciate at a constant rate, regardless of the pattern of investment as investment theory suggests (Bernstein & Nadiri, 1988) is estimated using the conventional perpetual inventory method Nadiri & Prucha (1996). In practice, however, different capital depreciation rates are used. For instance, in a study by Kyriacou (1991) that examines the level and growth effects of physical and human capital, the capital depreciation rates for physical capital stock (δ^P) and human capital (δ^H) is assumed to take the values of 8% and 10%, respectively. It is important to note that measuring depreciation rates provides a formidable challenge in practice.

As the procedure for estimating the stock of physical capital is based on the perpetual inventory method, according to Nadiri & Prucha (1996) its estimation can be expressed as:

$$K_t = \sum_{i=0}^{\infty} \varpi_i I_{t-i}^K \tag{5}$$

[58] Nadiri & Prucha (1996) use similar equations for both the physical capital stock and human capital to estimate the depreciation rates of the physical and human capital for the U.S. manufacturing sector. However, human capital will be discussed later when the relationship between physical and human capital is specified.

where $\varpi_i \geq 0$ denotes the efficiency function. It is assumed that ϖ_i is non-increasing i.e. $\varpi_0 = 1$, $\varpi_i > 0$ for i = 0…, m and $\varpi_i = 0$ and i > m, where m is maximum average survival time of capital. The average survival time is given by:

$$\sum_{i=0}^{m}(\varpi_i - \varpi_{i+1})i \tag{6}$$

Now, given $K_t = I_t^K + (1-\delta^P)K_{t-1}$ it follows that the depreciation rate for physical capital can be specified as:

$$\delta_t^K = [\sum_{i=0}^{m}(\varpi_i - \varpi_{i+1})I_{t-i-1}^K)/[\sum_{i=0}^{m}\varpi_i I_{t-i-1}^K] \tag{7}$$

Hence, by assuming that the capital stock accumulates in the manner described by equation (4) and depreciates it the fashion given in equation (7) gross investment can be expressed as:

$$I_t = I_{t+1} - (1-\psi)K_t \tag{8}$$

where I_t is planned expansion investment which is the difference between planned gross investment and planned replacement[59] and $(1-\psi)$ is the transaction cost charged by FIs[60]. The $t + 1$ subscript on investment variable (I) emphasize that these are planned investments. The rationale for using planned as opposed to actual investments is that "The use of planned rather than actual investment provides a better basis for studying the motivation for replacement investment, free of the effects of unexpected delivery lags and other factors that prevent plans from being realized" (Feldstein & Foot, 1971, p.53).

The imposition of transaction costs imply that the financial markets in which the transactions take place are far from being perfect as one would expect in the real

[59] See, for example, Feldstein & Foot (1971) for a detailed explanation of the planned versus actual investment with their functional relationship.

[60] Though a similar functional equation is used by Maswana (2006) to empirically investigate the finance-growth puzzle in China, the author uses I_{t+1} instead of K_{t+1}.

world. From equation (8) the transaction cost (*1*-ψ) component results from the spread between lending and borrowing rates charged by the FIs. A low-cost financial market regime facilitates adoption of technological innovation in the financial sector (Bencivenga et al., 1995). As capital market equilibrium requires that available net savings (gross savings minus transaction costs) be equal to gross investment equilibrium in the capital market occurs when:

$$\phi S_t = I_t \tag{9}$$

Using equations (1) through (9) and dropping the time indices, the growth rate of output (*g)* can be written as:

$$g = A\left(\frac{I}{Y}\right) - \psi = A\phi s - \psi \tag{10}$$

where *s* denotes the gross savings rate and *I* denotes gross investment respectively. The investment rate in the economy is determined exogenously and is constant. The labour force of the economy is also determined exogenously, but it is assumed that there is no population growth. As postulated by endogenous growth theory, to contribute more productively to growth, a country's labour force has to be equipped with appropriate knowledge and skill sets, and be technology savvy.

Furthermore, the model is constructed with the assumption that only one good (output) – units of a country's GDP – can be produced at a certain time. This single output can be either consumed in the current period or saved to finance future consumption needs. According to Keynesian economic theory, savings results from the difference between income and consumption expenditure. To a large extent, the decision to forgo consumption in the current period is influenced by the uncertainty (risk) about the future. Hence, Keynesians argue that capital is accumulated to fund future consumption needs (transaction motive) and to meet precautionary related expenses such as medical emergencies (precautionary motive). The accumulated stock of capital is invested by the rational consumer in various asset classes (such as stocks and bonds) in the capital markets. These

investments in turn are expected to generate positive rates of return: capital gains, dividends and interest income. The financial and investment transactions are made possible by the involvement of FIs. Given the assumption that the consumer is a rational decision maker capital is not accumulated for speculative motives.

The discussion above demonstrates that financial intermediation activities, particularly through the credit market, are boosted when FIs (notably banks) act as a key conduit to facilitate investment and financial transactions between key market participants: suppliers of funds (lenders); and demanders of funds (borrowers). Equation (10) attempts to capture the financial intermediation process as theoretically FD is assumed to occur as a result of increased financial intermediation. However, in reality, it could also be influenced by other factors such as financial innovation or government policies.

This leads us to identifying two main channels through which financial development can affect growth. The first channel involves the efficiency with which savings are allocated to investment (Hassan et al., 2011). As financial institutions engage in increased intermediation, they are likely to become more efficient in providing quality financial services. Efficiency gains would result in the narrowing of the spread between the lending and borrowing rates. The spread is an important indicator for the financial intermediation process and an important determinant of the demand for money as Keynesian economic theory posits (Laidler, 1968), with the volume of deposits and credit levels determined by the spread. Other factors such as the creditworthiness of borrowers and availability of collateral are also taken into account by the potential lender in pricing a loan product. Increase in demand for loanable funds can in turn cause an increase in market interest rates.

Increased probability of bad credit risk can prevail as lenders lend to low-creditworthy borrowers. An obvious characterisation in many developing countries is the prevalence of large lending-borrowing margins. This could be caused by factors such as high transaction costs due to the strong presence of informational asymmetry in such markets. As the current theory of financial intermediation suggests, gains in efficiencies would, in turn, result in an increase in the proportion of savings channelled to investments (ϕ) with the consequent rise of g.

The second channel relates to the efficiency with which available capital is put to productive use. As and when lending increases due to fall in interest rates, domestic credit would likely increase. This would lead to rises in the level of investment demand. Increase in investment activities would in turn: (1) induce aggregate economic activity with rises in the level of income and employment; (2) stimulate demand for more financial and banking services; (3) spur technological innovation; and (4) boost physical capital accumulation. Thus, increased financial intermediation, via increased credit activity, can affect growth in a more positive way. In line with economic theory, changes in interest rates play a key role in determining whether a loan is attractive or not.

It is therefore evident that there are three ways in which FD can influence growth: (1) increasing the marginal productivity of capital *(A)*; (2) raising the proportion of saving channeled to investments (ϕ)*;* and (3) influencing savings rates *(s).* While this is consistent with the endogenous financial development and growth model certain assumptions, such as closed economy, which does not account for capital flows and the model's restriction to financial intermediation activities while ignoring stock market activities and other components in the financial system (Ang, 2008), as noted earlier are relaxed. Furthermore, this process occurs via improvements in capital (savings) mobilisation through attractive financial instruments and risk management processes such as pooling and hedging. As Akinlo & Egbetunde (2010) put it, "Essentially, an efficient financial sector is seen as purveyor of limited credit resources from surplus units to the deficits" (p.19).

This implies that as the overall productivity of capital, *A*, increases due to efficient allocation of capital it leads to higher growth. This is demonstrated by the functional relationship in equation (10). As physical capital and human capital are assumed to follow the continuous time accumulation their relationship can be specified as:

$$\dot{K} = s_k Y_t - \delta^P K_t \qquad (11)$$

$$\dot{H} = s_h Y_t - \delta^H H_t \qquad (12)$$

where s_k is the saving rate for physical capital; δ^P denotes the depreciation rate of physical capital; s_h is the saving rate for human capital; δ^H denotes the depreciation rate of human capital; and the dot above variables indicates the time derivative of that variable. In subsequent discussions these time derivatives are quantitatively defined. Data on the growth rates of all of the variables above can be gathered in practice, but the problem is that data for technology is hard to assemble. As change in technology (A_t) is considered as "left over" after accounting for growth in everything else, it is commonly referred to as the "Solow residual"[61].

Moreover, labour force (L_t) grows at a constant exponential rate of the form:

$$L_t = L_0 e^{n,t} \tag{13}$$

where the population growth n is constant. According to standard neoclassical theory the growth rate of population has a negative correlation with the level of output per capita. This implies that a higher population growth rate reduces the steady state capital-output ratio because more investment must go simply to maintain the existing capital-output ratio in the growing population. In other words, the portion of an economy's investment is used to provide capital for new workers entering the labour market rather than to raise capital per worker for the existing pool of skilled workers. As mentioned in Chapter 2, due to non-availability of labour force data *IMR* is used as a proxy for labour force. The efficiency level of each worker is assumed to also grow at a constant exponential rate of the form:

$$A_t = A_0 e^{g,\,t} \tag{14}$$

where g is the constant rate of technological progress. The depreciation rate of both types of capital is assumed to be constant and equal to δ, but in reality δ, n, g are not constant. The more a unit of physical capital is used, the more it depreciates.

[61] 'Solow residual' is named after Robert Solow because of his pioneering work in growth.

According to Villa (2005) population growth (n) is computed using the following formula:

n = fertility – mortality + net migration (15)

In the traditional neoclassical growth model technological progress is labour-augmenting, but in the modified model technological change is taken to be capital-augmenting due to the restrictive nature of the steady state growth theorem. Growth theory suggests that a higher level of income and technology may reduce fertility by increasing wages and the relative value of women's time and overall opportunity cost of rising children. Fertility is also reduced as the level of income increases, and the "endowment" given to the children increases (Kremer, 1993). Kremer (1993) further states that the general production function assumes that there will be a period of increasing income and population growth rates and eventually income will reach a certain level, say $\tilde{y}$, after which population growth rate begins to fall.

Whilst the rate of technological progress is the ultimate source of growth in the neoclassical model a number of issues arise (Villa, 2005): (1) it is unlikely to assume that technology is constant that it is not affected by external economic decisions; (2) according to neoclassical theory in a perfectly competitive world (such as the Harrod-Domar model) the total amount of output is devoted to pay only the inputs; and (3) as all the available output are used up in inputs, there is no way to finance technology. This demonstrates that the main channel to boost labour productivity is to increase the intensity of capital and its efficiency (Henriot & Coe-Rexecode, 2010). Furthermore, by taking into account the above considerations, together with the validity of all the assumptions of the neoclassical model and the steady state framework, Villa (2005) demonstrates that by normalising with respect to A_tL_t the production function in its intensive form can be given as:

$$Y_{E,t} = k_t^{\alpha} h_t^{\beta} \quad (16)$$

where $Y_{E,t}$ is the output per efficiency unit of labour. Spending on education to ensure a sustained supply of a skilled and technological savvy labour force delivers positive returns in much the same way as spending on fixed capital. With the assumption that investing in human capital can be considered as the counterpart to investing in fixed capital, the fraction of income invested in physical capital *(s_k)* and the fraction invested in human capital (s_h) can be specified respectively as:

$$\dot{K} = s_k Y_t - \delta^P K_t \quad (17)$$

$$\dot{K} = s_k k_t^{\alpha} h_t^{\beta} - (n + g + \delta^H) k_t \quad (18)$$

where g is the capital growth rate that can be estimated from a gathered series. In the same vein, the human capital accumulation can be expressed as:

$$\dot{H} = s_h Y_t - \delta^H H_t \quad (19)$$

$$\dot{H} = s_h k_t^{\alpha} h_t^{\beta} - (n + g + \delta^H) h_t \quad (20)$$

A steady state equilibrium condition is thus given by[62]:

$$k = \left(\frac{S_K H^{\beta}}{n+g+\delta}\right)^{\frac{1}{1-\alpha}} \quad (21)$$

$$h = \left(\frac{S_K H^{\alpha}}{n+g+\delta}\right)^{\frac{1}{1-\beta}} \quad (22)$$

The solving of the above systems yield the following:

$$H^* = \left(\frac{S_H^{1-\alpha} S_K{}^{\alpha}}{n+g+\delta}\right)^{\frac{1}{1-\alpha}} \quad (23)$$

[62] In the interest of brevity starting with equation (21) only δ will be used to indicate depreciation rate for both physical and human capital instead of δ^P and δ^H, respectively.

$$K^* = \left(\frac{S_H^{\beta} S_K^{1-\beta}}{n+g+\delta}\right)^{\frac{1}{1-\alpha-\beta}} \quad (24)$$

From the definition of the production function per worker income is given by:

$$\frac{Y_t}{L_t} = A_0 e^{gt} \left(\frac{S_H^{\beta} S_K^{1-\beta}}{n+g+\delta}\right)^{\frac{1}{1-\alpha-\beta}} \left(\frac{S_H^{1-\alpha} S_K^{\alpha}}{n+g+\delta}\right)^{\frac{1}{1-\alpha-\beta}} \quad (25)$$

where A_0 is the initial stock of knowledge; s is the rate of investment, n and g are rates of growth of employment (labour) and technology, respectively; δ is the depreciation rate and $\propto$ is the share of profits.

The bulk of empirical work with the NCGM and endogenous growth models use cross-country data, although cross-country empirical work has limitations for country-specific growth policies (Rao et al., 2010). In this study, the steady state level of output per capita equation is estimated. This equation is derived by replacing the stock of H with its equilibrium steady state value. By taking the logs of equation (25) a typical specification based on constant returns Cobb-Douglas production function and the Harrod neutral technical progress can be specified as:

$$\ln\left(\frac{Y_t}{L_t}\right) = \ln A_0 + gt + \frac{\alpha}{1-\alpha}\ln(s) - \frac{\alpha}{1-\alpha}\ln(n+g+\delta) \quad (26)$$

Since all other ratios and economic growth rates are constants, equation (26) implies that in the steady state the following equation holds:

$$\Delta ln \frac{Y_t}{L_t} = g \quad (27)$$

Derivation of the steady state output per capita equation with human capital augmented production function with the assumption that steady state growth of human capital like physical capital is zero can be specified as:

$$\ln\left(\frac{Y_t}{L_t}\right) = \ln A_0 + gt + \frac{\alpha}{1-\alpha-\beta}\ln s_k + \frac{\beta}{1-\alpha-\beta} ln s_h - \frac{\alpha+\beta}{1-\alpha-\beta}\ln(n+g+\delta) \quad (28)$$

where $\ln\left(\frac{Y_t}{L_t}\right)$ is the log of real per capita GDP of a specific country *i* at time *t* and the new parameter β is the share of income of human capital. The steady state output growth equation will be the same as equation (27). Moreover, the MRW framework suggests that the input human capital can be expressed in two different ways: (i) the rate of accumulation of human capital, s_H, which is captured by equation (23); and (ii) the level of human capital (H). Thus, the output per capita (in log specification) can be obtained by incorporating equation (13), which is the production function in its intensive form, into equation (18), which is the steady state physical capital equilibrium function. The solving of these two equations yields a per capita specification of the following form (expressed in terms of level of *h*)[63]:

$$\ln\left(\frac{Y_t}{L_t}\right) = \ln A_0 + gt + \frac{\alpha}{1-\alpha}\ln s_k + \frac{\beta}{1-\alpha}\ln h^* - \frac{\alpha}{1-\alpha}\ln(n + g + \delta) \quad (29)$$

To get equation (29), MRW eliminates s_h from equation (28) by using a steady state solution for per worker capital *(h*).* As this equation is the level effect human capital in extended NCGM, it can be subject to standard regression analysis. The empirical analysis of this model should therefore check if the available human capital data correspond more closely to either the level of human capital or the rate of human capital accumulation. It is referred to as a level specification because the level of human and physical capital affects the level of output per capita (Villa, 2005)[64].

Thus, as equation (29) represents a theoretical model premised on long-term steady growth state, where all the variables in the economy grow at their long-run growth rate, it is used as a valid specification for panel studies. However, as both panel and time series dataset are used equation (29), which is in equilibrium reduced form, is inappropriate for time series modelling. This is because in steady state equations a year is too short a period for any economy to reach its steady state equilibrium (Rao et al., 2010). This leads to analysing how the EGM and MRW frameworks are incorporated into the methodology for estimation purposes.

[63] Though the issue of income convergence in the long-run is not covered in this study it is important to highlight that a previous study by Bertram (2004) found that there is no tendency for island economies to converge to one another.

[64] Villa's (2005) work is heavily relied on in this section.

4.4 Panel and time series approaches

As the emergence of endogenous growth models has provided the analytical framework to better study the effect of financial development on growth (Ghirmay, 2004) the hypothesis that financial development is linked to growth, or vice versa, can be formally represented by a common time series econometric model (Demirguc-Kunt & Levine, 2001). Additional shift variables, or their proxies like physical capital, human capital, labour, financial development, and the set of controls are introduced into these specifications with the implicit assumption that they only have level effects. Thus, in accord with the expectations of contemporary endogenous growth theory and empirics where FIs are explicitly modeled, the functional relationship between financial intermediation and growth can be represented by the following estimable econometric model:

$$lnY_t = \alpha_0 + \Phi lnK_t + \theta lnH_t + \gamma lnL_t + \varphi\, FD_t + \sigma lnX_t + \epsilon_t \qquad (30)$$

where FD_t represents the four sets of financial proxies (*FSD, LL, DCP* and *PC)*; σlnX_t represents the vectors of explanatory factors which vary across researchers and studies*;* L and H for labour and human capital, respectively; Φ, θ, γ and σ are parameters of interest to be estimated; α represents the constant; and ϵ_t is an error term that accounts for the effects of other potential growth inducing factors that are omitted. The basic presumption here is that economic growth (or financial development) may be affected by macroeconomic factors other than human and physical capital and labour that determine capacity utilisation and the level of economic activity (Gani, 1998).

Both empirics and endogenous growth theory propose a growing number of other possible determinants of growth. Given the constancy in the parameter values where such values are assumed to be determined by technology, under the condition of steady state growth technology is not included in equation (30). Differently put, this is due to the treatment of technology as Harrod-neutral. As equation (30) augurs well with the REs model it will be further explored and used as a base model in Chapter 5. The REs model will be further incorporated into the general-to-specific (GS) lag selection framework for estimation purposes. As will be seen in the next chapter, the

consideration of the REs model is based on the Hausman specification test between the two panel models: FEs and REs.

The preceding discussions have demonstrated how and why the neoclassical and endogenous growth models, together with the Cobb-Douglas production function and the investment-saving functional relationship, can be used as the basis for the construction of an econometric model. The selected variable of interest would be incorporated into the econometric model for estimation purposes. However, the type of dataset used also determines the type of econometric model to be applied. The use of two types of datasets, i.e. panel and time series, influenced the selection of two corresponding estimation frameworks: (1) the REs with GS modelling procedure; and (2) VECM. Equation (30) will be appropriately adjusted to accommodate a VAR model and its panel version. Their frameworks are described next.

4.4.1 Time series modelling framework

Multivariate cointegration framework

To check if the variables are non-stationary in levels and stationary in their first difference prior to estimation, two specific tests are performed: (1) the unit root test to check for the stationary status of the variables; followed by (2) the test of cointegration to check the existence of a long-run relationship among the variables. The test of cointegration is based on a VAR[65] approach initiated by Johansen (1988). Thus, for a general VAR (*p*) model of order *m* can be specified as:

$$\Delta X_t = \alpha + \Pi_m X_{t-m} + \sum_{i=1}^{m-1} \Gamma_i \Delta X_{t-i} + \epsilon_t, \quad i \in \{1, 2, \ldots, N\} \tag{31}$$

where X_t is a 10 x 1 *(nx1)* column vector for the 10 variable case; Δ is the difference operator; α is an (nx1) constant term; Γ and Π represent coefficient matrices (in this case 10 x 1 and 10 x 10 matrix) where Π is referred to as the impact matrix for it contains information about the long-run relationship; m is the lag length; X_{t-m} is a vector of exogenous variables which includes FD_t; and ϵ_t is a 10 x 1 column vector

[65] VAR models were made popular by Sims (1980) and "is one of the most successful, flexible and easy to use models for the analysis of multivariate time series" (Achsani et al., 2013, p.27).

of forecast errors. The maximum number of cointegration vectors is one less than the total variables in VAR model i.e. (n-1) cointegration vector. In general, the cointegration vector provides the basis of the cointegration space. Linear combinations of them produce long run relations. Therefore, after estimating the cointegration space, we will proceed with tests on linear restrictions to identify the cointegration vectors in Chapter 5. As 10 variables will be used in the VAR models in Chapter 6, the maximum no of cointegration relationships will be nine. Nonetheless, if we get 10 cointegration vectors in the case of 10 variable model then there won't be any need to perform cointegration analysis as the variables are stationary [66].

By VAR construction the elements of vector ϵ_t satisfy a number of important assumptions of statistical analysis: ϵ_t is individually serially uncorrelated and has a mean of zero with constant variances i.e. $\epsilon_t \sim N(0, \Sigma)$[67]. The inclusion of several explanatory variables makes this study multivariate in nature as opposed to a bivariate framework. Johansen's methodology requires the estimation of a VAR equation of the type specified in equation (31). The residuals of the VAR specification are then used to compute two likelihood ratio (LR) tests. Two most commonly used LR tests developed by Johansen & Juselius (1990) (JJ test) to determine the unique co-integrating vectors of X_t are the trace test and the maximal eigenvalue test. The trace test evaluates the null hypothesis of r co-integrating vectors against the alternative of (r+1) co-integrating vectors whilst the maximal eigenvalue test evaluates the null hypothesis of, at the most, r co-integrating vectors versus the general null of *p* co-integrating vectors (Perera & Paudel, 2009).

VECM framework and Granger causality

There are two possible specifications of error correction in equation (31) i.e. two VEMs. The inclusion of an error term is critical to estimate a VECM model. Therefore, after obtaining the test of integration, the test of cointegration is performed to check the existence of a long-run relationship among the variables, in particular between FD and growth. Once this requirement is satisfied the production function is specified so that the dynamic adjustment process is based on the well-

[66] Concepts such as stationarity, nonstationarity and cointegration will be discussed in Chapter 5.
[67] See, for example, Enders (2008) for a detailed explanation of VAR.

known error correction model (ECM) (Rao et al., 2010) to test Granger-causality between two variables. This implies that a co-integrated equation comprising the variables in question contains an error term.

Following Engle & Granger (1987), Johansen (1988 & 1991), and Johansen & Juselius (1990), VECM is employed in Chapter 6 to estimate the long-run equilibrium relationship between FD indicators and real output. In empirical research, causality tests in the Granger's sense are increasingly applied (Hacker & Hatemi-J, 2006). In line with the Granger representation theorem the short-term dynamic relationship involving the variables could be examined within the VECM framework if the series are co-integrated (Gounder, 2012). Additionally, Granger (1983) showed that if two variables are integrated an ECM could be fitted, but in the case of more than two variables the endogenous variables must be integrated of *I(1)* for the JJ test of cointegration and VECM procedure to be implemented.

By taking financial development (*FD)* - the core variable which is proxied by four financial indicators - and confining the variables to five additional arguments (*IMR, GOV, GCAP, TRAD* and *INF)* plus growth *(Y)* as a dependent variable yields a total of seven variables of interest. Given the seven set of variables with assumption that at least one co-integrated relationship exists among these variables a VECM specification will have a total of six equations. Additionally, a VECM model has an error correction term (ECT) that measures the speed of adjustment towards long-run equilibrium. This results in a VECM specification of the following forms (in log where log is applicable)[68]:

$$\Delta lnY_t = \alpha_{11} + \sum_{i=1}^{m} \beta_{12}\Delta lnY_{t-1} + \sum_{i=1}^{m} \varphi_{13}\Delta FD_{t-1} + \sum_{i=1}^{m} \Phi_{14}\Delta GCA_{t-1} + \sum_{i=1}^{m} \gamma_{15}\Delta IMR_{t-1}$$

$$+\sum_{i=1}^{m} \rho_{16}\Delta GOV_{t-1} + \sum_{i=1}^{m} \psi_{17}\Delta TRAD_{t-1} + \sum_{i=1}^{m} \lambda_{18}\Delta INF_{t-1} + \pi_{19}ECT_{t-1} + \ominus_{10}DUM + u_{it} \quad (32)$$

$$\Delta FDI_t = \alpha_{21} + \sum_{i=1}^{m} \varphi_{22}\Delta FD_{t-1} + \sum_{i=1}^{m} \beta_{23}\Delta lnY_{t-1} + \sum_{i=1}^{m} \Phi_{24}\Delta GCA_{t-1} + \sum_{i=1}^{m} \gamma_{25}\Delta IMR_{t-1}$$

[68] Since the steps involved in deriving the VECM specifications for each selected variable are basically the same, the VECM specifications for only three variables i.e. $\Delta lnY_t, \Delta FD_t$ and ΔGCA_t are derived here. Of these specifications we are only interested in equations (32) and (33) with growth and finance as dependent variables, respectively.

$$+\sum_{i=1}^{m}\rho_{26}\Delta GOV_{t-1}+\sum_{i=1}^{m}\psi_{27}\Delta TRAD_{t-1}+\sum_{i=1}^{m}\lambda_{28}\Delta INF_{t-1}+\pi_{29}ECT_{t-1}+\ominus_{210}DUM+u_{it} \quad (33)$$

$$\Delta GCA_t=\alpha_{31}+\sum_{i=1}^{m}\beta_{32}\Delta lnY_{t-1}+\sum_{i=1}^{m}\varphi_{33}\Delta FD_{t-1}+\sum_{i=1}^{m}\Phi_{34}\Delta GCA_{t-1}+\sum_{i=1}^{m}\gamma_{35}\Delta IMR_{t-1}$$

$$+\sum_{i=1}^{m}\rho_{36}\Delta GOV_{t-1}+\sum_{i=1}^{m}\psi_{37}\Delta TRAD_{t-1}+\sum_{i=1}^{m}\lambda_{38}\Delta INF_{t-1}+\pi_{39}ECT_{t-1}+\ominus_{310}DUM+u_{it} \quad (34)$$

where *GCA, LE* and *IMR* are the proxies for physical capital *(K)*, human capital *(H)* and labour force *(L)*; β, φ, Φ, γ, ρ, ψ, and λ are the short-run coefficients; and ECT_{t-1} is the error correction term. The coefficient of the ECT term (in this case π) contains information about whether the past values of the variables of interest affect their current values. The direction and speed of adjustments in the dependent variable to deviations from the linear long-run relationship are measured by the magnitude and statistical significance of the coefficient of ECT. *Dum* represents the dummy variables.

Hence, the ECT factor represents the long-run causal effect in relation to the long-run equilibrium relationship of the co-integrated processes. The lagged difference terms describe the effects of *n* past values on the dependent variable. Thus, the lagged change in independent variables can be interpreted as representing the short-run causal impact, while the error correction terms provide the adjustments between the dependent and independent variables towards their respective long-term equilibrium (Gounder, 2012). This shows that there are two possible specifications of error correction leading to two VECM models: the long-run VECM; and the transitory VECM. The short-run dynamics are captured through the individual coefficients of the difference terms.

To conclude that there is long-run causality between FD and economic growth, the coefficient (π) of ECT should turn out negative and significant. The Wald Statistics is used to check the existence of short-run causality between the dependent variable and other regressors. The rejection of the null of no causality indicates the absence of causality. By expressing this in terms of the hypotheses: *FD* does not Granger cause *Y* if all $\omega = 0$, and *Y* does not Granger cause *FD* if all $\beta = 0$. Standard F statistics are

will be used to tests these hypotheses. Engle & Granger (1987) further illustrate that the presence of cointegration between two variables could result in either a unidirectional or bi-directional Granger causality between the two variables in question under an ECM environment.

The VAR and VECM models will be estimated under the time series analysis in Chapter 6. However, unit root test on the variables followed by cointegration tests will be performed prior to estimations as a standard procedure. This is to determine whether to include a series (if stationary), or not (if not stationary), as the treatment of non-stationary data as stationary in estimations would induce spurious estimations. This will be followed by the examination of the short-run dynamics coupled with the test of Granger-causality hypothesis between FD and economic growth using VECM. The panel version of a VAR framework is presented next.

4.4.2 Panel regression framework

To investigate the hypothesis that FD is positively associated with growth (as proxied by *RGDPC)* the panel version of the time series equation (27) is specified by equation (35) by following the framework given by (Hassan et al., 2011):

$$GROWTH_{i,t} = lnRGDPC_{i,t} - lnRGDPC_{i,t-1;} \qquad i \in \{1, 2, \ldots, N\} \tag{35}$$

where $GROWTH_{it}$ denotes real output (proxied by *RGDPC*) for *i*-th country at time *t*-th observation; *lnRGDPC* is the log of real per capita GDP at time *t* for the *i-th* country in the panel. Using the notation *Q* to denoted output and by treating the initial level of *lnRGDPC* as $Q_{i,0}$ and using $\ddot{Q}_{it}$ to represent the steady state real per capita GDP in the long-run the first-order approximation of the NCGM model can be expressed as:

$$GROWTH_{i,t} = -\lambda(Qi,t - \ddot{Q}_{i,t}) \tag{36}$$

where λ is a positive convergent parameter. As the literature often implicitly models $\ddot{Q}_i$ as a linear function of structural parameters a typical growth model can be quantified as:

$$GROWTH_{i,t} = -\lambda Qi,t + \lambda' X_{i,t}) + \epsilon_{it} \quad (37)$$

where $X_{i,t}$ is a vector of variables controlling for the long-run real growth across the countries in the panel. Based on a panel modelling framework a panel estimation model in its extended form can be specified as:

$$GROWTH_{i,t} = \beta_0 Q_{i,1976} + \varphi FD_{i,t} + \Phi GCA_{i,t} + \theta LE_{i,t} + \gamma IMR_{i,t} + \rho GOV_{i,t} + \psi XM_{i,t} + \lambda INF_{i,t} + \omega FDI_{i,t} + \oint AID_{i,t} + \eta_{it}, \ \eta_i = \mu_i + \epsilon_{it} \quad (38)$$

where $\eta_i = \mu_i + \epsilon_{it}$ and η_{it} represents an individual level effect which is unknown and ϵ_{it} is the idiosyncratic error. The other parameters and notations remain the same as defined for equations (30) and (31). Equation (38) is functionally similar to the REs specification as explained earlier under the time series framework. The main difference between REs and FEs specifications lies in the way they treat the individual level effect (μ_i) as it is treated differently across groups whilst all other coefficients and error variances are constrained to be the same.

4.5 Frameworks for accompanying tests

It is critical to test for non-stationarity of the variables of interest to determine whether to include a trend series (if stationary) or not (if non-stationary). The existence of a linear combination among the variables in a regression with non-trending residuals is essential to ensure that the results are statistically valid and economically meaningful. The first test involves the determination of non-stationarity followed by the test of cointegration under both panel or time series approaches. In the literature, a process that has a unit root is called integrated of order one, denoted as *I(1)*, whilst a stationary process is referred to as an integrated of order zero process, denoted as *I(0)* (Gil-Alana, 2002). A stationary time series has a constant mean, constant variance (homoscedasticity) and its covariance is independent of time. The presence of unit root can also dramatically affect the asymptotic properties of panel and time series regression estimates and test statistics (Nelson, & Plosser, 1982).

Trending behaviour or non-stationarity in the mean is normally exhibited in many macroeconomic and financial time series datasets as such series tend to grow over.

The data gathered for the current study such as real GDP is no exception. However, though the presence of a unit root can be detected through unit root tests, it can be reduced to stationarity through the application of the standard first differencing procedure. Second differencing is normally implemented in cases where stationarity is not achieved via first differencing. The inclusion of a non-stationary variable in estimations would in turn lead to biased, inefficient and inconsistent parameter estimates. This would lead to erroneous statistical inferences. This has important implications for policy and theory. For instance, the pursuance of misguided policy options based on empirically flawed inferences by policy makers could trigger negative effects such as stagnation in economic growth.

In the context of this study, such adverse effects would entail outcomes such as poor financial sector and economic growth performances in the long-run. Conversely, theoretical contributions too can also be flawed. To avoid such implications unit root tests will be done on both panel and time series datasets to check for the presence of unit root. This would result in the inclusion of only *I(0)* variables in the subsequent model estimations. To test for non-stationarity of an autoregressive process of say order *p* (*denoted as AR(p)*) with the null hypothesis that a variable contains a unit root and stationary variable in the alternative hypothesis, a number of both panel and time series tests have emerged. Some of these early conventional unit root and stationarity tests are: Augmented Dickey-Fuller (Said & Dickey, 1984) (ADF test); Dickey-Fuller (Dickey & Fuller, 1979) (DF test); (Fisher, 1932) (Fisher test) and (Phillips & Perron, 1988) (PP test).

As first generation tests have been generally accepted as lacking statistical power in distinguishing the unit root null from stationarity (Li & Liu, 2005) a barrage of second generation studies attempting to construct a more efficient test for both panel and time series have emerged over the last decade. Several of these important tests are: Campbell & Perron (1991); Im et al., (2003) (IPS test); Kwiatkowski et al., (1992) (KPSS test); Levin et al., (2002) (LLC test); Maddala & Kim (1998) (MK test); Ng & Perron (2001) (NP test); and Harris & Tzavalis (1999) (HT test). Given the importance of performing unit root test or stationarity test (as some testing procedures test the null whilst others test the alternative) such as gaining statistical power, formal unit root tests on the data series will be executed in the next two

chapters. More specifically, in Chapter 5, panel unit root test using IPS testing procedure will be performed while in Chapter 6 unit root test using time series data will be implemented with the commonly used ADF testing procedure.

4.5.1 Unit root, cointegration and lag selection tests for panel datasets

The frameworks for both the unit root and co-integration tests as applied on panel dataset are presented in this subsection.

IPS panel unit root test framework

As in the time series analysis, testing procedures are used to first determine whether the series in question is stationary or not, and then to decide whether the series is co-integrated or not. As the IPS panel unit test is relied upon to test the time series properties of the panel data, its data generating process (DGP) when $\Delta y_{i,t} = y_{i,t} - y_{i,t-1}$ with the null hypothesis of unit root $H_0: \beta_i = 0$ for at least some i's against the heterogeneous alternative of $H_1: \beta_i < 0$ with individual effects and no time trend is of the following form[69]:

$$\Delta Y_{i,t} = \alpha_i + \beta_i Y_{i,t-1} + \sum_{j=1}^{n} \rho_{ij} \Delta Y_{i,t-j} + \epsilon_{i,t;} \quad (39)$$

where Δ is the first difference operator; $Y_{i,t}$ is the dependent variable (real per capita GDP); $i = 1,2,\ldots, N; t = 1,2,\ldots, T$ represents the cross-sectional dimension and the time length in the ADF regression; α_i is the constant term; β_i is the coefficient of the lagged dependent variable which is allowed to differ across groups (Hoang & McNown, 2006); n is the number of lags chosen considering the underlying data generating process; ρ_{ij} is the vector of the coefficients of the differenced and lagged dependent variable; and $\epsilon_{i,t}$ is the stochastic error term which is assumed to be independent of i's and t's, normally distributed but having cross-sectionally heterogeneous variance, σ_i^2 (Ahmed[70], 2010).

With the assumption of the presence of a stationary variable in the null hypothesis (H_0) and a non-stationarity in the alternative hypothesis (H_1), if the calculated

[69] The significance of performing unit root test on a series plus the rationale for the use of the IPS test will be provided in Chapter 5.
[70] Dr Abdullahi Ahmed served as the associate supervisor of this research.

statistics is higher than McKinnon's critical value then we do not reject H_0 and consider the variable is stationary, if not, then it is considered non-stationary. The IPS test-statistic is estimated by the following specification:

$$t_{IPS} = \frac{\sqrt{N}[\bar{t} - E(\bar{t})]}{\sqrt{var(\bar{t})}} \quad (40)$$

where the terms $E(\bar{t})$ and t-bar $(\bar{t})$ are generated by simulation and tabulated by IPS with the t-bar statistic converging to the standard normal distribution as N and T ∞ (Asghar et al., 2011).

Panel cointegration test framework

There is a growing literature on panel unit root tests with cross-sectional dependence (Bai et al., 2009). More recent work also allows for cross-sectional dependence of error structure (e_{it}) when testing for the null hypothesis of panel cointegration (e.g. Breitung & Das, 2008). Given the above, the cointegration framework can be specified as:

$$e_{it} = \lambda'_i F_t + \mu_{it}, \qquad \mu_{it} = y_{it} - \beta x_{it} - \lambda'_i F_t \quad (41)$$

where the error structure (e_{it}) has a common component ($\lambda'_i F_t$) and a stationary idiosyncratic component (μ_{it}) with a null hypothesis of panel cointegration. Given this error structure the panel cointegration holds (Bai et al., 2009) when:

$\mu_{it} = y_{it} - \beta x_{it} - \lambda'_i F_t$ is jointly stationary. (42)

where a regression of y_{it} on x_{it} yields a consistent estimator for β when F_t is *I(0).*

GS framework for panel lag order estimation

One of the delicate issues in time series models is the determination of the appropriate lag order to capture response time and feedback (Han et al., 2013). The number of variables and lag lengths integrated into a specific econometric model play a crucial role in determining the subsequent results of a model. The lagged

differences play an important role in ensuring that the errors terms are white noise. If the lag length is too large then the power of the test suffers. Conversely, if the lag length is too small then the remaining serial correlation in the errors will bias the test. This shows that the inclusion of correct lag lengths make inferences on long-run parameters statistically valid.

The lag order selection problem is even more challenging in panel models because of the presence of fixed effects which means that the dimension of the parameter space increases with the sample size (Han et al., (2013). Thus, an appropriate statistical procedure is required to determine the appropriate length of the distributed lag. Those used widely in lag length determination procedures are: Akaike information criteria (AIC) (Akaike, 1973); Schwarz information criteria (SIC) (Schwarz, 1978); Campbell & Perron (1991); and GS testing strategy (Hall, 1994). Of these four tests, the GS lag term specification testing approach of Hall (1994) with a panel specific *AR(1)* process will be employed for the determination of lags for panel data in Chapter 5. For time series modelling AIC will be considered in Chapter 6. One of the key reasons for considering the GS lag determination criterion is that it tends to choose models of higher order. Extended work by Hoover & Perez (2004) using cross-sectional time series datasets found impressive performance by the GS method when compared to alternative methods. In addition, according to Han et al., (2013) an obvious alternative approach to determine the appropriate lag order for panel data that avoids data loss is the GS sequential modelling procedure.

The GS sequential modelling procedure may be implemented in the usual way, but the framework for a simple panel *AR(k)* process can be specified as[71]:

$$y_{it} = \sum_{s=1}^{k} \rho_s y_{it-s} + \varepsilon_{it,} \text{ where } \varepsilon_{it,} \tilde{} \; iid\, N(0, \sigma^2)\,,\; i = 1,..n\;; t = 1,...,T \tag{43}$$

According to Han et al., (2013): "The sequence begins by estimating the largest model – the panel *AR*(k_{max} *)* model for some given k_{max} – and tests the significance of $\hat{\rho}_{k_{\max}}$. If the null hypothesis that $\rho_{k_{\max}} = 0$ is not rejected at the chosen level, then the

[71] See, for example, Han et al., (2013) for panel *AR(k)* process with its specifications.

panel $AR(k_{max} - 1)$ model is fitted and the null hypothesis $\rho_{k_{\max}-1} = 0$ is tested (p.7). Han et al., (2013) further adds that this sequential process of estimating and testing is continued until the null hypothesis is rejected, and $\hat{k}$ is defined as the largest value such that the regressor y_{it-k} is significant. Given the panel *AR(k)* process as specified by equation (43) the parameters of panel equation (38) will be estimated with the assumption of an *AR(1)* process in the disturbances in the next chapter.

4.5.2 Time series properties of the macroeconomic dataset

As the significance of performing integration test on a series, as well as the rationale for the use of the ADF test for the time series data, is provided in the next chapter the object of this subsection is to present the framework behind the ADF test.

ADF time series unit root test framework

As in the case of panel analysis, testing procedures are used in time series analysis to first determine the stationarity properties of the variables under investigation. The unit root testing procedure that will be applied for the time series dataset in Chapter 6 is the well-known ADF procedure. This test is performed with assumption of the presence of a unit root (non-stationarity variable) in the null hypothesis *(H_0)* and a stationary variable in the alternative hypothesis *(H_1).* If the calculated test statistics is higher than the McKinnon's critical value the null of a unit root is not rejected. This would imply that the variable being tested is non-stationary. If the opposite holds the variable is considered stationary.

In undertaking unit root test both in levels and in first difference tests are executed. Each series started with the most flexible specification of the test equation that includes an intercept and a trend:

$$\Delta X_t = \alpha_1 + \alpha_2 t\, \chi X_{,\,t-1} + \sum_{j=1}^{k} \beta_j \Delta X_{t-j} + \epsilon_t \qquad (44)$$

where Δ is the first difference operator; α_i represents the constant; X_t is vector of the variables of interest; ϵ_t is a vector of residuals (the white noise error term)*; t* is the time trend; *k* is the appropriate lag length of the augmented terms. The Akaike

Information Criterion (AIC) is used to determine the lag length; and β_j is the coefficient of the lagged augmented term. As can be seen from equation (44), the ADF test is essentially the test of significance of the coefficient χ.

Time series cointegration test framework

After the test of unit root the test of co-integration is usually performed to establish whether or not there exists a stable co-integrated (long-run) association between a pair of series. The concept of co-integration was introduced by Granger (1981). As co-integration implies the existence of an ECM it integrates the short- and long-run information in modelling the data and proves to be a superior modelling technique (Ghosh et al., 1999). By combining systems of equations of ECM we get a VECM. As a VAR framework proposed by Johansen (1988) is applied for the test of co-integration with a p-dimensional VAR of order *k*, it can be specified as:

$$X_t = \alpha + \Pi_1 X_{t-l} + \Pi_2 X_{t-2} + \ldots\ldots\ldots\ldots\ldots + \Pi_k X_{t-k} + \epsilon_t \qquad (45)$$

The above equation can be further re-written as:

$$\Delta X_t = \alpha + \Pi X_{t-m} + \sum_{i=1}^{m-1} \Gamma_i \Delta X_{t-i} + \epsilon_t, \quad i \in \{1, 2, \ldots, N\} \qquad (46)$$

As equation (46) is the same as equation (31) the notations and parameters remain as explained in equation (31). The Maximum Eigenvalue and the Trace tests, as noted before, are utilised for the test of cointegration. In the case of a bivariate *VAR* the null hypothesis is that there is no cointegration between the variables against the alternative that there is only one cointegrating vector. As cointegration implies the presence of an ECM, if the variables are cointegrated VECM models will be specified to test both short-run and long-run causality among the variables.

Thus VECM provide information about both the short-and long-run adjustments to changes in X_t via estimated parameters Γ and Π, respectively. The expression ΠX_{t-m} is the ECT and Π can be factored into two separate matrices, say π_1 and π_2 such that $\Pi = \pi_1 \pi_2$' where π_2' denotes the vector of cointegrating parameters while π_1 is the

vector of error correction coefficients which measures the speed of convergence to the long-run steady state. This steady state is consistent with what we arrived at under the MRW framework earlier in equation (29).

Granger-causality

The direction of the hypothesised causal relationship between FD and growth will also be tested using the Granger-causality framework. Thus, Granger-causality based on first difference VAR's in the case of no co-integration can be expressed as:

$$\Delta lny_t = \alpha_1 + \sum_{j=1}^{m} \beta_j \Delta lnY_{t-j} + \sum_{j=1}^{n} \varphi_j \Delta FD_{t-1} + \epsilon_{t1} \quad (47)$$

$$\Delta FD_t = \alpha_2 + \sum_{j=1}^{n} \varphi_j \Delta FD_{t-1} + \sum_{j=1}^{m} \beta_j \Delta lnY_{t-j} + \epsilon_{t2} \quad (48)$$

An unrestricted VAR model of the type specified above is used when it is assumed (or when cointegration tests reveal) that the variables are not cointegrated. A test of joint significance of these lagged terms *(φ_j* and β_j) constitutes short-run Granger causality. In the VAR framework Granger-causality test is based on the null hypothesis, which is formulated as zero restrictions on the coefficients of the lags of a subset of the variables. As the Wald test is the standard tool used for testing zero restrictions on the coefficients of VAR processes, it is applied to test for short-term causality in the Granger-sense. If the variables in the VAR system are stationary, then the Wald statistic has an asymptotically chi-square distribution with q degrees of freedom, where q is the number of restrictions under the null hypothesis (Emirmahmutoglu & Kose, 2011).

4.6 Chapter summary

Prior to analysing the frameworks and methodology underpinning this study, the definition of financial sector and its key components (FIs, NBFIs and capital markets) were examined. There is deep interaction among these components. The absence of a generally accepted conceptual framework for finance-growth nexus led to the development of this study's conceptual model (Figure 4.1). The model

attempts to illustrate a typical dual economy of the type common in economies of developing countries where the informal sector operates side-by-side with the formal economy. The conventional five-sector income model was modified to include the informal sector as the sixth sector. In addition, by combining Levine's (1997) theoretical approach to finance-growth nexus the hypothesised causal link between FD and growth is illustrated.

After providing the empirical and theoretical considerations that led to the framing of the proposed hypothesis, the theoretical EGM-MRW framework which this study adopts was appraised. This is consistent with the literature, as a growing body of empirical research on growth since the 1980s also use the EGM-MRW framework. The theoretical process of savings-investment intermediation process was explained both quantitatively and qualitatively. The econometric process of how the EGM-MRW framework is incorporated into the methodology for estimation was discussed in detail with the use of equations. The econometric methodologies related to the panel (FEs with GS sequential modelling procedure) and time series (VAR, VECM and Granger-causality) approaches were discussed. Finally, the frameworks for statistical tests of unit root and cointegration were explored. This is because prior to estimation the variables in question need to be tested for unit root followed by cointegration to avoid spuriousness in estimations. The FEs with GS methodology and its accompanying tests are applied and discussed in the next chapter.

CHAPTER 5

EMPIRICAL RESULTS - PANEL DATA ANALYSIS

5.1 Introduction

The importance of NCGM and its relevance to finance-growth nexus were examined in the previous chapter. This chapter aims to empirically test the economic hypothesis of *"finance-leading growth"* in the context of MSG economies. The chapter is structured as follows. Section 5.2 presents the basic descriptive statistics derived from the panel dataset. Section 5.3 describes the importance of carrying out panel unit root test and the rationale behind the application of Im-Pesaran-Shin (IPS) unit root testing procedure. Diagnostic tests and the GS sequential lag-term selection approach are discussed in Section 5.4. In Section 5.5 the empirical results for four REs models with GS technique are estimated by panel corrected standard errors (PCSEs) are reported. Section 5.6 concludes the chapter.

5.2 Descriptive statistics

The theoretical bases for assigning the expected signs to the variables relative to growth and FD were explained in Chapter 2. Table 5.1 presents the basic descriptive statistics of the variables of interest pooled across time and country in terms of the variance, mean and correlation coefficients. Several observations can be drawn from the results. The variance for the financial indicator *DCP* (131.36) is higher compared to the variances for the other three financial indicators: LL (0.09); PC (0.01); and FSD (0.09). This could imply that domestic credit activity was more volatile during the reviewed period. In crude terms, the large variation between the largest variance (357.63) and smallest variance (21.81) for the controls could indicate the presence of panel heteroskedasticity. While there is no considerable variation among the four financial indicators, there is considerable variation in the mean of the set of controls. As non-stationarity in the mean or trending behaviour can cause results to go astray, the standard approach of first differencing as a trend removing procedure to ensure

the inclusion of only stationary variables in subsequent estimations will be executed later in the analysis.

Table 5.1: Descriptive statistics and Pearson Correlation

Variance and mean				[a]Correlation coefficients				
Variable	Obs.	Variance	Mean	*lnRGDPC*	*LL*	*PC*	*FSD*	*DCP*
(i) Economic growth measure								
lnRGDPC	140	0.28	7.25					
(ii) Financial indicators								
LL	135	0.09	0.51	0.10	1.00			
PC	135	0.01	0.28	0.10	0.23*	1.00		
FSD	135	0.09	0.47	-0.01	1.00**	0.23*	1.00	
DCP	135	131.36	27.13	0.25**[b]	0.41**	0.86**	0.41**	1.00
(iii) Set of controls								
GOV	140	27.93	21.13	-0.24**	0.25**	-0.04	0.24**	-0.07
LnGCAP	140	0.12	2.98	1.00	0.29**	0.11	0.27**	0.22*
TRAD	137	278.12	72.39	-0.15	-0.35**	-0.25**	-0.36**	-0.17
INF	139	20.32	6.97	-0.37**	-0.37**	-0.35**	-0.37**	-0.41**
LE	140	24.73	61.84	0.74**	0.51**	0.72**	0.52**	0.70**
IMR	140	357.63	38.25	-0.73**	-0.44**	-0.66**	-0.46**	-0.58**
FDI	140	21.81	4.46	0.12**	0.46**	0.48**	0.45**	0.38**
AID	140	459.61	23.75	-0.35**	0.17	-0.10	0.18	-0.12

Note: (a) the correlations for the financial proxies are estimated with Pearson Partial Correlations with pairwise-case deletion after controlling for other controls, whilst the coefficients for the other predictors are estimated with Pearson Correlations; (b) **, * correlation is significant at the 0.01 level (2-tailed) and 0.05 level (2-tailed), respectively.

Partial correlations coefficients are reported for the four core financial sector proxies with other predictors in Pearson correlations. For financial proxies and growth, the effects of other explanatory variables were controlled under partial correlation coefficients. Of the four financial measures, the correlation coefficient values for three - *LL*, *PC*, and *DCP* - are consistent with their predicted positive signs. Of this only *DCP* is significantly correlated with growth ($r = 0.25$, $p < 0.10$). The correlation coefficient sign for *FSD* is not as expected and is insignificant. Though there is a perfect positive correlation between *FSD* and *LL* (1.00) and positive and significant correlation between *DCP* and *PC* (0.86) they will still be included in the subsequent empirical explorations. This is because each financial indicator will be entered only once in each model to test a particular proxy's extent of impact on growth.

Correlation results indicate that the majority of financial proxies and growth tend to move together. This could imply that there is long-run association between financial development and growth, where finance could spur growth or vice versa. In other words, reverse causality (or endogeneity) is possible, where the hypothesised causal effects could go from growth to finance or from finance to growth. This will be tested empirically later. Given the conventional assumption of linearity, the strength of the underlying relationship between a pair of variables, particularly between a dependent variable and the regresssors, is assumed to be rudimentarily captured by the value of the correlation.

Most of the correlation coefficients for the controls relative to growth carry expected signs and are significant except *TRAD*. It could be argued that *TRAD*'s negative sign is in order as trade openness of a given economy is an indicator of international integration of the real sector. When this indicator is high, exports are less attractive and so some studies treat this variable with a negative sign (Kalule, 2010). Since resource-rich nations such as PNG rely heavily on the receipts from the export of commodities to support the growth of their economies *TRAD*'s relationship to growth is expected to be positive as stated in Chapter 2. In empirical research it is impossible to include all possible factors in a single model to test a specific theory or hypothesis. Therefore, after the datasets are subject to unit root and cointegration tests only those variables that turn out significant will be selected for subsequent statistical analysis. The tests to determine the panel properties of the dataset are discussed and executed in the next section.

5.3 Testing the panel properties of the data

It is critical to test for non-stationarity (if null hypothesis is *I(1))* or stationarity (if null hypothesis is *I(0))* of the variables of interest prior to model estimations to determine whether to include a series (if stationary) or not (if not stationary). As the treatment of non-stationary data as stationary in estimations would induce spuriousness in a regression, the object of this section is to discuss the rationale for choosing the IPS panel unit root test and the results obtained from the implementation of the IPS test procedure.

5.3.1 Panel unit root test

Carrying out the panel-based unit root test ensures the series are *I(0)* prior to estimation in order to avoid complications such as model misspecification and spuriousness in results. The importance of this will be discussed in Chapter 6. Statistical tests provide evidence for the presence of unit root as a preliminary step to check whether each data series is integrated and has a unit root (Nelson & Plosser, 1982). The use of panel data unit root tests increases the power of unit root tests based on a single time series. In addition, data is utilised in the most efficient manner via panel unit root tests (Christopoulos & Tsionas, 2004). Numerous panel unit root tests[72] are available in the economic literature, and the following three are widely used (Hoang & McNown, 2006): the IPS test (Im et al., 2003); the LLC test (Levin et al., 2002); and the MW test combines these tests by Maddala & Wu (1999). Different formal panel unit root tests have differences in areas such as assumptions, null or alternative hypothesis, and how they treat either balanced or unbalanced data. Different panel testing procedures are used depending on whether stationarity or non-stationarity is being tested as the null.

Besides the differences in assumptions about the null, there are other important differences among the tests. For instance, of the above popular panel unit root tests the LLC test is of limited use because the null and alternative hypotheses are so strict that it is not realistic in practice. Further analyses of the available panel-based unit root tests indicate that the IPS test has a number of advantages: it allows each panel to have its own βi unlike other panel unit root tests that assume all panels to have the same value of βi[73] (Hoang & McNown, 2006); it relaxes the identical assumption and estimates an Augmented Dickey Fuller (ADF) test; it is the test most often used in practice because it is simple and easy to use (Hoang & McNown, 2006); it is the most powerful test in the sense that it allows for heterogeneity in the panel unit root analysis (Ahmed, 2010); and the IPS test with the null hypothesis that all the panels contain a unit root is easy to use because it has tables of critical values for ready reference (Maddala & Wu, 1999)[74].

[72] Levin & Lin (1993) laid the foundations for panel unit root tests.
[73] Where β_i - the coefficient of lagged dependent variable - fits into the test equation was pointed out when the IPS unit root framework was discussed in the last chapter.
[74] In Tables 3 and 4 of their paper, Im et al., (1997) provide the critical and *p*-values for ready reference. See, Maddala & Wu (1999) for a comparison of different tests including the IPS test.

When the IPS and LL tests were compared against other alternatives by Maddala & Wu (1999) the IPS test proved more powerful. A key downside of other tests, such as the Fisher test, is that unlike the IPS test the critical values are derived via Monte Carlo experiments. Finally, that the IPS appears to have superior test power to analyse long-run relationships in panel data. Given these compelling reasons and the relative ease and frequency of use of the IPS test, this study uses the IPS unit root test to examine whether the variables of interest are stationary or not to avoid the inclusion of non-stationary time series variables that would lead to spurious results.

5.3.2 Panel unit root test

The results of the IPS[75] panel unit root test in levels (original) and first difference (demean) specifications at various lag lengths (as denoted by Δ) of each variable are reported in Table 5.2. Tests in levels and first difference constitute two parts: original with no trend and original with trend; and demean with no trend and demean with trend. Country and time effects are common in panel datasets, and problems induced by the time-dimension, notably due to non-stationarity, are ignored by most studies (Kittel & Winner, 2005). Performing the unit root test on all series via the demeaning procedure addresses these effects. Based on the unit root results, only variables that turn out stationary are accepted for further empirical analyses. The execution of first differences in panel models also wipes out cross-country effects.

The results show that in the original series in levels without trend, only four variables i.e. *GCAP*, *INF*, *IMR* and *AID* are *I(0).* For these four control variables that are stationary in levels, the null hypothesis of unit root is rejected at the following significance levels: 5% for *GCAP;* 1% for *INF;* 1% for *IMR;* and 1% for *AID*. The remaining variables i.e. economic growth measure (*RGDPC*), all the four financial proxies (*LL, PC, FSD* and *DCP*), and the remaining controls (*GOV, TRAD, LE and FDI*) are *I(1).*

[75] The IPS panel unit root is performed using the *Stata* command: *xtunitroot.*

Table 5.2: Panel unit root test using IPS

Variables of interest[a]	Original		Demean	
	No trend	Trend	No trend	Trend
(i) Economic growth measure				
lnRGDPC	0.142	-1.495**	0.111	-2.266
[b]*ΔlnRGDPC*	-5.973***[c]	-5.994***	-6.323***	-6.346***
(ii) Financial indicators				
LL	1.644	0.0638	-2.4035***	-1.704**
ΔLL	-5.268***	-5.287***	-5.884***	-5.973***
PC	3.068	1.150	-0.056	-1.260
ΔPC	-4.694***	-4.873***	-5.4455***	-5.477***
FSD	2.542	0.668	-2.222**	-1.471*
ΔFSD	-5.099***	-5.248***	-5.927***	-6.049***
DCP	2.706	1.285	0.751	-0.767
ΔDCP	-4.863***	-5.072***	-5.359***	-5.468***
(iii) Set of controls				
GOV	-1.268	-3.763***	-0.561	-3.466***
ΔGOV	-7.105***	-7.104***	-6.986***	-6.965***
GCAP	-1.711**	-2.413***	-1.567**	-2.211**
ΔlnGCAP	-6.969***	-7.028***	-7.178***	-7.228***
TRAD	-0.979	-1.267	0.320	-1.328**
ΔXM	-6.693***	-6.779***	-6.480***	-6.574***
INF	-4.593***	-5.086***	-5.160***	-5.324***
ΔINF	-7.826***	-7.852***	-8.233***	-8.277***
LE	-1.051	0.623	1.1000	1.057
ΔLE	-1.467*	-3.325***	-2.194***	1.056
IMR	-9.595***	-1.077	-2.815***	-1.186
ΔIMR	-1.379*	-4.523***	-3.692***	-5.426***
FDI	-0.353	-1.258	0.541	-0.295
ΔFDI	-7.012***	-7.433***	-7.164***	-7.622***
AID	-3.235***	-3.764***	-3.020	-3.707***
ΔAID	-7.351***	-7.648***	-7.653***	-7.746***

Notes: (a) A total of 13 variables (eight controls, four financial proxies and the dependent variable are used in the model specifications; (b) Δ (delta) for lag lengths and represents unit root values in first difference levels; and (c) Statistical significance levels: *<10%,**<5%, and ***<1%, respectively.

As the other variables contain unit root the IPS test is done again in first difference. This procedure ensured that the series were generated by an *I(0*) process. All the variables, including the three that were previously stationary in levels, are found to be strongly stationary in first difference at 1% significance level. *LE* and *IMR* appear stationary at 10% significance level. This shows that all series in question are now *I(1)*, which justifies the selection of lag length one with first differencing. The exception, however, is *GCAP* at two lags. The possibility of a co-integrating relationship between the potentially co-integrating variables of FD and economic growth will not be explored further in this study as $H0_1$ focusses on a *finance-leading hypothesis.* The IPS test indicated that a number of variables of interest are co-integrated. Hence, it is assumed that there is a long-run association between finance and growth. A cointegration test with time series data using the JJ cointegration test will be executed in Chapter 6.

As all the variables are stationary in their first differences, the null of unit root is rejected with no trend and with trend at both original and demeans levels. Consequently, all the series that are included in the estimations are *I(1)*. Having such a stationary system implies that the effects of shocks have been eliminated by the first differencing process. The inclusion of *I(1)* series in regressions, coupled with the purging of shocks, yields robust estimations. Having settled the stationarity issue other key econometric issues (such as heteroskedasticity) will be analysed.

5.4 Diagnostic tests, PCSEs and GS procedure

The diagnostic tests on panel data are implemented in subsection 5.4.1. This is followed by an evaluation of the PCSEs estimator in subsection 5.4.2. The GS lag order selection procedure is covered in subsection 5.4.3.

5.4.1 Diagnostic checks

Three main problems arise when the Gauss-Markov assumption of the error structure, being *i.i.d (independent and identically distributed)*, is violated. These complications are: heteroskedasticity; panel autocorrelation; and contemporaneous correlation (Beck, 2001): This implies that each country may have its own error variance and non-constant errors terms, and that errors may be correlated with the previous errors. Given these complications, the corresponding panel error

assumptions are: error variance for any given unit is assumed to be constant i.e. homoskedasticity of variance; errors are assumed to show first-order serial correlation, AR(1); and temporal dependence exhibited by errors is assumed to be time-invariant and may also be invariant across units (Beck & Katz, 1995). Non-correction of these complications can potentially lead to biased estimates, which would in turn lead to misguided economic policy options.

Diagnostic tests are executed on the data to detect these three main problems. For heteroskedasticity and autocorrelation the Likelihood Ratio (LR) tests and Wooldridge tests are respectively implemented. For the LR test, the null hypothesis *(H_0)* is the parameter vector of a model that satisfies a smooth constraint with the assumption of heterogeneity nested in homogeneity (Pauwels & Weiss, 2008). For the Woolridge test the null is "no first-order autocorrelation" (Wooldridge, 2002). To determine whether the models are specified correctly or not the Ramsey RESET[76] test is effected with the null hypothesis that the models are correctly specified. Suitable approaches will be employed in this study to eliminate these complications if they are present.

Since iterated feasible generalised least squares (FGLS) with heteroskedasticity produces maximum-like hood parameter estimates, a LR test is executed. The LR test employs the number of constraints in the nested model based on the number of parameters. Specifically, the number of constraints is computed by the number of panels minus 1, which is given by local dF = e (N_g) – 1 (Wiggins & Poi, 2003). This specific iteration for the heteroskedastic test is employed here.

Conversely, the iterated GLS with autocorrelation does not produce the maximum-like hood parameter estimates as with heteroskedasticity. This affects the implementation of the LR test. According to Drukker (2003), simulation results show that the Wooldridge's test has good size and power properties with samples of moderate size. As such the new Wooldridge test for autocorrelation in panel data models is exploited in this study. The results for the two tests of LR and Wooldridge are reported in Table 5.3.

[76] Ramsy RESET Test indicates whether there is likely to be some omitted variable(s) which would improve model performance (Ramsey, 1969).

Table 5.3: Heteroskedasticity and autocorrelation diagnostic tests

Tested model	**Issue of heteroskedasticity**			**Issue of serial correlation**[b]		
	LR test[a]	*P*-value	Model diagnostic outcome	F(1,3)	*P*-value	Model diagnostic outcome
Model 1: FSD as proxy	LR chi2(3) = 7.08	0.0695	Affected by heteroskedasticity.	7.751	0.0688	Not affected by autocorrelation.
Model 2: LL as proxy	LR chi2(3) = 7.06	0.0701	Affected by heteroskedasticity	8.099	0.0653	Not affected by autocorrelation.
Model 3: DCP as proxy	LR chi2(3) = 7.42	0.0597	Affected by heteroskedasticity	7.585	0.0705	Not affected by autocorrelation.
Model 4: PC as proxy	LR chi2(3) = 7.62	0.0547	Affected by heteroskedasticity	7.475	0.0717	Not affected by autocorrelation.

Notes: (a) The Likelihood Ratio (LR) test assumption is: *homoscedastic nested in heteroskedastic*. Thus, the null hypothesis is: *Ho: no heteroskedasticity*; and (b) the null hypothesis for the Wooldridge test for autocorrelation is: *Ho: no first order autocorrelation.*

As shown Table 5.3 all four models tested are affected by heteroskedasticity but not by autocorrelation. The issue of autocorrelation is not present in any of the models, as a significant test statistic indicates the presence of serial correlation. This shows that any serial autocorrelation in the level data has been corrected by: first differencing; the use of correct functional specification of the models, as evident by the Ramsy RESET test; and the inclusion of the lagged dependent variable. This is a desirable outcome as the correction of autocorrelation leads to valid estimates.

Furthermore, to test whether the functional forms used are correctly specified or not and to check misspecification the Ramsy RESET test (proposed by Ramsey (1969)) is implemented. The Ramsey RESET test results are reported Table 5.4. The residuals $(\hat{\epsilon}_i)$ tend to change systematically with the fitted value $\widehat{Y}$ under three different situations: (1) when a specific model is not properly specified; (2) when a relevant variable is excluded; or (3) when an irrelevant variable is included. In the case of non-linear relationships between $(\hat{\epsilon}_i)$ and $(\widehat{Y}_i)$ we introduce $(\widehat{Y}_i^2)$, $(\widehat{Y}_i^3)$, and $\widehat{Y}_i^4$ as regressors in the unrestricted model together with $(\widehat{Y}_i)$. The *p-values* in all the extended models with predicted powers of explanatory variables are insignificant.

Hence, the null hypotheses, i.e. H_0: $\delta_1 = 0$; $\delta_2 = 0$; and $\delta_3 = 0$, in each model is not rejected. This leads to the conclusion that the original restricted linear specification models (as opposed to the new unrestricted predicted models with $\widehat{Y}$) are correctly specified. The results suggest that the powers *(2nd, 3rd, and 4th)* of the explanatory variables do not jointly add explanatory power to the model.

Overall, the diagnostic tests show no evidence of misspecification of the functional form and autocorrelation. This implies that the variables included are relevant and the models to be estimated will be unbiased. Nonetheless, the presence of heteroskedasticity is evident. This can invalidate statistical tests of significance that assume that the modelling errors are uncorrelated, *i.i.d.* with constant variances, whilst the problem of serial correlation biases the standard errors causing the results to be less efficient (Drukker, 2003).

Table 5.4: Ramsey RESET test

Fitted $\hat{Y}$variable	*FSD (Model 1)*		*LL (Model 2)*		*DCPC (Model 3)*		*PC (Model 4)*	
	Coefficient (S.E)[b]	*P-value*	Coefficient (S.E)	*P-value*	Coefficient (S.E)	*P-value*	Coefficient (S.E)	*P-value*
[a]*RESET2* $(\delta_1 \hat{Y}_i^2)$	7.81 (15.92)	0.624	12.79 (16.11)	0.392	13.74 (15.51)	0.37	10.36 (15.46)	0.505
RESET 3 $(\delta_2 \hat{Y}_i^3)$	334.22 (187.34)	0.074	306.03 (189.57)	0.106	245.41 (185.69)	0.186	263.34 (198.39)	0.184
RESET 4 $(\delta_3 \hat{Y}_i^4)$	-2361.41 (5349.96)	0.659	-4427.71 (5515.59)	0.422	-3532.04 (5055.61)	0.485	-2642.92 (5185.55)	0.610

Notes: (a) The Ramsy RESET Test tests the null hypothesis of correct specification: *H_0:* $\delta_1 = 0$; $\delta_2 = 0$; *and* $\delta_3 = 0$; where suppose the following model is first estimated: $\widehat{Y_i} = \widehat{\beta_1} + \widehat{\beta_2} X_{2i} + \widehat{\beta_3} X_{2i} + \epsilon$; i = 1, 2,...N, then the RESET test proceeds by estimating: $\hat{Y}_i = \widehat{\beta_1} + \widehat{\beta_2} X_{2i} + \widehat{\beta_3} X_{2i} + \delta_1 \hat{Y}_i^2 + \delta_2 \hat{Y}_i^3 + \delta_3 \hat{Y}_i^4 + \epsilon$; and (b) Standard error (S.E) in parentheses.

5.4.2 PCSEs as the model estimator

Econometric models are estimated by appropriate estimators that handle problems such as heteroskedasticity. As the correction of panel-level heteroskedasticity yields parsimonious models with more reliable estimates, PCSEs will be employed to correct heteroskedasticity.

PCSEs

Although the use of PCSEs as an estimation strategy allows other disturbance covariance structures, it refers specifically to models that are both heteroskedastic and contemporaneously correlated across panels, with or without autocorrelation. According to Beck (2001) the use of PCSEs deals with remaining contemporaneous correlation of the errors, or panel heteroskedasticity. The correction of such anomalies enhances powers in errors, resulting in robust parameter estimates. Beck & Katz (1995), who contributed substantially in this area, found that ordinary least squares (OLS) with PCSEs provide more efficient estimation than FGLS. In their work, Beck & Katz (1995) use Monte Carlo analysis to test the robustness of panel data models like OLS (Parks, 1967). FGLS show that PCSEs perform well in the presence of complicated panel error structures. Because the well-known Parks GLS method is affected by the assumption that the error process is known (which in practice is unknown), FGLS was introduced with a 'feasible' estimate of the process to avoid the GLS assumption that the error process is known (Beck & Katz, 1995).

Beck & Katz (1995) further maintain that since the combination of OLS with PCSEs allows for accurate estimation of variability in the presence of complicated panel error structures, its application as an estimation strategy is reasonable. Beside the FGLS method, the PCSEs method has all the options for dealing with or mitigating the problems of heteroskedasticity, autocorrelation and contemporaneous correlation structure. The combination of OLS with PCSEs therefore allows for accurate estimation of variability in the presence of panel error structures. As the PCSEs method is usually better than its OLS counterparts its use leads to correct inferences (Beck, 2001).

PCSEs and FGLS follow two different estimation schemes for panel models. The OLS with PCSEs produces estimates of the parameters when no autocorrelation is

specified, or Prais–Winsten estimates when autocorrelation is specified. If autocorrelation is specified the estimates of the parameters are conditional on the estimates of the autocorrelation parameter(s) (Kmenta, 1997). GLS produces full FGLS parameter and variance–covariance estimates (Green, 2012). In *Stata* software, the Prais-Winsten FGLS method is used by assuming an AR (1) process in the disturbances. The advent of new statistical estimators such as PCSEs that make more efficient use of data by correcting common estimation difficulties, such as autocorrelation and heteroskedasticity, has advanced panel-oriented research.

PCSEs Prais-Winsten estimation robustness check

As autocorrelation did not pose a challenge, but that heteroskedasticity did, the appropriate estimator used here is the PCSEs Prais-Winsten estimator. The aim of the robustness analysis is to determine whether PCSEs as the preferred estimator (i.e. panel estimation procedure 1 in Table 5.5) did a better job of correcting heteroskedasticity than the two alternate estimation procedures: (2) PCSEs regression without heteroskedasticity corrected standard error; and (3) GLS with heteroskedasticity. The smaller values of S.Es suggest that PCSEs wiped out heteroskedasticity in all four models with greater efficiency. Thus, the robustness checks indicate that PCSEs is a superior estimator compared to the two alternatives. This offers credence to the claim that PCSEs[77] performs well with panel data.

Lagged dependent variable

Inclusion of a lagged dependent variable has several advantages. Firstly, it removes serial correlation. According to Beck & Katz (2011): "It is often the case that the inclusion of lagged dependent variable eliminates almost all the serial correlation of errors" (p.339). The use of log transformations may also ease the problem of heteroskedasticity arising from the cross-sectional dimension of the dataset (Bertram, 2004). Previous studies (e.g. Luintel & Khan, 1999; Levine et al., 2000) also use the log of real per capita GDP[78] as an indicator of growth with its lagged term.

[77] The *Stata* command to run linear regression with PCSEs is *xtpcse*.

[78] As real GDP is computed as nominal GDP divided by GDP deflator (1978=100) the ratio of real GDP to total population yields real per capita GDP.

Table 5.5: PCSEs Prais-Winsten estimation robustness test

Panel-estimation procedure	*Model 1 with FSD*			*Model 2 with LL*			*Model 3 with DCP*			*Model 4 with PC*		
	Wald ch2	*p*-value	Heter present or corrected	Wald ch2	*p*-value	Heter present or corrected	Wald ch2	*p*-value	Heter present or corrected	Wald ch2	*p*-value	Heter present or corrected
(1) [a]PCSEs with hetero	32.11	0.000 ***[d]	Corrected	32.07	0.000 ***	Corrected	30.01	0.000 ***	Corrected	29.61	0.000 ***	Corrected
(2) [b]PCSEs without hetro	27.59	0.004 **	Present	27.43	0.004 **	Present	25.48	0.008 **	Present	25.33	0.008 **	Present
(3) [c]GLS with hetero	28.43	0.003 **	Present	28.49	0.003 **	Present	25.70	0.099	Present	26.45	0.006 **	Present

Notes: (a) PCSEs Prais-Winsten regression with heteroskedasticity and autocorrelation of order 1 (AR1) correction. This hetero-corrected standard-error (S.E) estimation procedure is used to obtain the estimates; (b) PCSEs Prais-Winsten regression without heteroskedasticity and autocorrelation of order 1 (AR1) correction; (c) Generalized Least Squares (GLS) with panel heteroskedasticity correction; and (d) ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

Secondly, including a lagged variable via the GS framework makes the REs specifications dynamic in nature. Thirdly, as the FEs and REs model treat lagged dependent variable as zero, the estimation of the influence of prior values of the dependent variable on current values is not possible (Bollen & Brand, 2008) but the use of the GS sequential modelling method (explained below) which accommodate lagged terms makes this possible. Finally, the short-run dynamics of the errors can be accounted for by including lagged differences (Breitung, & Pesaran, 2005). Through the lag determination process the respective lags for each variable are determined prior to model estimation with PCSEs. This lag selection process is explained next.

5.4.3 GS lag order and REs model

The GS testing strategy starts with the highest order of lag, denoted as *p-max,* as explained in Chapter 4. The maximum lag term was initially set at five. If the variable or coefficient in question in the specification turns out to be insignificant at the *p-th* lagged difference term, the lag term in question is reduced by one for that specific variable. Any insignificant lag term, *p* is assigned a value of zero or removed and those found to be significant are retained. The new equation is then re-regressed. This iteration process continues until statistical significance is achieved with congruent and encompassing results.

Panel AR(k) process sequential models are used for the analysis of long-run relations when the underlying regressors are *I(1)* or when variables are *I(0)* valid inferences on the long-run can be made using standard normal asymptotic theory (Han et al., 2013). In line with economic theory it is assumed that a long-run association exists between FD and economic growth. As all the series turned *I(1)* via panel unit root test (as reported in Table 5.3) the parameters of our four REs models are estimated using the PCSEs method. Due to the anticipated reverse causality between economic growth and the financial sector proxies, economic growth variable is introduced among the explanatory variables as a lagged variable (Kalule, 2010). This means the issue of endogeneity is addressed when lags are introduced.

Of the numerous panel estimators available, the following four conventional panel estimators were evaluated: pooled; seemingly unrelated regression equation; fixed effects (FEs); and random effects (FEs) (Hausman & Taylor, 1981). The consideration

of the pooled OLS procedure was not required as *Stata* software estimates pooled OLS regressions within PCSEs. Consequently, the Chow test between FEs and pooled or the Lagrangian Multiplier (LM) test between RE and pooled were not pursued. As SURE framework with error components require systems of equations that are pooled together (Baltagi & Kao, 2001) it was also considered unsuitable for further consideration.

The choice was narrowed down to the two alternative traditional pooled estimators: FEs and REs. The main difference between these two specifications lies in the way they treat the individual level effect (μ_i)[79] as it is treated differently across groups whilst all other coefficients and error variances are constrained to be same. To be more specific, the FEs model treats μ_i as a fixed and unknown constant whilst the REs specification assumes that μ_i is drawn from an *i.d.d.* distribution (i.e., $\mu_i \sim N(0,\sigma_\mu^2)$ and is uncorrelated both with the error term (ϵ_t) and with the explanatory variable (X_{it}) (Hausman, 1978). To determine whether to use the FEs or REs model, the Hausman specification test with the null hypothesis that REs is the preferred model versus the alternative FE (Rabe-Hesketh & Skrondal, 2008) was implemented. All four Hausman tests turned out in favour of the REs model.

The key question is whether there is significant correlation between the unobserved individual random effects and the regressors. If such a correlation is present the REs model would be inconsistently estimated. This would mean the FEs model would be the preferred option. Conversely, if there is no such correlation then the REs model is considered more powerful than the FEs model. In this case autocorrelation is corrected through the inclusion of lagged dependent variable. This outcome is evident from the Wooldridge test discussed earlier. The REs model has the advantage of greater efficiency relative to the FEs model leading to smaller standard errors and higher statistical power to detect effects (Hsiao, 2003).

[79] Though μ_i will be captured in the specifications in Chapter 4 a simplest of FEs specification can be expressed here for purposes of clarity as: $y_{it} = \beta X_{it} + \eta_{it}$, $\eta_i = \mu_i + \epsilon_{it}$ where μ_i is the individual effect, ϵ_{it} is error term, and X_{it} is explanatory variable.

An additional benefit of using the REs model is that the treatment of steady state condition in a theoretical model allows substantiative meaning to be attached to the intercepts (Kittel & Winner, 2005). Given these benefits, the REs specification will be used as a base model and incorporated into the GS sequential modelling framework. The use of REs would also mean that the presence of shocks (both internal and external) if any in the series are assumed to be randomly distributed. Table 5.6 summarises several biases with their treatments related to panel modelling.

5.5 Analysis of panel regressions

As outlined earlier, four separate sets of REs models are estimated due to the use of four financial measures with PCSEs as the estimator. Each of the four models aimed to measure the extent to which FD influenced growth in the MSG countries over the reviewed period. The main empirical results are summarised in Table 5.7 (further below) and the analysis for each model is provided next.

5.5.1 Model 1 with FSD as the financial proxy

In *Model 1* the coefficient on lagged (one period) real per capita GDP carried the expected positive sign and is highly statistically significant at the 5% level. This suggests that economic growth in the past period had significantly influenced the current period growth. The coefficient on lagged *FSD*[80] has the predicted sign and is significant at the 5% level. The magnitude of FSD with respect to growth is 0.1422. This result is in favour of the hypothesis that FD positively and significantly contributed to economic growth in MSG countries through the channel of increased financial intermediation activity during the period of study.

The coefficient on lagged *TRAD* also carried the expected sign and is highly significant at the 1% level. *GCAP* is also significant at the 10% level and has the predicted effect at two-period lagged difference. At one lagged period the coefficient on *GCAP* is insignificant with an unexpected sign. *GCAP* appears to be the only variable with two-period lagged effect. None of the other controls is significant. The lagged effects of *GOV* and *INF* appear insignificant. The lagged coefficients on *LE* and *IMR* are contrary to initial expectations and are insignificant.

[80] Represented by $\Delta\text{financial proxy}_{t-1}$ in Table 5.7 when FSD (ΔFSD_{t-1}) is the financial proxy.

Table 5.6: A number of panel data biases with their remedies

Some key sources of bias	**Remedies**
(a) Panel models are based on the implicit assumption that countries have common economic structures and technologies, but this is not true (Demetriades & Hussein, 1996).	The countries in the panel constitute a relatively homogenous group as they are all Melanesian countries in the same region as explained in Chapter 5.
(b) It is not capable of addressing the important issue of direction of causality as the cross-country cross-sectional approach can capture only the average effects of a variable across countries (Ahmed, 2010). This limitation is particularly severe when causality effects are tested as the possibility of differences in causality patterns across countries are likely (Arestis & Demetriades, 1997), Therefore, the neglect of reverse causality might introduce simultaneity bias (Shan, & Jianhong, 2006).	It is not an issue as causality is not empirically tested using panel data. We only test the hypothesis of "finance-led growth".
(c) Cross-country studies are beset by econometric difficulties such as parameter heterogeneity, endogeneity and model uncertainty (Temple, 1999).	RAMSEY REST test is employed to detect model misspecification whilst the problems of endogeneity and heteroskedasticity are corrected with the use of PCSEs after they were detected through diagnostic tests as discussed in Section 5.4.
(d) Omitted variable bias and heterogeneity (Yildirim et al., 2007).	The implementation of panel data analyses has the effect of overcoming the possible omitted variable bias and heterogeneity and strengthens cross-sectional results.
(e) It is inherently incapable of examining lagged relationships. Therefore, it is inappropriate for testing Granger causality (Shan, & Jianhong, 2006).	Panel causality is not empirically tested as this chapter is devoted to empirically testing the hypothesis of "finance-led growth".
(f) Serial correlation.	As indicated earlier, it is often the case that the inclusion of lagged dependent variable eliminates almost all the serial correlation of errors.
(g) Panel heteroskedasticity (e.g. Beck, 2001).	The use of PCSEs estimation procedure corrected any remaining contemporaneous correlation of the errors or panel heteroskedasticity. Also as panel data allows for higher power, estimated results are not seriously misguided but robust.

Source: Developed by the Author.

Table 5.7: Determinants of growth based on PCSEs estimation

Dependent variable: $\Delta lnRGDPC_t$ (real per capita GDP), first difference								
Variables of interest	*Model 1: FSD as proxy*		*Model 2: LL as proxy*		*Model 3: DCP as proxy*		*Model 4: PC as proxy*	
	[a]Coef. (t-stats)	S.E	Coef. (t-stats)	S.E	Coef. (t-stats)	S.E	Coef. (t-stats)	S.E
$\Delta lnRGDPC_{t-1}$	0.2160**[b] (2.36)[c]	0.091	0.2148** (2.35)	0.092	0.2114** (2.27)	0.093	0.2143** (2.25)	0.095
$\Delta financial\ proxy_{t-1}$[d]	0.1432** (1.97)	0.073	0.1422** (1.97)	0.072	-0.0004 (-0.27)	0.002	0.0219 (0.11)	0.204
ΔGOV_{t-1}	-0.0028 (-1.28)	0.002	-0.0028 (-1.30)	0.002	-0.0019 (-0.86)	0.002	-0.0021 (-0.94)	0.002
$\Delta lnGCAP_{t-1}$	-0.0192 (-0.73)	0.03	-0.0193 (-0.74)	0.026	-0.0125 (-0.48)	0.026	-0.0122 (-0.47)	0.026
$\Delta lnGCAP_{t-2}$	0.0474* (1.84)	0.03	0.0479* (1.86)	0.026	0.0488 (1.87)	0.026	0.04960* (1.86)	0.027
$\Delta TRAD_{t-1}$	0.0020***(3.24)	0.001	0.0020***(3.26)	0.001	0.0020*** (3.13)	0.001	0.0020*** (3.13)	0.001
ΔINF_{t-1}	-0.0016 (-1.50)	0.001	-0.0016 (-1.53)	0.001	-0.0017 (-1.56)	0.001	-0.0016 (-1.53)	0.001
ΔLE_{t-1}	-0.0163 (-0.92)	0.018	-0.0167 (-0.94)	0.018	-0.0161 (-0.90)	0.018	-0.0163 (-0.91)	0.018
ΔIMR_{t-1}	0.0058 (0.61)	0.010	0.0059 (0.62)	0.010	0.0039 (0.41)	0.010	0.0039 (0.41)	0.010
D1 (AFC)	-0.0170 (-0.97)	0.017	-0.0170 (-1.00)	0.018	-0.0167 (-0.95)	0.018	-0.0158 (-0.89)	0.018
D2 (GFC)	-0.0084 (-0.60)	0.014	-0.0086 (-0.62)	0.014	0.0038 (0.27)	0.014	0.0014 (0.09)	0.016
Cons	0.0240* (1.84)	0.013	0.0245* (1.88)	0.013	0.0238 (1.82)	0.013	0.0232* (1.76)	0.013
Wald ch2 (11)	32.11		32.07		30.01		29.61	
Prob>chi Sq.	0.000		0.000		0.0016		0.001	
R^2	0.2378		0.2386		0.2279		0.2254	
Rho (Pρ)	-0.0463		-0.0463		-0.0657		-0.0608	

Notes: (a) Coef. for Coefficients, *t-stats* for test statistics, and *S.E* for heteroskedasticity corrected Standard Error using PCSEs; (b) ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively; (c) Parenthesis contain t-statistics, and (d) ΔFSD_{t-1} is represented by $\Delta financial\ proxy_{t-1}$ when *FSD* is the financial proxy in Model 1; ΔLL_{t-1} is represented by $\Delta financial\ proxy_{t-1}$ when *LL* is the financial proxy in *Model 2;* ΔDCP_{t-1} is represented by $\Delta financial\ proxy_{t-1}$ when *DCP* is the financial proxy in *Model 3*; and ΔPC_{t-1} is represented by $\Delta financial\ proxy_{t-1}$ when *PC* is the financial proxy in *Model 4*, respectively.

The coefficient on lagged *TRAD* also carried the expected sign and is highly significant at the 1% level. *GCAP* is also significant at the 10% level and has the predicted effect at two-period lagged difference. At one lagged period the coefficient on *GCAP* is insignificant with an unexpected sign. *GCAP* appears to be the only variable with two-period lagged effect. None of the other controls is significant. The lagged effects of *GOV* and *INF* appear insignificant. The lagged coefficients on *LE* and *IMR* are contrary to initial expectations and are insignificant.

The coefficients of dummy variables are insignificant in all regressions. This suggests that AFC and GFC had no impact on the economic performance of MSG countries in the period reviewed. The estimate of the dependent variable (growth) is positive (0.0240) and significant at the 1% level. The low estimate of autocorrelation (Pρ) in *Model 1* confirms the correction of autocorrelation by the inclusion of lags.

5.5.2 Model 2 with LL as the financial proxy

Model 2 is as equally statistically significant at the 5% level as is *Model 1*. As the coefficient on lagged *LL* carried the expected positive sign and is significant. The magnitude of *LL* with respect to growth is 0.1422. As FD in the previous period had significant positive effect on the current economic performance, this result also supports the hypothesis that FD plays a positively significantly role in the economic growth process via increased financial intermediation.

The coefficient on lagged (one period) *TRAD* is positive expected and is highly significant at the 1% level. *GCAP* carried a positive sign as expected and significant at the 10% level at two lagged period. At one-year lag, its coefficient is insignificant. *GCAP* is the only variable with two-period lag effect as all the other regressors appear with a maximum of one lag. In contrast, lagged *GOV* and lagged *INF* are not statistically significant. Lagged coefficients on *LE* and *IMR* are neither in line with theoretically expected signs, nor are they statistically significant. Furthermore, the two dummy variables are insignificant even though they have a negative sign on their coefficients. The constant (0.0240) is positive and significant at the 1% level. The estimate of autocorrelation (Pρ) is low (-0.0463) in *Model 1*, indicating that the problem of autocorrelation was corrected by PCSEs. This is further reflected by the smaller values of S.E in the regression. Another important observation is that the

results of *Model 1* and *Model 2* appear to be similar in magnitude, signs and significance.

5.5.3 Model 3 with DCP as the financial proxy

Model 3 with DCP as the financial proxy is not significant. However, the coefficient on lagged real per capita GDP carried the predicted positive sign and is statistically significant at the 10% level. This is consistent with previous model results. The coefficient on *TRAD* at one period lagged difference is positive as expected and significant at the 10% level. One interesting observation is that the lagged effects of *TRAD* in terms of signs and significance levels seem to be almost same in all the four regressions. This suggests that the *TRAD* had a positively significant effect on growth.

GCAP is also significant with a positive sign as expected, but at two-period lagged difference at the 10% level. At one lagged period the coefficient on *GCAP* is not significant. *GCAP* is the only variable with two lagged period effect; all the other regressors had a maximum of one lagged period. The lagged effects of *GOV* and *INF* are not significant. The coefficients of *LE* and *IMR* are neither in line with theoretically expected signs nor are they statistically significant. The two dummy variables are insignificant. The constant is positive (0.0240) and significant at the 1% level. The low estimate of autocorrelation (Pρ is -0.0647) indicates the correction of autocorrelation by PCSEs. The smaller values of S.E suggest that heteroskesdasticity was remedied by PCSEs.

5.5.4 Model 4 with PC as the financial proxy

In *Model 4 with PC as the financial proxy* the coefficient on lagged *PC* is not significant. This means that FD had no significant impact on economic growth in MSG countries during the period examined. The coefficient on lagged real per capita GDP carried the expected positive sign and is highly statistically significant at the 5% level as in the previous models. The coefficient on *TRAD* at lagged difference is positive and significant at the 10% level. Again, the results of the lagged effects of *TRAD* are the same in all regressions. *GCAP* also carried a positive sign as expected and is significant at the 10% level. The lagged coefficient on *GCAP* is not significant and had the opposite negative sign. The results of the lagged effects of *GCAP* are

also similar in all specifications. The lagged *GOV* and lagged *INF* variables are not significant. These results are same in all the four models. Lagged coefficients on *LE* and *IMR* are neither in line with the theoretically expected signs nor are they statistically significant. Similar results are also found in the other models.

Across all specifications the two dummy variables entered negatively. This implies that *AFC* and *GFC* that had adversely affected Asian economies with contagious effects to the rest of the world had a tenuous impact on the MSG economies. As the estimate of autocorrelation (Pρ) is low (-0.0647), it suggests that autocorrelation was corrected by PCSEs. The smaller values of S.E also indicate that heteroskedasticity was indeed corrected by PCSEs. The constant (0.0240) is positive and significant at the 1% level. Finally, the smaller values of S.E in all the models suggest that heteroskedasticity is corrected by PCSEs, and thus it is meaningful to interpret and rely on the estimation results. The estimated S.Es are robust as evident by the very small error values[81]. This suggests that the empirical results are reasonably correct. Valid conclusions can thus be drawn.

Though the coefficients of *FDI* and *AID* - the two remaining explanatory variables - had the predicted sign they did not turn out significant in either of the lags. This suggests that *AID* and *FDI* seem to have had no significant impact on economic growth and financial development in the period studied. Their values are therefore not reported in Table 5.7 to conserve space. This is surprising and contrary to traditional economic theory because many small nation-states of the Pacific including the MSG countries depend heavily on foreign *AID* assistance and *FDI*. However, this study's findings are consistent with findings from a number of previous studies on the effects of *AID* assistance and *FDI* on growth. For example, Van de Walle (2005) while exploring different approaches to overcome stagnation in aid-dependent countries points out that *AID* dependent nations lag far behind in economic growth. An empirical study by Feeny (2005) on the impact of foreign aid on economic growth in PNG also found little evidence that aid and its various components have contributed to economic growth in PNG. The same holds for the

[81] The use of *Stata* software is helpful in this process because according to Hoechle (2007) *Stata* has a long tradition of providing the option to estimate S.Es that are robust to certain violations of underlying econometric model.

other MSG countries. In the case of *FDI*, Hermes & Lensink's (2003), for example, argue that *FDI* is more growth enhancing in countries with better developed financial sectors. This argument may hold here because the financial sectors of the MSG economies are relatively underdeveloped as noted in Chapter 3.

5.6 Diagnosis of impact by financial development on growth

The coefficient of (one period) lagged dependent variable economic growth (*RGDPC*) is stable (around 0.22) in all the four specifications. This suggests that there is an element of persistency where the previous economic growth rates positively and significantly affected subsequent (current) economic performance of the MSG countries studied. Of the four specifications only *Model 1* and *Model 2* had the predicted signs and effects. Their respective magnitudes were around 14%. For *Models 3* and *4* the coefficient signs turned out positive as expected though they were not significant. The regression results suggest that, holding other factors constant, FD via *FSD* and *LL* not only had a positively significant influence, but also played an economically significant role in inducing economic growth in the MSG economies during the studied period.

Further analyses of the broad financial activities that constitute the two statistically significant financial ratios indicate that an increase in the deposit base *(FSD)* of both bank and NBFIs seem to have boosted the lending capacity of the FIs. This means more credit was advanced notably by banks during the period to fund high yielding investments. The possible increase in credit market activity may have enhanced further competition with positive spill-over effects on the secondary liquidity creation and credit multiplier processes. This in turn had a positive effect on the economic growth process.

The proxy *LL* (which constitutes currency plus demand and interest bearing liabilities of both banks and NBFIs) also had a positive influence on growth. Financial innovations including the development of an assorted mix of new products and the diffusion of technology especially into banking sector had positive effects on agency costs such as high transaction, monitoring and screening costs. This generated efficiency and allocative gains in the banking sector. Due to the reduction in information asymmetries (e.g. agency, information and transaction costs) the

informational and finance gap between lenders and borrowers seem to have narrowed in the MSG countries examined.

Though it is expected that the growth in financial markets such as credit, bond and stock would positively affect the level of economic activity by determining the savings rate, the amount of funds channelled to investment and capital accumulation, its significance has not risen over the last decade as developments of capital markets are in early stages in the developing countries. Thus, the banking sector is left with the bulk of this and other financial service responsibilities. In the Pacific the banking sector dominates the financial sector and is characterized by features such as urban operations, excess liquidity, limited competition, generally high profits and large interest rate spreads (ADB, 2001).

Even the other two financial indicators (*PC* and *DCP*) carried expected positive signs. Thus, in the MSG countries there appears to be a positive relationship between growth and FD processes. This supports hypotheses 2 and 3 of this dissertation, and implies that FD has been boosted by both external and internal forces of change such as advancements in ICT, financial innovation, internationalisation of financial markets and institutions, enhanced governance practices, regulatory changes, increased competition, and prudential management of market participants' conduct and operations by the regulatory authorities. External effects are reflected by the positive and highly significant trade openness coefficient values in all the models. As implied by theory and evidence, better developed financial systems eased external financing constraints facing firms as one mechanism through which FD influenced economic growth.

In terms of the other variables, the coefficient of lagged *TRAD* is stable at 0.002 across all specifications. This suggests an element of persistency in the manner in which *TRAD* positively and significantly affects current growth. This parameter estimate seems plausible as all the MSG countries depend heavily on trade. The two-period lagged effect of *GCAP* turned out positive and significant at the 5% level and 1% level in *Models 1* and *2*, respectively. Further, the results show that variables *GOV, INF, FDI* and *AID* are not significant in all the specifications. The effect of inflation on growth found in this study is contrary to a large body of evidence from

growth studies (e.g. Rousseau & Wachtel, 2002) that shows that inflation has a strong negative association with growth.

The overall empirical analysis suggests that FD has exerted a positive and statistically significant impact on economic growth in the MSG economies over the last three decades via credit growth activity facilitated by the FIs. The estimation results are therefore robust and do not refute the hypotheses posed in this study. There is strong evidence in favour of $H0_1$ i.e. *supply-leading hypothesis*. This not only reduced the cost of credit rationing but also increased the amount of savings needed to channel to profitable investments. As a result, the development of the financial sector helped improve the allocation of risk and increase the efficiency of the saving and investment processes. This had positive effects on capital accumulation and financial intermediation. The growth of the financial sector may have shifted the aggregate production function as depicted by the Cobb-Douglass production function of the studied countries upward. There is also evidence to conclude that the economic growth in the prior period had a significant impact on the subsequent (current) economic growth rates in the MSG economies during the examined period.

The empirical results support the positive role that the channels of trade *(TRAD)*, factor mobility via capital accumulation *(GCAP)* and FD via *FSD* and *LL* (or credit) as an input had on increasing national output. Though the AFC had hit the East Asian economies hard (Delpachitra[82] & Van Dai, 2012) and the GFC also adversely affected many small states disproportionately hard, especially those that rely heavily on banking and tourism (World Bank, 2009a), with recession across advanced economies (Giles, 2008) the results show that the financial crises shocks in the period studied had a tenuous effect on the MSG economies. One of the key factors that insulated the Pacific economies from such global financial turbulence is their close ties to Australia and New Zealand, which remained relatively buoyant during the crises. However, indirect impacts were felt by the MSG economies as trade and investment figures, as well as tourist arrivals, dropped. In addition, as *AID* assistance entered the regressions insignificantly in all specifications they are not reported. This

[82] Professor Sarath Delpachitra served as the principal supervisor of this study.

is in line with previous studies (Huges, 2003; Stewart, 2006) where large aid flows have not translated into improved living standards in all of the Pacific islands.

5.7 Chapter summary

This chapter focused on three basic themes: (1) analysis of the data; (2) diagnostic tests and estimations; and (3) discussion of empirical results. Under the first theme, data sources, measurement of variables, basic descriptive statistics and properties of datasets including the results of panel unit root were covered. Under the second theme the diagnostic tests plus the subsequent estimation of the REs models by PCSEs was presented. Under the last theme the rationale for employing PCSEs for determining the lags was explored. Further, a series of biases associated with panel modelling were discussed together with their corresponding remedies. The use of PCSEs saw the correction of heteroskedasticity and the inclusion of lagged dependent variable eliminated the serial correlation of errors. The correction of these anomalies resulted in efficient, consistent and unbiased regression coefficients, setting the foundation for valid conclusions.

The final discussion focussed on the results from the four estimated FEs specifications that were reported in Table 5.7. The key findings are: the coefficients on lagged *RGDPC* and *TRAD* are highly significant and carried the expected positive sign in all four models; the development of the financial system robustly (i.e. positively and significantly) influenced the subsequent rates of economic growth; and the effect of financial crises and inflation did not turn out to be significant as expected. Financial crises had an insignificant effect on growth. *INF* outcome is generally inconsistent with abundant evidence that strongly suggests that *INF* significantly distorts growth. *AID* assistance entered the regressions insignificantly in all specifications. Population growth as proxied by *IMR* does not seem to have the large negative effects that are frequently conjectured.

CHAPTER SIX

EMPIRICAL RESULTS - TIME SERIES DATA ANALYSIS FOR PNG

6.1 Introduction

The question of whether FD induced economic growth or not in the MSG countries in the period studied was investigated in Chapter 5 with the results supporting the *finance-leading growth hypothesis*. As noted in Chapter 2, studies in the empirical literature fail to address country-specific issues as they largely use cross-sectional data. This has caused a spike in interest in country-specific time series studies in recent years. The aim of this chapter is to add to this growing body of research by empirically investigating the hypothesised causality between FD and economic growth in PNG using the VECM approach over the same period of investigation.

The chapter is structured as follows. While the rationale and objectives for undertaking this study were provided in Chapter 1, a number of additional reasons for undertaking country-specific empirical work for PNG are discussed in Section 6.2. Building on the frameworks for both time series and panel methodologies that were analysed in Chapter 4, the VECM estimation method plus the underlying tests of unit root and cointegration of the dataset are explored in Section 6.3. In Section 6.4 standard diagnostic tests are implemented to ensure our regression results are not spurious. Diagnostic tests on VECM are performed in Section 6.5. Empirical results from VECM and Granger-causality between FD and growth are reported in Section 6.5. Section 6.6 summarises the chapter.

6.2 Rationale for the Granger-causality test

Empirical studies since the 1980s have shown that the pattern of causality differs significantly among countries. This could be due to a wide range of issues including methodological differences. The causality between FD and growth remains one of the most debated topics in economic development literature as the results reported in

previous empirical studies' remain inconclusive (Akinlo & Egbetunde, 2010). The different categories of views that findings from finance-growth nexus fall into were summarised in Chapter 2 (refer Table 2.1).

Though there exists strong evidence of correlation between finance and growth, there is no consensus on the direction of causation between the two constructs: finance and real growth. Besides the challenge of identifying the causes of economic growth, the other great challenge of applied economics lies in distinguishing correlation from causation (Bazzi & Clemens, 2009) as correlation does not address the issue of causation. Levine (2003) also emphasises that the issue of causality is not formally addressed in the Levine & Zervos (1998) work on which this study builds. Pradhan (2007) further contend that "Modeling the dynamic relationship among time series variables could be well established through various time series techniques" (p.743). This suggests that additional empirical work on the co-evolution of finance and growth is warranted (King, 2005).

As discussed in Chapter 2, traditional financial intermediary theory suggests that due to market frictions a well-developed financial sector is likely to contribute to improved economic growth performance via the provision of the essential financial services such as channelling of credit to the most productive sectors of the economy. The recent targeting of the developing countries' financial sector as a core area of intervention by the ADB is an indication of the vital role that the financial sector plays in inducing growth (Zhuang et al., 2009). As the MSG countries continue to be recipients of ADB's financial sector development assistance packages and they are all members of the World Bank, the findings of this study would represent an invaluable tool for economic policy.

The use of time series as opposed to panel data is important in distinguishing different causal patterns (Ahmed, 2010). After reviewing time series studies Dabós & Gantman (2013) point out that time series evidence is in general not conclusive regarding the causal relationship between finance and growth. Additionally, "While it is common to consider cross-country regression estimates to judge the growth effects of such factors, the implications obviously relate to each country, and it is important to study the individual-country evidence at least at a simple level" (Ram,

1999, p.165). The recent surge in interest in country-specific studies underlines the significance of the relationship between FD and growth. As noted in Chapter 2, apart from Fiji there is no similar country-specific study for the three remaining MSG countries, nor is there a panel study for the MSG economies.

The properties of the time series datasets were explained in Chapters 1 and 5. The next section presents the basic descriptive statistics.

6.3 Descriptive statistics

The description of the gathered data, including data sources, and measurement of the variables of interest with expected signs relative to economic growth were presented in Chapter 5. The basic descriptive statistics of the variables in terms of the standard deviation, mean and the correlation coefficient for PNG are reported in Table 6.1. A number of observations can be drawn from the results. Firstly, the mean and variance for the financial proxy *DCP* are higher compared to the mean and variances for the three remaining financial proxies. Similar results were obtained using panel data. This could imply a high level of volatility in credit activity during the period studied in PNG.

Secondly, the correlations *LL* and *FSD* are in line with their predicted signs relative to the growth whilst the other two display opposite signs. The results suggest that *FSD* and *LL*, and *DCP* and *PC* are highly correlated: 0.97 and 0.96, respectively. This also seems to be the case with panel data. Though *FSD* and *LL* are perfectly positively correlated (1.00) and *DCP* and *PC* are also highly positively correlated (0.86) they will still be included in our subsequent statistical analyses. This is because each of the four financial indicators are entered once in the four different regressions to (1) investigate the potential impact its proxy had on growth and (2) to test the hypothesised direction of causality between FD and economic growth.

The results of the correlation indicate that the majority of the financial proxies tend to move together with growth. This could suggest the presence of a long-run association (cointegration) among the variables. As such the test of cointegration will be implemented later to empirically test the existence of any cointegration equation (CE).

Table 6.1: Descriptive statistics and Pearson Correlation

Variance and mean				[a]Correlation coefficients				
Variable	Obs.	Std.Dev	Mean	*lnRGDPC*	*LL*	*PC*	*FSD*	*DCP*
(i) Economic growth measure								
lnRGDPC	*35*	*0.09*	*6.68*	*1.00*				
(ii) Financial proxies								
LL	*35*	*0.09*	*0.34*	*0.33*	*1.00*			
PC	*35*	*0.06*	*0.19*	*-0.28*	*0.63**[b]*	*1.00*		
FSD	*35*	*0.10*	*0.29*	*0.43**	*0.97***	*0.58***	*1.00*	
DCP	*35*	*19.62*	*5.67*	*-0.25*	*0.71***	*0.96***	*0.65***	*1.00*
(iii) Set of controls								
GOV	35	5.50	19.88	-0.52**	-0.58**	-0.04	-0.70**	-0.12
LnGCAP	35	0.15	3.09	-0.59**	-0.31	0.02	-0.41*	0.08
TRAD	35	12.93	87.02	0.28	0.39*	-0.13	0.49**	-0.02
INF	35	4.23	7.34	0.22	-0.08	-0.17	-0.05	-0.20
IMR	35	12.22	64.03	-0.47**	-0.51**	-0.18	-0.67**	-0.22

Note: (a) the correlations for the financial proxies are estimated with Pearson Correlations with pairwise-case deletion; and (b) **, * significance of correlation at the 0.01 level (2-tailed) and 0.05 level (2-tailed), respectively.

Reverse causality (or endogeneity) is also a possibility where the hypothesised causal effects could go from growth to finance in line with the *growth-led hypothesis*. Given the conventional assumption of linearity, the strength of the underlying relationship between the pair of variables, particularly between the dependent variables and the regresssors is assumed to be rudimentarily captured by the respective values of the correlation coefficients.

The correlation coefficients for a few of the controls such as *GOV* and *IMR* carry the expected signs and are significant relative to growth, whilst others such as *INF* and *lnGCAP* produce mixed signs. As resource–rich nations such as PNG rely heavily on export of resources (e.g. gold, oil and gas) for a large part of their economic growth the correlation for *TRAD* is as expected. As none of the pairs of the other explanatory

variables are perfectly correlated to warrant their exclusion they are all retained. The analysis of the macroeconomic properties of the time series dataset is covered next.

6.4 Testing the time series properties of the data

The presence of a unit root in the time series representation of a variable has important implications for both the econometric method used and the subsequent economic interpretations in which a particular variable appears due to spurious estimations. Because such an outcome is not desirable, the statistical properties of the time series variables are pre-tested for the presence of unit root using tests of unit root (Step 1) and cointegration (Step 2). This is to help determine whether it is feasible to apply an error correction model (ECM) in a VECM environment or a VAR model. The model to be used is determined in Step 3.

Step 1: Unit root tests

A unit root test is a pre-test aimed at avoiding spuriousness in regressions (Granger, 1986). The ADF test, which is one of the common 'first generation' unit root tests, will be employed here. The selection of adequate number of lags and lagged differences in model specifications is crucial in achieving consistency in model estimations. Therefore, to determine individual series' lag length, the Akaike Information Criterion (AIC) is used. Instead of starting with a maximum lag of say five and paring it down to an appropriate lag length by examining the value of AIC, the process is started with two lags and pared down to one lag. Due to the use of annual data[83] two lags only were deemed appropriate. The ADF test is executed with the assumption of presence of a unit root (non-stationarity variable) in the null hypothesis (H_0) and a stationary variable in the alternative hypothesis (H_a). The results of the ADF unit root test are reported in Table 6.2.

Stationarity tests at level indicate that all the series are non-stationary. Though the Phillips-Perron test was also used to validate these results, its results are not reported as no significant differences were found. The results appeared consistent when other variables such as *FDI* and *AID* were included in the case of PNG. In the end only seven variables comprising the dependent variable with one financial proxy and four

[83] The *Eviews* software also restricted the number of lags to a maximum of two.

controls were used. As the unit root hypothesis cannot be rejected, the next step is to difference once the variables in question. The null hypothesis of non-stationarity is easily rejected at the 1% and 5% significance levels by the ADF tests for all the series in their first difference. The results of the stationarity tests on differenced variables turned out stationary as shown Table 6.2.

Table 6.2: Unit root test results using ADF test

Variables of interest[a]	Level		ADF first difference (Δ)[b]	
	Constant (C)	C + Trend	Constant (C)	C + Trend
(1) *Economic growth proxy*				
lnRGDPC	-1.58	-2.19	-4.58***[c]	-4.56
(2*) Financial proxies*				
FSD	-1.50	-3.37	-3.73**	-3.74**
LL	-2.42	-2.19	-3.98***	-3.97**
DCP	-2.09	-2.05	-3.72	-3.67**
PC	-2.22	-2.18	-3.76	-3.67**
(3) Other regressors				
GOV	0.15	-3.05	-6.01***	-6.01**
lnGCAP	-0.92	-2.39	-4.35***	-4.23**
IMR	-1.70	-2.03	-5.57***	-5.21***
TRAD	-1.70	-2.46	-2.26	-4.19**
INF	-4.03	-3.15	-6.73***	-6.61***

Notes: (a) A total of 13 variables (eight controls, four financial proxies and the dependent variable were initially included for pre-testing; (b) Δ (delta) for lag lengths and represents unit root values in first difference levels; and (c) indicates statistical significance levels at: **<5%, and **<1%, respectively.

The unit root test is necessary to confirm that empirically meaningful relationships are being modelled. Based on the results it is suggested that all the series are (*I(0)* at level and (*I(1)* at first difference. As the series in question are *I(1)* their use in the subsequent statistical analysis should not give rise to spurious results. Following the unit root test the JJ test will be used as the test of cointegration to identify long-run economic relationships among the variables because only non-stationary or level data are being utilised.

Step 2: Test of co-integration using JJ test

As the series are integrated of the same order i.e. *I(1)* we can apply the commonly used Joansen-Juselius (JJ) maximum likelihood method of cointegration to obtain the number of CEs. Usually the variables are stationary at their first difference resulting in *I(1)* series. The two JJ maximum likelihood estimators of Trace statistic and Maximum Eigenvalue statistic methods are employed here. As both of these

tests are widely reported in the literature at the 5% level of rejection of hypothesis we will also report on them to decide on co-integration among the variables. The results of JJ test are reported in Table 6.3[84]. The test reveals that at the 5% level of significance there is at least one co-integrating vector among the variables. This implies that the variables have a long-run equilibrium relationship among them which is consistent with economic theory. Thus, the existence of unit root and co-integration provides important economic information in relation to the trending behaviour of the data series. Further, under an ECM environment the presence of a co-integration relationship also suggests the existence of a causal link.

As there is cointegration among the variables, equation (28), with economic growth as the dependent variable, and equation (29), with finance as the dependent variable as specified in Chapter 4, will be tested to determine the short-run and long-run Granger-causality. In computing the number of CEs allowance was made for linear determinstic trend in data with the exploration of the two options: (1) intercept (no trend) and (2) intercept and trend in CE with no trend in VAR. Though both options yielded similar results the latter option was preferred. More precisely, going by the *Eviews* generated graphs of CEs (not reported as they are just basic graphs for observation purposes) this option produced trends averaging closer around zero mean than what the no trend counterpart offered. As this is a desirable outcome it suggests that the coefficient of ECT will be significant when the models are estimated. Step 3 is to decide on an appropriate methodology for estimation.

Step 3: Choice of time series methodology: VECM

When the JJ cointegration test produces evidence that the variables are cointegrated the application of an ECM model in restricted VAR or in VECM form is validated. However, the estimation of an unrestricted VAR model is justified if the Trace and Maximum Eigenvalue tests produce no evidence of CE. Due to the presence of long-run vectors among the variables (as determined by the JJ cointegration test in Step 2) the VECM estimator with at least two CEs will be applied next to investigate the issue of causality between FD and growth.

[84] Given the use of four financial measures, four models are estimated in this chapter as was the case under panel modelling in Chapter 5.

Table 6.3: Johansen-Juselius (JJ) cointegration test

[a]No. of CEs	Hypothesis		J-J test statistic		Critical values			
					0.05		[b]*P*-values**	
	$H_{0:}$	$H_{1:}$	Trace (4 CEs)	Max-eigenvalue (2 CEs)	Trace (4 CEs)	Max-eigenvalue (2 CEs)	Trace (4 CEs)	Max-eigenvalue (2 CEs)
A: With financial proxy LL								
1. None	r=0	r=1 or r >1	209.64*	57.24*[c]	150.56	50.60	0.000	0.01
2. At most 1	r=1 or r≤1	r=2 or r≤2	152.40*	48.59*	117.71	44.50	0.000	0.02
3. At most 2	r = 2 or r≤2	r=3 or r≤3	103.81*		88.80			
4. At most 3	r = 3 or r≤3	r=4 or r≤4	71.95*		63.88			
B: With financial proxy FSD								
1. None	r=0	r=1 or r >1	217.99*	55.23*	150.56	50.60	0.000	0.02
2. At most 1	r=1 or r≤1	r=2 or r≤2	162.77*	53.15*	117.71	44.50	0.000	0.01
3. At most 2	r = 2 or r≤2	r=3 or r≤3	109.62*		88.80		0.000	
4. At most 3	r = 3 or r≤3	r=4 or r≤4	75.64*		63.88		0.004	
C: With financial proxy PC								
1. None	r=0	r=1 or r >1	219.50*	70.76*	150.56	50.60	0.000	0.00
2. At most 1	r=1 or r≤1	r=2 or r≤2	148.74*		117.71		0.000	
3. At most 2	r = 2 or r≤2	r=3 or r≤3	108.59*		88.80		0.000	
4. At most 3	r = 3 or r≤3	r=4 or r≤4	71.11*		63.92		0.011	
D: With financial proxy DCP								
1. None	r=0	r=1 or r >1	157.48*	50.17*	111.78	42.77	0.000	0.006
2. At most 1	r=1 or r≤1	r=2 or r≤2	107.30*	37.15*	83.94	36.63	0.000	0.043
3. At most 2	r = 2 or r≤2	r=3 or r≤3	70.15*		60.06		0.006	
4. At most 3	r = 3 or r≤3	r=4 or r≤4	43.94*		40.18		0.020	

Notes: (a) No. of CEs is for number of co-integration equations. The Trace and Max-Eigenvalue tests using each of the four financial proxies indicate at least one co-integrating equation at the 0.05 level of significance; (b) ** MacKinnon-Haug-Michelis (1999) *p*-values; and (c) * Denotes rejection of the hypothesis at the 0.05 level.

6.5 Diagnostic tests on VECM

As diagnostic checks are required to substantiate that the models are well specified prior to estimation the following VECM residuals tests will be executed: the Breusch-Pagan-Godfrey test for heteroskedasticity; the Breusch-Godfrey Lagrange Multiplier (LM) test for serial correlation; and the Jarque-Bera (JB) test for normality. The results from these residual tests are summarised in Table 6.4. The results of the Breusch-Pagan-Godfrey test for each model show that the null hypothesis ($H_{0:}$) of no heteroskedasticity in the residuals cannot be rejected. This is a desirable outcome.

The results of the Breusch-Godfrey Serial Correlation LM test show that both the F-test and the probability of Chi-square are insignificant in all the models. This suggests that the null ($H_{0:}$) of no serial correlation in the residuals cannot be rejected. The Portmanteau (PAR) test for autocorrelation up to lag 12 was also carried out to validate the test of serial correlation. The results for the PAR test also produced evidence of no autocorrelation in residuals[85]. This means that serially correlated residual terms were corrected via first differencing. The JB test indicates that there are no problems with the normality assumption in all the models as this test fails to reject the null ($H_{0:}$) of normality in the distribution of residuals. This is also a desirable outcome.

Overall, all the four models fail to reject the null hypothesis associated with the problems of heteroskedasticity, serial correlation and non-normality in the residuals. This is a desirable outcome in that there is no indication of significant deviations from the desired model properties. As the models are now structurally efficient, it is expected that correct S.Es will be estimated resulting in valid empirical results.

6.6 Analysis of VECM estimations and Granger-causality

Having established the validity of the models, the VECM results will be discussed in subsection 6.6.1 and the Granger-causality test will be performed in subsection 6.6.2.

[85] Though the Harvey and Breusch-Pagan-Godfrey tests for serial correlation were also executed to verify the result they are not reported because the two tests produced consistent results.

Table 6.4: Diagnostic tests on VECM

Panel A: ΔlnRGDPC as dependent variable

Model being tested	Heteroskedasticity (Breusch-Pagan-Godfrey test)[a]		Serial Correlation[b] (Breusch-Godfrey LM test)			Normality (Jarque-Bera test)[c]		
	Prob. Chi-Square(23)[d]	Diagnostic outcome	Prob. F-(2,11)	Prob. Chi-Square(2)	Diagnostic outcome	JB test	Prob.	Diagnostic outcome
Model 1: *lnRGDP* on *FSD* as financial proxy	0.2904	Fail to reject null	0.6190	0.2628	Fail to reject null	0.0340	0.9832	Fail to reject null
Model 2: *lnRGDP* on *LL* as financial proxy	0.1730	Fail to reject null	0.8271	0.5811	Fail to reject null	0.2079	0.9013	Fail to reject null
Model 3: *lnRGDP* on *DCP* as financial proxy	0.1852	Fail to reject null	0.2036	0.1179	Fail to reject null	5.5529	0.1100	Fail to reject null
Model 4: *lnRGDP* on *PC* as financial proxy	0.1824	Fail to reject null	0.3498	0.0.0620	Fail to reject null	2.0818	0.3531	Fail to reject null

Notes: (a) The null of Breusch-Pagan-Godfrey test is: H_0: residuals are not heteroskedastic and H_a: residuals are heteroskedastic; (b) The null of the Breusch-Godfrey Serial Correlation LM Test is: H_0: there is no autocorrelation in the residuals and H_a: there is no autocorrelation in the residuals; (c) The null of the Jarque-Bera (JB) test of normality is: H_0: residuals are normally distributed and H_1: residuals are not normally distributed; and (d) Prob. Chi-squared in relation to Obs*R-squared.

Panel B: Δfinancialproxy as dependent variable

Model being tested	Heteroskedasticity (Breusch-Pagan-Godfrey test)		Serial Correlation (Breusch-Godfrey LM test)			Jarque-Bera (JB) test of normality		
	Prob. Chi-Square(23)	Diagnostic outcome	Prob. F-(2,11)	Prob. Chi-Square(2)	Diagnostic outcome	JB test	Prob.	Diagnostic outcome
Model 1: *FSD* as dependent variable	0.2706	Fail to reject null	0.8933	0.7225	Fail to reject null	1.5100	0.4681	Fail to reject null
Model 2: *LL* as dependent variable	0.1900	Fail to reject null	0.8581	0.6445	Fail to reject null	1.1942	0.5504	Fail to reject null
Model 3: *DCP* as dependent variable	0.3718	Fail to reject null	0.1113	0.0052	Fail to reject null	1.4998	0.4724	Fail to reject null
Model 4: *PC* as dependent variable	0.3393	Fail to reject null	0.2526	0.0290	Fail to reject null	0.4832	0.7854	Fail to reject null

6.6.1 VECM estimation

Four VECM models are estimated due to the use of four financial measures as was the case under panel modelling in Chapter 5. The application of VECM is validated by the presence of the co-integrating equation among the variables. Each model is aimed at evaluating the impact of each of the four financial proxies on economic growth. For the purposes of testing reverse causality between FD and growth the effects of growth on FD is also tested in these specifications. Table 6.5 reports the results of the VECM estimation along with the corresponding *t*–statistics. Panel A in Table 6.5 contains the results when growth is used as the dependent variable while results in Panel B are obtained from using FD as the dependent variable. In Panel A the coefficients of the ECTs at both one and two lagged periods for *Models 1* and *2* with two co-integrating vectors are strongly significant and have the expected negative sign.

In particular the speed of convergence is around 32 percent at one year lag and 9 percent at two year lag in *Model 1 with FSD as financial proxy*. Under *Models 1* and *2* the lagged effects of economic growth are also favourable i.e. highly significant and positive at two lagged period. Other important statistics are also high: R^2 (*Model 1* = 83.72%; *Model 2* = 85.84%) and Adjusted R^2 (*Model 1* = 61.18%; *Model 2* = 66.23%). Thus, the fit of the models are reasonable and the respective *p*-values of the F-statistic are also strongly significant.

Based on the *p*-value, the lagged coefficients of *FSD* and *LL* are positive and strongly significant. This suggests that the effects of past FD appear to Granger-cause growth in the long-run. The joint significance of FD on short-run causality is further explored using the Wald test. This is in contrast to the other two remaining models: *Models 3* and *4*. Though the ECTs for lags 1 and 2 are highly significant their signs, together with that for growth, are not right. Other statistics such as the R^2, Adjusted R^2 and F-statistics are also not robust. An interesting observation is that that similar results were obtained with the *FSD* and *LL* proxies under panel modelling. However, unlike in the panel data here *INF* had a significant effect on growth. Given the robustness of results, more attention will be given to *Models 1* and *2* in the subsequent discussions.

Table 6.5: VECM estimation results

Panel A: $\Delta lnRGDPC_t$ as dependent variable

Variables of interest	*Model 1: FSD as fin proxy* (2 co-integrating vectors)		*Model 2: LL as fin proxy* (2 co-integrating vectors)		*Model 3: DCP as fin proxy* (2cointegrating vectors)		*Model 4: PC as fin proxy* (2cointegrating vectors)	
	[a]Coef. (t-stats)[b]	S.E	Coef. (t-stats)	S.E	Coef. (t-stats)	S.E	Coef. (t-stats)	S.E
$\Delta lnRGDPC_{t-1}$	0.0277(0.15)	0.15	0.0571(0.37)	0.19	-0.6712(-1.95)	0.35	-0.6391(-1.47)	0.44
$\Delta lnRGDPC_{t-2}$	0.4236**[c] (2.37)	0.18	0.6161** (3.75)	0.16	-0.3758(-1.44)	0.26	-0.1764(-0.63)	0.28
$\Delta financialproxy_{t-1}$[d]	0.0086(0.20)	0.43	0.0785(0.24)	0.32	-0.0240***(-3.81)	0.01	-1.5422*(-2.08)	0.74
$\Delta financialproxy_{t-2}$	1.6785***(3.88)	0.43	1.8741***(4.80)	0.39	0.0009(0.12)	0.00	0.3843(0.62)	0.62
ΔIMR_{t-1}	-0.0497*(-1.96)	0.03	0.0140(0.51)	0.03	-0.0961**(-2.20)	0.04	-0.0419(-1.10)	0.04
ΔIMR_{t-2}	0.0031(0.11)	0.03	0.0700**(2.65)	0.03	-0.0549(-1.18)	0.05	-0.0126(-0.32)	0.04
ΔGOV_{t-1}	-0.0205** (-2.84)	0.01	-0.0151* (-2.04)	0.01	-0.0056(-0.47)	0.01	-0.0232*(-1.97)	0.01
ΔGOV_{t-2}	-0.0249*** (-3.63)	0.01	-0.0284*** (-4.16)	0.01	-0.0180(-2.27)	0.01	-0.0233**(-2.43)	0.03
$\Delta lnGCAP_{t-1}$	0.0911(1.54)	0.06	0.0731(1.19)	0.06	-0.0048(-0.06)	0.08	-0.0641(-0.70)	0.09
$\Delta lnGCAP_{t-2}$	0.1059*(1.86)	0.06	0.0797(1.37)	0.06	-0.0831(-1.12)	0.28	-0.0084(-0.09)	0.09
$\Delta TRAD_{t-1}$	-0.0025(-1.12)	0.00	-0.0040(-1.88)	0.00	-0.0024(-0.82)	0.00	-0.0064**(-2.31)	0.00
$\Delta TRAD_{t-2}$	-0.0018(-1.37)	0.00	-0.0020(-1.55)	0.00	-0.0044**(-2.30)	0.00	-0.0038*(-2.08)	0.00
$\Delta INF\Delta INF_{t-1}$	-0.0054**(-2.39)	0.00	-0.0050**(-2.95)	0.00	-0.0088**(-2.95)	0.00	-0.0071**(-2.21)	0.00
$\Delta INF\Delta INF_{t-2}$	-0.0037** (-2.35)	0.00	-0.0041** (-2.85)	0.00	-0.0077 *(-3.28)	0.00	-0.0054**(-2.33)	0.00
[e]CointEq1 ECT_{t-1}	-0.3234***(-3.12)	0.10	-0.4391***(-5.6)	0.08	0.5216**(2.86)	0.18	0.2590**(2.05)	0.13
CointEq2 ECT_{t-2}	0.0861***(3.80)	0.02	-0.3037***(-3.3)	0.09	0.013***(3.06)	0.00	0.8053***(3.27)	0.25
Constant	-0.0872*(-2.00)	0.04			-0.1815(-214)	0.08	-0.0800(-1.40)	0.06
D1 (AFC)	0.0272(0.91)	0.03			0.0186(0.53)	0.03	0.0262(0.72)	0.04
D2 (GFC)	-0.0601(-1.06)	0.05			0.0609(1.24)	0.05	0.0678(1.30)	0.05
R^2	0.8372		0.8584		0.7124		0.6659	
Adjusted R^2	0.6118		0.6623		0.3142		0.2033	
F-statistic	3.7144		4.3780		1.7889		1.4396	
Prob(F-statistic)	0.0100		0.0047		0.1446		0.2546	

Notes: (a) *Coef*. for Coefficients, *t-stats* for test statistics, and *S.E* for heteroskedasticity corrected Standard Error; (b) Parenthesis contain *t*-statistics, (c) ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively. The critical values are taken from the *t* distribution; and (d) $\Delta FSD\Delta FSD_{t-1}$ is represented by $\Delta financialproxy_{t-1}$ $\Delta financialproxy$when *FSD* is the financial proxy in *Model 1*; $\Delta LL\Delta FSD_{t-1}$ is represented by $\Delta financialproxy_{t-1}$ when *LL* is the financial proxy in *Model 2;* $\Delta DCP\Delta FSD_{t-1}$ is represented by $\Delta financialproxy$ when *DCP* is the financial proxy in *Model 3*; and $\Delta PC\Delta FSD_{t-1}$ is represented by $\Delta financialproxy_{t-1}$ when *PC* is the financial proxy in *Model 4*, respectively; and (e) CointEq1 ECT_{t-1} is for co-integrating equation one error correction-term for one lagged period (ECT_{t-1}) and CointEq2 ECT_{t-1} for co-integrating equation two error-correction term for two lagged period (ECT_{t-2}).

Panel B: $\Delta financialproxy$ as dependent variable

Variables of interest	*Model 1: FSD as fin proxy* (2 co-integrating vectors)		*Model 2: LL as fin proxy* (2 co-integrating vectors)		*Model 3: DCP as fin proxy* (2 co-integrating vectors)		*Model 4: PC as fin proxy* (2cointegrating vectors)	
	Coef. (t-stats)	S.E	Coef. (t-stats)	S.E	Coef. (t-stats)	S.E	Coef. (t-stats)	S.E
$\Delta financialproxy_{t-1}$	0.6466(1.21)	0.53	0.0122(0.06)	0.21	0.6502(1.74)	0.37	0.2596(0.67)	0.40
$\Delta financialproxy_{t-2}$	-0.040(-0.06)	0.71	0.0606(0.28)	0.22	-0.2060(-0.48)	0.43	-0.0451(-0.14)	0.33
$\Delta lnRGDPC_{t-1}$	0.0782(0.39)	0.20	0.2995(0.70)	0.43	18.10(0.86)	20.44	0.2490(1.08)	0.23
$\Delta lnRGDPC_{t-2}$	0.0618(0.26)	0.24	-0.1020(-0.19)	0.52	27.83*(1.80)	15.48	0.2402(1.62)	0.15
ΔIMR_{t-1}	0.0581(1.51)	0.04	0.0653(1.76)	0.04	6.5585**(2.54)	2.59	0.0304(1.49)	0.02
ΔIMR_{t-2}	0.0016(0.04)	0.04	-0.0050(-0.14)	0.04	3.2527(1.21)	2.76	0.0100(0.47)	0.02
ΔGOV_{t-1}	-0.0002(-0.02)	0.01	0.0021(0.21)	0.01	0.7218(1.03)	0.70	0.0125*(1.98)	0.01
ΔGOV_{t-2}	0.0094(1.15)	0.01	0.0095(1.04)	0.01	0.8570*(1.82)	0.47	0.0087(1.76)	0.01
$\Delta lnGCAP_{t-1}$	-0.0533(-0.75)	0.07	-0.1364(-1.65)	0.08	-0.4478(-0.09)	4.87	-0.0409(-0.83)	0.05
$\Delta lnGCAP_{t-2}$	-0.0007(-0.01)	0.07	-0.0412(-0.53)	0.08	2.5001(0.57)	4.38	-0.0425(-0.89)	0.05
$\Delta TRAD_{t-1}$	0.0048(1.76)	0.00	0.0056*(1.95)	0.00	-0.0613(-0.36)	0.17	0.0025(1.67)	0.00
$\Delta TRAD_{t-2}$	0.0042**(2.53)	0.00	0.0054(3.07)	0.00	0.1349(1.19)	0.11	0.0018*(1.82)	0.00
$\Delta INF\Delta INF_{t-1}$	0.0022(0.98)	0.00	0.0023(1.01)	0.00	0.3340*(1.92)	0.18	0.0002(0.15)	0.00
$\Delta INF\Delta INF_{t-2}$	-0.0010(-0.53)	0.00	-0.0018(-0.94)	0.00	0.1472(1.06)	0.14	-0.0013(-1.03)	0.00
^{e}CointEq1 ECT_{t-1}	-0.2408(-1.20)	0.20	-0.1780(-1.43)	0.12	-0.8243**(-3.20)	0.26	-0.3273**(-2.50)	0.13
CointEq2 ECT_{t-2}	0.0507(0.64)	0.08	0.0941(0.90)	0.10	-0.380***(-3.51)	10.82	-0.2173***(-3.23)	0.07
Constant	0.0662(0.94)	0.07	0.0650(1.05)	0.06	11.96***(2.38)	5.02	0.0505(1.65)	0.03
Dummy1	-0.0051(-0.17)	0.03	-0.0063(-0.19)	0.03	8.68(2.98)	2.91	0.0217(1.10)	0.02
Dummy2	0.0624(0.92)	0.07	0.1040(1.63)	0.06	8.6841(2.98)	2.91	0.0628(2.26)	0.03
R^2	0.6487		0.6920		0.6976		0.7022	
Adjusted R^2	0.1622		0.2655		0.2788		0.2898	
F-statistic	1.3334		1.6224		1.6659		1.703	
Prob(F-statistic)	0.3026		0.1891		0.1763		0.1661	

In Panel B (where *FD* is the dependent variable) the key finding is that past growth and the lagged effects of *FD* has no significant effect on finance under all specifications. The ECTs under *Models 1* and *2* are insignificant. In *Models 3* and *4* though the ECTs appear significant and have the right sign because the coefficients of growth are not significant they are not robust. This suggests that there is no long-run causality relationship running from economic growth to FD. When growth is used as a dependent variable (in Panel A) and when finance is utilised as a dependent variable (Panel B) none of the dummies is significant. This suggests that the effects of financial crisis had no significant adverse effect on PNG's broader economy or its financial sector.

Though both the deterministic trend specification with no trend in data and linear trend in data with no intercept were analysed the results appeared consistent. The linear trend in data with intercept and trend in CE is used as it produced a higher value of R-squared compared to its counterpart. For the other controls, in almost models *GOV* and *INF* turned out as expected with significant adverse effect on growth as shown in Panel A. The proxy population growth *(IMR)* in the prior period had a weakly significant effect in *Model 1*, significant impact in *Models 2* and *3* at two lagged period and there was no evidence of any effect in *Model 4. GCAP* had only a weak effect in the prior period under *Model 1* with no evidence of impact in other models. Finally, *TRAD* shows signs of significance in *Models 3* and *4*. Overall, *FSD* and *LL* had a positive and significant effect on growth, and *DC* and *PC* generally did not. For the explanatory variables *GOV* and *INF* had a significant adverse effect on growth as expected.

Given these results, the test for short-run Granger-causality between the two contracts – growth and finance – by looking at the performance of the Wald test using its chi-square (χ^2) asymptotic distribution is now in order. Though the long-run causality can be determined on the basis of the *p*-values of the ECTs and the signs of their coefficients in each model, they are also presented together with the short-run Granger-causality results in the next subsection.

6.6.2 Granger-causality between finance and growth

Granger-causality

The presence of co-integrating relations among the variables triggers the implementation of causality tests using the Granger-causality approach. *RGDPC* will be first regressed on finance with other controls followed by finance on growth with the same set of regressors. In the process, the issue of whether finance Granger-causes growth or vice versa is empirically tested. Under the Granger-causality approach a *variable say Y is said to be Granger-caused by say variable X if X helps in predicting the value of Y*. In other words, the lagged values of X are statistically significant. The null hypothesis tested is that *X does not Granger-cause Y* and *Y does not Granger-cause X*. The outcomes of the dynamic (short-run) Granger-causality and VECM-based long-run estimations are reported in Table 6.6.

Generally, the results show that Granger-causality is present in all the models. There is positive and statistically significant evidence of short-run uni-directional causality with causality stemming from FD to economic growth. Thus, the results reveal that growth responds to developments, particularly financial intermediation activity, or that developments in the financial sector do not seem to be explained by changes in economic activity. The bank dominancy of the financial sector is consistent with the expectation that financial intermediation affected the level of economic activity in PNG during the period studied.

In *Models 1* and *2* the short-term effects of FD on growth seem to be validated in the long-term with causality also running from FD to growth. This is evident in the coefficients of the ECTs which are significant at the 1% level at both lags with the right sign as shown in Panel B. Specifically, in *Model 1* ECT_{t-1} is around 44 percent and ECT_{t-2} is around 30 percent compared to *Model 2* whose ECT_{t-1} is 32.34 percent and ECT_{t-2} is nine percent. It is evident that though the speed of adjustment towards long-run growth, as represented by the respective ECTs in both models, is high the speed is higher in *Model 2 (with LL)* than in *Model 1 (with FSD).*

Table 6.6: Summary of Granger-causality results – finance vs. growth

Model number	**Panel A: Short-run causality using Wald test**		**Panel B: Long-run causality based on VECM estimations**				
	Chi-sq.	Direction of causality	ECT_{t-1}	ECT_{t-2}	$Coef._{t-1}$	$Coef._{t-2}$	Direction of causality
Model1: FSD does not Granger-cause *RGDPC*[a]	22.06***[b]	*FSD* $\xrightarrow{c}$ *RGDPC*	-0.32***	0.09***	0.03	0.42**	*FSD* ⟶ *RGDPC*
RGDPC does not Granger-cause *FSD*	0.26	Fails to reject null	-0.24	0.05	0.65	-0.04	Fails to reject H_0:
Model 2: LL does not Granger-cause *RGDPC*	23.10***	*LL* ⟶ *RGDP*C	-0.44***	-0.30***	0.06	0.62**	*LL* ⟶ *RGDPC*
RGDPC does not Granger-cause *LL*	0.09	Fails to reject H_0:	-0.18	0.09	0.01	0.06	Fails to reject H_0:
Model 3: DCP does not Granger-cause *RGDPC*	14.54***	*DCP* ⟶ *RGDP*C	0.52**	0.01***	-0.67	-0.38	Fails to reject H_0:
RGDPC does not Granger-cause *DCP*	3.23	Fails to reject H_0:	-0.82**	-38.02***	0.65	-0.21	Fails to reject H_0:
Model 4: PC does not Granger-cause *RGDPC*	4.99*	*DCP* ⟶ *RGDP*C	0.26**	0.81***	-0.64	- 0.18	Fails to reject H_0:
RGDPC does not Granger-cause *PC*	2.82	Fails to reject H_0:	-0.33**	-0.22***	0.26	-0.05	Fails to reject H_0:

Notes: (a) The null hypothesis *(H_0)*: finance does not Granger-cause growth and alternative hypothesis *(H_1)*: finance does Granger-cause growth when finance is the dependent variable and the vice versa when growth is the dependent variable; (b) ** and * denote significance at the 1% and 5% level, respectively; and (c) and arrow indicates the direction of Granger-causality between finance (as proxied by *FSD*, *LL*, *DCP* and *PC*) and economic growth.

Though the magnitudes of the coefficients seem to be relatively higher in both models, *Model 2*'s coefficient (62%) is bigger than *Model 1*'s (42%). On the other hand, in *Models 3* and *4* the short-term causal effects of financial system development on growth appear not to be sustainable into the long-run. This is evident in the coefficients of the ECTs at both lags of the respective models, which turn out insignificant as shown in Panel B. Specifically, in *Model 3* its ECT_{t-1} is 52 percent and ECT_{t-2} is only 1.3 percent; and the ECT_{t-1} and ECT_{t-2} in *Model 4* is around 26 and 80 percent, respectively. Thus, under *Models 3* and *4* the speed of adjustments are significant and high compared to the values of *Models 1* and *2*, and the coefficients of growth at both lags 1 and 2 are insignificant.

Diagnosis of impact on FD and economic growth

Results reveal a significantly positive causal relationship between finance and growth for PNG with the direction of causation running predominantly from FD to economic growth. Thus, overall, there is evidence of uni-directional causality with causality running from FD (via the proxies of *FSD* and *LL*) to economic growth. This is consistent with the dominant assumption in the finance-growth nexus literature that FD induces economic growth. The results are thus in favour of *finance-leading hypothesis* (*$H0_2$)* i.e. *Financial sector development (as measured by FSD, LLY, PC and DCP) may have induced the process of economic growth (as measured by the change in real per capita GDP) in PNG over the period 1976-2010.*

Accordingly, there is evidence to conclude that *FSD* and *LL* predict economic growth in PNG while for *DCP* and *PC*, though seeming to have short-run causal impact on economic growth, there is no evidence of this short-run causality being sustained into the long-run. Such an outcome is inconsistent with results found for countries that have less sophisticated financial systems such as Fiji.

6.7 Chapter summary

This chapter empirically investigated the hypothesised causal link between FD and economic growth for PNG and found evidence of *finance-leading growth hypothesis* where FD had a positively significant influence on growth in the last three decades. The literature related to the causality was briefly revisited to provide context for the presentation of two additional reasons for devoting a separate chapter on the subject.

Building on the frameworks for time series and panel econometric approaches in Chapter 4, the VECM estimation method and the tests of unit root and cointegration were executed to determine the macroeconomic properties of the time series dataset. The JJ Cointegration test revealed the existence of a long-run relationship among the variables of interest. Application of first differencing ensured that only *I(1)* series were included for further statistical analysis.

To ensure the regression results were not spurious several standard statistical diagnostic tests were implemented. More specifically, the Breusch-Godfrey Lagrange Multiplier test for serial correlation; the Breusch-Pagan-Godfrey test for heteroskedasticity; and the Jarque-Bera (JB) test for normality were implemented. As all the models failed to reject the null hypothesis associated with these problems, the models were structurally efficient resulting in valid empirical results. *FSD* and Overall, *LL* had a positive and significant effect on growth, and *DC* and *PC* generally did not. For the explanatory variables *GOV* and *INF* had a significant adverse effect on growth as expected. The estimation results were proven to be robust; i.e. they do not refute the *finance-leading growth hypothesis* posed in this study. The presence of cointegrating relations among the variables triggered the implementation of causality tests using the Granger-causality approach. Generally, the results show that Granger-causality is present in all the models. There is positive and statistically significant evidence of short-run uni-directional causality with causality stemming from FD to economic growth. Thus, the results reveal that growth responds to developments, particularly financial intermediation activity, or that developments in the financial sector do not seem to be explained by changes in economic activity.

CHAPTER SEVEN

CONCLUSIONS AND POLICY IMPLICATIONS

7.1 Introduction

This dissertation investigated the issue of FD and economic growth in the MSG countries (Papua New Guinea, Fiji, Solomon Islands and Vanuatu) for the period 1976 to 2010 for the first time. The empirical results presented in Chapters 5 (panel) and 6 (time series) offered support for the proposition that FD had a positive and economically significant impact on economic growth in the MSG economies. On the basis of these results the relevant policy and theoretical implications, the contribution of the study, limitations encountered and directions for future research are discussed in this chapter. The structure of the concluding chapter is as follows. Section 7.2 reviews the study and Section 7.3 summarises the key findings. Section 7.4 examines the research contributions and main implications obtained from the panel and time series estimations. The contributions to the literature are highlighted in Section 7.5. Avenues for future research are identified and proposed in Section 7.6. The chapter is summarised in Section 7.7.

7.2 Review of the study

Though the finance-growth nexus issue is well-researched, findings about the relationship between financial sector development and the economic growth process, remain inconclusive. One key objective of finance-growth studies is to help governments and policy makers prioritise policy, allocate resources and institute institutional reforms. The more efficient an economy is in the roles of resource allocation, the greater its contribution to productivity and growth. Interest in the topic has recently surged, particularly in the developing countries. As increased economic growth usually translates into improvements in the general standard of living for the masses, understanding the finance-growth relationship in the developing countries is of particular importance. This study was motivated by the lack of similar studies in the MSG economies. One of the key objectives of the study was to help governments

and policy makers develop evidence-based policies to promote inclusive financial sector development and sustainable economic growth.

The absence of a conceptual model on the finance-growth nexus prompted the development of this study's model (see Figure 4.1). The basic MRW theoretical framework was extended and incorporated into an estimable econometric specification in Chapter 4. The methodological process adopted by this study was presented in Figure 1.1. Specifically, for the panel dataset, the GS sequential modelling approach of Hall (1994) with a panel specific *AR(1)* process is employed for the determination of lags. The estimations of the REs models by newer estimators, such as PCSEs, that perform well in correcting common estimation difficulties such as autocorrelation and heteroskedasticity of datasets, enhances the power of errors.

For the time series dataset, the cointegration tests supported the use of VECM specification. Econometric biases related to the two approaches were identified and addressed with appropriate remedies to avoid spurious results. Diagnostic tests on VECM (refer Table 6.1) also yielded desirable outcomes resulting in valid empirical estimations. This suggests that the coefficients estimated by PCSEs and VECM were robust, and further implies that the policy implications drawn here are reasonable and correct. The Granger-causality analysis was also performed to determine the direction of causality between FD and growth.

7.3 Summary of empirical findings

Key findings related to the two fundamental research questions (RQs) posed in this study are summarised in this section. RQ 1 was investigated in Chapter 5 and RQ 2 was investigated in Chapter 6:

RQ 1: To what extent did financial sector development induced economic growth in the MSG countries over the 1976-2010 period?

RQ 2: To what extent did financial sector development influenced economic growth process in PNG over the 1976-2010 period? Or vice versa.

The RQs led to the formulation of two hypotheses:

$H0_1$: Financial sector development (as measured by FSD, LLY, PC and *DCP) may have induced the economic growth process (as measured by the change in real per capita GDP) in MSG countries over the period 1976-2010.*

$H0_2$: Financial sector development may have induced the process of economic growth in PNG over the period 1976-2010; or vice versa i.e. the process of economic growth may have induced financial sector development in PNG over the period 1976-2010.

(a) Panel data analyses in the context of MSG countries

On the basis of RQ 1, sub-RQ 1.1 was framed:

Sub-RQ 1.1: What financial and nonfinancial factors influenced financial sector development in MSG countries over the period 1976 to 2010?

The main finding of this study suggests that FD, especially via the financial proxies of *FSD* and *LL*, had a positive significant influence on economic growth in the MSG economies over the last three decades. This finding is consistent with a substantial body of literature that generally supports the *finance-leading growth hypothesis* (e.g. Levine et al., 2000; Christopoulos & Tsionas, 2004; King & Levine, 1993a; among others). This means there is no evidence of the presence of other major testable hypotheses (refer Table 2.1). As the MSG countries are developing countries this study's findings are also consistent with Patrick's (1996) hypothesis that countries in the initial stages of economic development tend to exhibit *"supply-leading growth"* where the creation of financial institutions provides liquidity for spurring economic growth. Thus, this study shows that there is a positive finance–growth link in the MSG countries. In addition, the empirical results reveal that economic growth in the past period had a positively significant influence on the subsequent (current) period's growth on a more consistent basis.

Time series (VECM) estimations are in line with panel (REs) estimations that FD had a positive significant influence on growth. An increase in the deposit base of both banks and NBFIs seem to have boosted the lending capacity of the FIs. Given the dormancy of banks in the financial sectors of the MSG economies, banks played a lead role in the intermediation process. This in turn boosted credit market activity with high yielding investments getting funded, and consequently, investment demand was boosted. Though this seems to suggest that investment demand is an important

channel of transmission from FD to economic growth, the question of whether this is due to efficiency or volume of investment cannot be established as channels of transmission were not investigated. This is an area for future research as discussed in Section 7.6. The stimulation of credit market activity may have enhanced further competition with positive spill-over effects on secondary liquidity creation and credit multiplier processes. So, it can be concluded that the combined effect of financial factors, such as credit activity, demand and interest bearing liabilities of banks and NBFIs, had a positive impact on financial sector development in the MSG economies.

Developments in the financial sector such as the introduction of a mix of new products, especially in the banking sector, and the flow of technology, such as mobile banking platforms, had positive effects on agency costs. This generated efficiency and allocative gains in the banking sector. Due to the reduction in information asymmetries, such as agency, information and transaction costs, the informational and finance gap between suppliers of funds and demanders of funds seem to have narrowed in the countries examined. This reduced the cost of credit rationing and increased the savings base of the FIs, which are needed to fund profitable investments. As a result, the growth of the financial sector helped improve the allocation of risk and increase the efficiency of the saving and investment processes. This had positive effects on capital accumulation and financial intermediation. The bank dominancy of the financial sector is consistent with the expectation that financial intermediation affects the level of economic activity in the MSG countries.

As stated in Chapter 3, capital market development is in an infant stage in the MSG countries. Consequently, it is expected that growth in financial markets, i.e. credit, bond and stock markets, affect the level of economic activity by determining the savings rate, the amount of funds channelled to investment and capital accumulation has not been raised to levels seen in other countries with developed financial markets. The banking sector therefore is left as the main channel to raise capital to fund profitable investments. A broad range of financial services are offered by the banks. Thus, the banking sector in many PICs dominates the financial sector and is

characterised by features such as urban operations, excess liquidity, limited competition, generally high profits and large interest rate spreads (ADB, 2001).

Moreover, FD in the countries studied appears to have been boosted by both external and internal forces of change such as: advancements in ICT; financial innovation; internationalisation of financial markets and institutions; enhanced governance practices; regulatory changes; increased competition; and prudential management of market participants' conduct and operations by the regulatory authorities. So the financial sector reforms, activities and events that occurred in the MSG economies during the reviewed period (as discussed in Chapters 1 and 3), had positively influenced the performance of the MSG countries' financial sectors. This in turn provided strong and significant stimulus for the economic growth process in the MSG economies. Further, the growth of the financial sector may have shifted the aggregate production function as depicted by the Cobb-Douglass production function of the studied countries upward.

The empirical results are also relatively more supportive of the positive role of the channels of trade *(TRAD)* and factor mobility via capital accumulation *(GCAP)* as inputs in increasing national output. Given that *TRAD* had a significantly positive impact on current growth on a more consistent basis this seems plausible as all the MSG countries depend heavily on trade. As these non-financial variables (*TRAD* and *GCAP)* played an important role in influencing economic growth, it seems that a well-functioning financial system is a necessary, but not a sufficient condition to reach steady economic growth in the small open developing countries of the Pacific. However, the main *supply-leading hypothesis* ($H0_1$) was largely supported by the data.

(b) Time series data analyses

On the basis of RQ 2, three sub-RQs were formulated:

Sub-RQ 2.1: What financial and non-financial factors contributed to financial sector development in PNG over the period 1976 to 2010?

Sub-RQ 2.2: What financial and non-financial factors contributed to economic growth in PNG over the period 1976 to 2010?

Sub-RQ 2.3: Is there a causal link between financial sector development and economic growth in PNG?

Consistent with the panel regression results, the main finding of the time series analysis is that there is a significantly positive causal relationship between finance and growth for PNG with the direction of causation running predominantly from FD to economic growth. While the Granger-causality results indicate the presence of a long-run causality running from FD to economic growth (see Table 6.6), short-term Granger-causality analysis provides a clear result: positive and statistically significant evidence of short-run uni-directional causality with causality stemming from FD to economic growth. The direction of long-run causality also runs from finance to growth. Thus, there is evidence of uni-directional causality with causality running from FD (via the proxies of *FSD* and *LL*) to economic growth.

The estimation results are in support of the main *finance-leading growth hypothesis*. This means $H0_2$ is not rejected. This finding is consistent with the dominant assumption in the finance-growth nexus literature that FD induces economic growth. Nonetheless, such an outcome is inconsistent with results found for countries which have less sophisticated financial systems. The findings of Gounder's (2012) study is consistent with this study's finding for Fiji, but contradicts Wagabaca's (2004) study, which found that while a positive relationship between finance and growth existed in Fiji the direction of causation was from economic growth to FD.

The factors identified under both panel and time series analyses influenced financial sector development in PNG. However, an additional factor that had significant adverse effect on growth in PNG is the *INF* variable. As panel data revealed the effects of financial crisis had no significant adverse effect on PNG's financial sector and its broader economy. In answer to the third question, this study's empirical findings show a positive financial sector development and economic growth causal link in PNG.

Thus, it is evident that the estimation results are robust; they do not refute the hypotheses raised in this study. Further, the overarching aim of this study to

empirically investigate the relationship between FD and economic growth in the MSG countries, plus objectives 1, 2 and 3 outlined in Chapter 1, has been achieved. The fourth objective of supporting evidence-based policy formulation is addressed in Section 7.4 and the last aim of identifying future research is realised in Section 7.6.

7.4 Implications and research contributions

One of the key objectives of this study is to provide new insights to guide the process of FD and economic growth in the MSG countries. As Levine (1997, p.690) puts it "Given the links between the functioning of the financial system and economic growth, designing optimal financial sector policies is critically important".

7.4.1 Implications for policy

The topic under consideration in this thesis has received considerable attention by both policy makers and academic researchers, particularly in the developing countries. This is a reflection of not only the theoretical significance of the relationship between FD and growth, but also its policy relevance where the overall objective of economic policy is to raise the rate of economic growth. It is hoped sustainably high rates of economic growth in the long-run would lead to improvements in the general living standards of the majority of the people via improvements in socio-economic indicators such as reduction in income inequality and increase in life expectancy. This study's findings are consistent with the findings of recent panel studies (e.g. Hasan et al., 2011) where besides FD, other variables such as *TRAD* from the real sector also play important roles in explaining growth. In this case, where other variables such as *TRAD*, *GCAP* and *INF* also played a significant role in explaining economic growth, it seems that a well-functioning financial sector is a necessary, but not a sufficient condition to reach steady economic growth in the MSG countries

Thus, the adoption of a more balanced market-friendly economic policy framework to support the development of a dynamic and competitive financial services sector, characterised by relatively easy access to credit to encourage long-run higher positive growth rates in the MSG economies, should be considered in a package of policy matrices including measures to induce financial intermediation, policies to boost trade and investment, coupled with strategies to contain inflationary pressures. There

is growing recognition by economists and policy makers that government policies toward financial institutions have an important causal effect on long-run economic growth (King & Levine, 1993b). Additionally, the policy emphasis on financial sector development is advocated by leading institutions such as ADB. According to Zhuang, et al., (2009) ADB's own reviews and growth studies have offered support for the proposition that finance induces growth. As this study's findings are consistent with this policy direction, several policy issues are discussed below under two categories: Primary and Secondary.

(a) Primary policy issues

Stimulation of credit market activity

Given the importance of the credit market in the PICs, structural reforms should explore innovative approaches to stimulate its growth. One policy platform to achieve this is related to the notion of a compulsory comprehensive credit reporting framework (CCR) to promote responsible lending by providing more information about credit histories and activities of customers. New Zealand, a developed country in the region that has the CCR framework, has significantly reduced their financing and informational gap with high growth of credit to the private sector. Due to the non-existence of a CCR regime in the Pacific island economies, its gradual adoption would take time to build towards maturity, would stimulate product innovation in the market and would further advance the cause of responsible lending and reporting. This would, in turn, induce the growth of the credit industry via the lowering of costs, such as information, transaction and monitoring costs, that are triggered by the presence of information asymmetries, which are inherent in the small but growing financial markets of the MSG countries.

Studies have shown that addressing market frictions, such as lowering information and transaction costs to reduce funding costs, is probably the most effective way of addressing the constraints impeding growth of the financial sector. A more efficient market would facilitate the allocation of risk capital more optimally with subsequent effective monitoring resulting in profitable investment outcomes. Consequently, investment demand would rise. As financial intermediation intensifies, secondary credit activity and the money multiplier effect increase. Such a broad-based approach

replaces the need for full subsidisation of financial system development at the expense of other growth enhancing sectors such as the export sector and state-owned enterprises (SOEs) (Khan & Semlali, 2000). This is because there is no strong empirical evidence advocating the full subsidisation of the financial system (Khan & Semlali, 2000). Studies show that China's sustained growth over many years was largely attributed to key reforms in SOEs and the trade sector (e.g. Shan & Jianhong, 2006). This was followed by financial sector reforms in the 1990s.

Reforms to make the banking sector more competitive

As the banking sector dominates the financial sectors of the MSG economies (ADB, 2001) reforms should explore ways of increasing competition in the banking sector. This would challenge the current practice of the urban bank centric operation approach and bring down information and transaction costs. It would also narrow the interest rates spreads i.e. the gap between borrowing and lending rates, which are high in these economies. In line with the new theory on financial intermediation, more attention needs to be given by policy makers, academics and researchers to financial risk management and participation costs issues, and how these tasks can be most effectively undertaken within a more competitive business environment. Reforms should target the financial sector's key conventional roles of supporting productive investment, mobilising and allocation of both small-and-large-savings, and exerting corporate governance on management.

Educational programs, financial literacy and human capital development

Having in place strategic partnerships and collaborative platforms with the financial service sector players, such as banks, regulatory agents and academic institutions, to develop educational programs and activities that develop the skilled human capital needed by the modern knowledge and technology driven economies and financial sectors need will in the long-run have positive effects on the real economy. One such strategy is the introduction of educational resource materials in finance and economics courses with emphasis on the role and importance of the financial sector to the economy. Such programs will provide opportunities for people to be financially educated and empowered to contribute positively to financial sector development and economic growth through income-employment generation businesses ventures. This is also extremely important for reducing poverty and

achieving the SDGs (formerly referred to as MDGs) which were not achieved by all the MSG countries by the previously set deadline of 2015.

As financial illiteracy rates are high in the countries studied, programs that will increase the accessibility of financial information, to address issues such as information asymmetry, need to be promoted by government, policy makers, regulatory agencies and the financial services industry. Strategies such as the introduction of the Centre for Excellence in Financial Inclusion **(**CEFI), that to date serves as the main body for coordinating and driving the national strategy for financial inclusion initiatives in the MSG countries since its inception in 2012, must continue to be vigorously supported with adequate funding and policy support by the government. Development partners and donors such as Australia should introduce similar financial education programs or work in partnership with existing institutions such as PNG Microfinance Centre in the country to support the cause of financial inclusion.

As the MSG countries, such as PNG, have large illiterate populations with lower income levels, FIs need to be innovative in designing and providing financial products and services that are more appropriate to the bulk of the population. To make this happen, government and policy makers must explore options such as tax incentives for the financial services sector and the private sector to become more innovative and competitive. Such shifts in fiscal policy approach would increase the national savings base and diversify the economy. The increased availability of financial products and services, and strengthening of institutional capacity bring about improvements in structural rigidities, such as reductions in information, transaction, and monitoring costs in an economy. Consistent with the *finance-leading hypothesis* this would lead to increased financial intermediation which would in turn be beneficial to the broader economy in the long-run.

Enhancing the development of financial infrastructure

Reforms to enhance the development of financial infrastructure need to look into: (1) how to promote a sound legal and regulatory framework to protect creditors, for effective contract enforcement and to address property rights; (2) how to ensure a user-friendly and well-functioning domestic and international payment systems; (3)

having in place a network of credit information bureaus; and (4) registries responsible for maintaining and providing collateral information. Addressing issues related to infrastructure and institutions should be complemented with measures to reduce the costs of doing business to encourage business growth and entrepreneurship. Notable sources of costs include compliance, red tape, bureaucratic restrictions, streamlining systems, process related to business start-ups, licensing, registration and reporting purposes. Policy makers therefore need to ensure that an enabling and efficient financial infrastructure framework exists to correct traditional market frictions (reducing costs) so synonymous with developing countries.

Given the widespread existence of moral hazard and adverse selection problems in financial transactions, more highly developed financial markets might facilitate faster economic growth. Thus, by having an enabling financial infrastructure, the performance of the developing countries' financial sector can be strengthened through financial market efficiencies and private sector productivity growth. When the markets are more efficient, more production, innovation and investment would take place. Consequently, the economy would prosper. Economic growth and finance theories also advocate for the adoption of such approaches to facilitate the growth of the financial sector and the real economy.

Policies targeted at remedying growth constraints in the informal sector

Financial and institutional development helps alleviate SMEs' growth constraints, increases their access to external finance, and thus levels the playing field between firms of different sizes (Beck & Demirguc-Kunt, 2006). Though no research exists on the significance of the informal sector to the financial sector and the real economy, the informal and SMEs sector i.e. *the sixth sector in the conceptual model* plays a critically role in the economies of developing countries as highlighted in the text. Given the informal sector's significance, specific financing tools, such as leasing and factoring, need to be explored to ensure SMEs access funds, and ensuring systems of credit information sharing are in place to expand the retail market base. Increase in loanable funds would lead to lower funding costs. This will result in more credit being made available to the informal sector. Expansion of informal businesses would result in informal businesses migrating to the formal private sector. Growth of

the SMEs and informal sector would have positive effects on the financial system and broaden the tax base. This is beneficial to the economy.

Sound microeconomic reforms

In many of these small island economies, microeconomic reforms to induce growth, such as improving competition, fair trade and consumer protection, have not been given the attention they deserve. As these interconnected issues are important for enhancing productivity growth in the private sector, policy makers need to look into reforms that will boost the growth of the private sector as a whole as banks are also part of the private sector.

Development of the NBFIs sector

As the NBFIs sector, which is considered an integral part of the financial sector in the economies of the studied countries, has a large untapped pool of capital mostly held by the retirement savings institutions (such as Nasfund and Nambawan Super in PNG) appropriate legislative frameworks should be established to free up this source of capital funding to help fund future investments in both the private and public sectors. This should be part of the broader framework to determine the national savings rate. Besides reducing the cost of funding due to increased competition and efficiency, this would deepen and provide access to the domestic corporate debt (bond) market. This would enable NBFIs to diversify their low risk holdings and manage their financial risks better. Dependence on overseas debt funding by corporate firms would also be reduced. Shortcomings need to be addressed to boost the growth of NBFIs (e.g. superfunds, insurance companies, MFIs, hedge funds, securities markets, etc.) as their growth will have a positive effect on financial sector growth. This in turn will have positive effects on economic growth.

Adoption of innovative technological practices in the financial sector

As previously highlighted, with the rapid technological advancements and improved communication systems fanning modern banking, the MSG economies (like other economies around the world, both developed and developing) have experienced a significant uptake of mobile money schemes (e.g. mobile banking operations) in the last decade. One such policy platform is the adoption of innovative technological practices, particularly by the banking sector, to facilitate lending and the design of a

suitable suite of financial instruments to accommodate the differing preferences of surplus units (depositors and investors) with flexible maturity terms. The embracing of the mobile banking platform in many parts of the developing world, including those in the Pacific where the uptake in MSG countries like PNG is phenomenal, appears to be a significant step in the right direction to tap into the huge "unbanked" segment of the population. As innovation is an important phenomenon in any sector of the modern economy, its adoption into the financial sector is critical for boosting the capacity of the MSG economies. Technological innovation can achieve other goals such as 'financial inclusion' and 'financial literacy' that are advocated by international bodies such as the World Bank and IMF.

Regulatory framework to nurture the growth of modern banking sector

Given new innovations in the provision of financial services, such as mobile banking operations, policy reforms by policymakers and regulators in the MSG economies need to focus their attention on the entire modern banking and financial ecosystem to ensure that banking and financial services become readily available to the bulk of the unbanked population, and that the existing regulatory framework has the capacity to nurture the growth of the modern financial services industry with adequate regulatory oversight. Hence, a financial sector regulator's capacity to address prudential matters, such as the formulation of regulatory framework and effective compliance enforcement, also matters because the key components of the financial sector are framed on laws and regulations to ensure their orderly function.

Development of the domestic capital market

The capital market is another key component of the financial system. Thus, financial reforms to nurture its growth and how it should function and interact with the global financial market infrastructure in the modern fast integrating global economy should be on the reform agenda of any government. More specifically, the development of a domestic bond market needs to be given priority as it is in an infant stage of development in the MSG economies. When credit markets operate without a well-functioning equity market there is scope for government involvement in the economy (Cho & Kim, 1995). Thus, the growth of the debt market will not only broaden the domestic financing sources, but also reduce the scope for government intervention

that is so common in the MSG economies, as credit markets in these economies operate without a well-functioning equity market.

Financial deregulation and minimal government intervention

The key policy issues explained here have a bearing on financial deregulation. A controlled and gradual pursuit of financial deregulation, such as opening up the financial services industry to make it more competitive, without hastily removing regulatory oversight is a step in the right direction. The provision of necessary contractual and informational frameworks within a permissive regulatory and competitive business environment is needed for not only existing FIs to prosper, but also to stimulate the emergence of other new firms (particularly those unincorporated SMES found mostly in the informal sector of the developing economies) to migrate into the formal financial and nonfinancial enterprise. The resulting increase in the number of individuals and small businesses would cause an expansion of the retail deposit market, and the consequent supply of loanable funds would reduce funding costs. This would in turn boost investment activities in the real economy.

(b) Secondary policy issues

Strengthen the processes and systems associated with data generation

A paucity of quality and consistent data has adverse policy implications (Batten, 2009) including computation of misleading key socio-economic indicators. Accordingly, the MSG countries should give priority to strengthening the data capacity of their respective national data repository agencies, such as the National Statistical Office (NSO) in PNG. One significant socio-economic indicator used in this study is the real per capita GDP. In reality, population census data that is used to calculate real GDP per capita is not collected and compiled on a timely basis in many developing countries. PNG is a case in point where census figures are usually not released on a timely basis and when they are, the figures are highly distorted. According to Haberkorn (2008) there is a danger of policy follies downstream when an inappropriate population denominator is used to calculate critical development indicators, such as per capita income, establishment of poverty lines, health incidence and prevalence rates, as well as determining development status (such as LDC) and the selection of countries for priority development assistance.

To support evidence-based policy formulation efforts key stakeholders, including governments, research bodies, donor agencies and development partners (such as the World Bank) that generate statistics on the region, need to work in a more coordinated, elaborate and collaborative manner to strengthen the processes, systems and methods associated with the generation of quality and timely data on many socio-economic variables that form the building blocks of statistics for economic policy analysis, and need to back this with adequate funding and specific technical support. Given the capacity constraints faced by many PICs, data generation, storage and accessibility should be done in partnership with international database providers such as the World Bank to ensure that timely data is made readily available to both internal and external users.

Improve ways to facilitate efficient transfer of remittances & FDI

Though debate exists among Pacific academics over the role of remittances in national development (Bertram, 1999) reforms of the financial sector should also look at how remittances can be cheaply and efficiently transferred from abroad as this will among other benefits, such as increasing financial activity, broadening the national savings base, and boosting consumption and foreign reserves. This is because remittances also constitute a significant part of the MSG economies such as Fiji as noted in Chapter 3.

Though many small open economies depend heavily on FDI, this study's findings did not show evidence of this given the underdeveloped status of the financial sectors. International capital inflows into an economy are more growth enhancing in countries with better developed financial sectors (Hermes & Lensink, 2003). This suggests that policies aimed at attracting *FDI* such as tax holidays and fiscal incentives will have positive effects on the economy when the financial sector performance and productivity is first enhanced.

Financial and economic integration to facilitate trade and investment

Since the *TRAD* variable also has a consistently positive and significant effect on growth in the MSG countries the pursuance of export-oriented less restrictive trade regimes, such as the more out-ward oriented policy direction adopted by the Asian countries in the 20th century to significantly revive their economic growth rates, is

strongly recommended as such a policy direction will have a positive effect on capital accumulation, productivity and economic growth as postulated by the endogenous growth theory. However, as open economies with flexible exchange rate regimes are vulnerable to external shocks and inflation (McKinnon, 1973) (and the PICs are no exception), a formal regional institutional framework on the process of financial and economic integration to facilitate economic cooperation, trade and investment in the region needs to be established as to date no such framework exists (as noted in Chapter 3). The recent establishment of PICTA is a step in the right direction as free trade is the first stage of the formal five-stage economic integration process. This policy direction is consistent with previous studies (e.g. Freitag, 2011) that propose the consideration of currency unions in the Pacific to stabilise prices and enhance the growth of the financial sector and the real economy.

Inflation management and macroeconomic stability

On the one hand, inflation turned out insignificant under panel data analysis. This implies that though some studies (e.g. De Gregorio, 1993) suggest that an economic environment characterised by high inflation is not hospitable for a favourable impact of FD policy on economic growth, here its impact is negligible, particularly on lending and borrowing activity. However, the irony is that the countries studied are strongly characterised by high and unpredictable rates of inflation coupled with highly fluctuating exchange rates as highlighted in Chapter 3. The weak growth-inflation relationship in the cross-section could be due to output returning to the same long-run growth path once inflation has been reduced as in Bruno & Easterly (1998). On the other hand, the time series evidence for PNG suggests that inflation has had a significant effect on growth. This is consistent with a substantial body of evidence indicating that sustained high rates of inflation can have detrimental consequences for an economy and affects the ability of the financial sector to allocate resources such as capital and savings effectively to the productive sectors of the economy (Beck, 2000; Rousseau & Wachtel, 2002).

Addressing inflationary pressures remains a significant challenge for governments and central monetary authorities in many countries. Empirical evidence (e.g. Bittencourt, 2011) suggests that inflation targeting coupled with sound economic policies and fiscal responsibility laws spurs financial and economic development, as

low inflation drives interest rates down and boosts purchasing power. To boost the growth of the financial sector the pursuance of sound macroeconomic policies to prudently align fiscal and monetary policy frameworks via fiscal and monetary responsibility laws need to be given prominence to keep inflation at manageably lower levels. For instance, strict observance to fiscal prudence measures and monetary policy guidelines has the effect of containing inflationary pressures in an economy. Such policy approaches are suitable for countries such as PNG where high inflation poses a huge development and policy challenge.

Prediction of future values

The models developed in this study can be applied in economic policy analysis to predict the future values of growth on the basis of known or expected future value(s) of the explanatory variables such as FD. Incorporating predicted outcomes in policy formulation and aligning those policies with the sustainable national development policy framework of the MSG countries has the potential to proactively initiate economic policies that will grow the financial and real sectors.

The findings of this study are robust and consistent with a wide body of theoretical and empirical evidence that supports the argument that well-functioning financial system has a positive impact on economic performance by enhancing intermediation efficiency. Thus, it is expected that the series of policy recommendations outlined above would induce the growth of the financial sector and its key components i.e. FIs and capital markets. This would in turn put the real economies of the individual MSG countries on a more sustainable economic growth trajectory.

This study's evidence further suggests that the FIs network played an economically significant role in inducing economic growth in the MSG economies. The key components of the financial sector, such as financial markets and how this is possible, were shown in Figures 3.3 (structure of the financial sector) and 3.4 (financial market structure). For MSG countries to meet their development objectives, such as the provision of economic and employment opportunities, diversification of the real economy, and increasing the tax base, their economies need strong, open and well-diversified financial sectors comprising robust FIs networks that can provide innovative financial products and services tailored to meet

the financing needs of the formal private sector and large informal sector that operates side-by-side in the dual economies of the Pacific and elsewhere.

Finally, this study has practical implications because it provides evidence and a framework for policy makers in developing countries to formulate evidence-based and theoretically sound economic policies to enhance their competitive advantage in the fast integrating global economic and financial world. However, one of the key practical challenges faced by policy makers and governments of the MSG countries is how the scarce public resources can be allocated and utilised effectively and efficiently to grow their respective financial sectors, which would in turn support sustainable and inclusive economic growth, so that the general living standards of the majority of the people are boosted with improvements in key socio-economic indicators like income inequality.

7.4.2 Implications for theory

The two main theories applicable to this study are: (1) economic growth theories, particularly the endogenous growth theory; and (2) financial intermediary theories. The current evidence is consistent with a growing a body of empirical research that has found evidence of a robust relationship between FD and economic growth, and it supports the endogenous growth literature, which stresses the significance of FD for steady state long-run economic growth.

Financial intermediary theory suggests that financial instruments, markets, and institutions arise to mitigate the effects of market frictions (e.g. information and transaction costs; enforcing contracts, and exchanging goods and financial claims) FD in the countries studied played a positive role in addressing these frictions, which resulted in increased productivity and efficiency. Traditional financial intermediation theory suggests that gains in efficiency arise from improvements in market frictions as well as improvements in structural deficiencies of institutions in an economy. It is argued (in the McKinnon-Shaw sense) that the distortion of the financial system affects the allocation of resources (capital). Financial repression through unwarranted government intervention, such as the imposition of interest rate caps, also disturbs the free working of capital markets. Consequently, FD will remain deficient and growth will not be sustained.

On the one hand, the new financial intermediation theory advocates the view that the traditional externalities in financial markets (such as transaction costs and asymmetric information) are fast becoming less relevant with advances in ICT. The emphasis under the new theory is now being shifted towards risk management and participation costs, i.e. the cost of learning about how to use financial markets and participating in them. On the other hand, traditional financial intermediary theory suggests that due to market frictions a well-developed financial sector is likely to contribute to improved economic growth performance via the provision of essential financial services such as channelling of credit to the most productive sectors of the economy.

As market frictions highly characterise the MSG economies, policies such as facilitating more competition in the banking sector to bring costs down, as well as establishing credit bureaus and registries as stressed earlier, should be directed to growing the financial sector to ensure markets are more efficient. Though the old financial intermediary theory that thrives on asymmetric information is now being increasingly challenged there will still be a place for it in the financial markets of developing countries as information asymmetry and structural rigidities in prices, wages, interest rates and exchange rates are so inherent in these economies.

While the dataset is only for four MSG countries in the South Pacific, the policy implications discussed here are equally relevant for other smaller developing PICs such as Tonga, Samoa and elsewhere around the world.

7.4.2 Contributions to the literature

This study contributes to the literature in several ways.

First, there is no similar study in the reported literature on the subject in the context of the MSG countries and so this study makes an important contribution to the finance-growth nexus literature. Though one or two time series studies on the topic were done for Fiji, time series analysis on the topic using PNG as a unit of analysis is done for the first time and a longer time frame was used here. By using new region and country specific data, this study offers new insights for policy makers, governments and key stakeholders, such as external development partners, to better

understand the relationship between FD and growth in the MSG economies to support evidence-based policy formulation and prioritise resource allocation.

Second, as highlighted in Chapter 1, in the absence of a generally accepted consensual conceptual framework on the finance-growth nexus issue in the reported literature, one has been developed for this study (see Figure 4.1). The framework was developed on the basis of the structural composition of a typical dual economy of the type found in the MSG economies and common elsewhere in the developing world where the subsistence informal economy operates side-by-side with the formal monetised economy. To include the informal economy, the conventional capitalist-based five-sector circular flow income model, which ignores the informal sector, was modified to produce a unique six-sector model. The development of this conceptualised framework is one of the significant contributions of this study.

7.5 Limitations of the study

Several limitations encountered in this study are discussed below.

Data limitation and measurement

Paucity of reliable data in the MSG countries poses significant challenges for policy makers and researchers as previously discussed. By omitting other growth-determining variables (due to lack of data) the estimates could be hardly free of bias (Odedokun, 1996). The financial indicators used that focus on the FI sector may not be fully representative of, or accurately proxy for, the functioning of the total financial system. Even how the GDP growth rates are measured and calculated can have some effect on the real GDP figures used. The manner in which CPI is computed is also important as CPI is calculated using an average regular income earner's wage and basket of basic goods at the expense of the rural majority who are not on any regular income. This is why the "correct" rate of underlying inflation may not be fully captured by the current CPI calculation methodology which is biased towards urban regular income earners. Nonetheless, as most of these measures are commonly used in the reported literature as standard proxy measures they are also used in a similar manner in this study.

Omission of other variables and sectors

From a broader perspective, a range of different factors identified in the literature (e.g. technology) and contributions of other sectors (e.g. agriculture, extractive resources, etc.) may influence FD and economic growth. Other social and political indicators (e.g. war, coups) too may have some impact on FD and economic growth (e.g. Barro, 1991; Londregan & Poole, 1990). It is practically impossible to incorporate all the factors of interest into finance-growth causality models. Thus, this research assumes that the effects of the omitted variables and sectors of the broader economy are captured by the annual real per capita GDP growth rates.

Methodological shortcomings

Econometric methodologies, including the various accompanying statistical tests applied throughout, suffer from a number of limitations. While appropriate diagnostic checks and statistical remedies were applied these caveats still have some bearing on the empirical analysis as one would expect in any econometric analysis.

Lack of prior studies to corroborate findings

The corroboration of this study's findings is not possible as there are no prior studies reported in the literature for the MSG countries as a panel and for PNG as an individual country-specific study.

Utilization of historical data

Although the models are designed to reflect historical rather than current conditions, it is worth considering its implications for the present for policy development and reconciling existing growth and finance theories.

7.6 Suggestions for future research

A number of areas for future research have been identified.

Channels of financial intermediation

Future empirical research will need to explore specific channels, such as capital accumulation, efficiency, and productivity enhancements, through which financial services may be related to growth to increase understanding on the role of financial intermediation in economic growth in the MSG economies given the variations in the

MSG countries levels of development and institutional frameworks. The literature also reports that institutional channels of transmission between finance and growth remain unresolved in both theory and empirics (Ang 2008; Demirhan et al., 2011; FitzGerald, 2007; Rachdi & Mbarek, 2011). For instance, as mentioned in Section 7.3, though investment demand seems to be an important channel of transmission from FD to economic growth the question of whether this is due to efficiency or volume of investment needs to be established in future work.

Country-specific studies to confirm or refute the current findings

Given the common challenging econometric problems arising from uncertainties related to theory, specification (or proxy) and heterogeneity, the results obtained from empirical panel growth studies will continue to be controversial in terms of robustness. Thus, while it may be plausible to accept this study as generally representing a wider picture of the growth process in the countries studied due to the treatment of the countries in the panel as an homogenous entity, in the future the task of combining the findings of this research with in-depth case studies for each country in the panel to confirm or refute the current findings is worthy of consideration. Note, however, that Fiji could be an exception as there are a number of studies on the subject (e.g. Gounder, 2012; Waqabaca, 2004) as pointed out in Chapter 2.

Relationship of the informal sector to the formal financial sector

Given the existence of a large and complex informal sector in the Pacific and developing economies elsewhere, further research could investigate the nature of the relationship between informal sector development and formal financial sector growth as its impact on the financial sector and wider economy is unknown in the countries studied. In such studies, the consideration of indicators such as the currency outside banking system to base money to estimate the size of the informal sector's contribution to growth and financial intermediation (Schneider & Enste, 2000) should also be investigated.

The effects of technology adoption on financial intermediation

Diffusion of technology may have affected growth in the economies of the MSG countries. For instance, in the banking sector the introduction of technology has dramatically changed the way banking business is conducted in the last two decades

in the MSG economies and elsewhere. The communications sector has also witnessed the arrival of new entrants with new technology. These two key sectors, communications and financial services, have been combining technology and innovation to offer a wide variety of new forms of financial products and services, such as mobile banking platforms, which are predicted to grow at a phenomenal rate in the modern fast integrating global financial structure. According to Levine (1997, p.690) "Innovations in telecommunications and computing have undeniably affected the financial services industry".

However, the effects of such technology on the financial sector and the real economy are undocumented and empirically untested in the MSG economies. Further empirical studies on the effects of technology adoption and the influence of human capital influence on the finance-growth nexus (as technology diffusion relies heavily on human capital) as channels of growth as the advocated by the endogenous growth model are required to guide economic policy formulation.

Accounting standards and information disclosure practices

Studies have shown that strong accounting standards and information disclosure practices tend to promote a market-based financial system (Demirguc-Kunt & Levine, 2001). Accounting standards simplify the interpretability and comparability of information across firms. In doing so, financial contracting is facilitated and critical information required for exerting corporate governance is disclosed. The impact of accounting standards on FD also needs to be empirically established by future studies as this study has not explicitly accounted for this variable.

Impact of the interaction between fiscal and monetary policies on financial development and economic growth

The estimation of potential growth (although its measurement remains weak) is crucial to assess correctly the fiscal and monetary policy stance. The impact of the interaction between fiscal and monetary stances on financial sector growth and the real economy needs to be studied in future research as the findings could provide new insights into how best to manage the two key sectors (real and financial) in order to induce sustained growth in the countries studied.

Forecasting and replication of study

While the goal of identifying the nature of finance-growth nexus within the specific context of MSPIC countries has been accomplished in this study, the other equally important task of forecasting future values of growth or financial intermediation on the basis of known or expected future values of the explanatory variables to aid economic policy development has not been pursued. The forecasting aspect can be further explored in future research because regardless of the depth of our understanding of the topic and the validity of the interpretations of the phenomenon, the need to extrapolate the identified pattern to predict future events is critical in the studied countries. Also, there remains the need for past empirical work to be redone when new statistical tools and better proxy variables are introduced to make prior growth studies more robust, reliable and informative.

7.7 Chapter summary

The purpose of this chapter was five-fold: (1) to provide a brief review of the study; (2) to summarise the findings and compare the findings to the previous literature with respect to the RQs and HOs; (3) to identify the implications of the results in terms of policy and the contributions made by this research; (4) to present the limitations encountered in the study; and finally (5) to identify and propose avenues for future research.

Economies in the developing MSG countries are under-developed and bank-based. The dominance and significance of the banking sector in these countries was empirically proven by this study's findings. Thus, as the study's outcomes suggest, FD is one of the policy variables that determine growth in the MSG economies and so policy makers and governments have to deepen the financial sector and undertake essential measures to strengthen the long-run relationship between FD and economic growth. A number of measures (bordering primarily on financial deepening and financial integration and secondarily on other factors of influence such as trade, investment and inflation) outlined in this chapter have the potential to grow the financial sector.

The development of the financial sector could in turn stimulate and maintain high economic growth rates as advocated by the "*supply-leading hypothesis"*. Sustainable

positive growth rates could in turn induce positive improvements in social wellbeing for the majority of the people. As income inequality is reduced due to positive growth, the incidences of poverty widely prevalent in the MSG countries would be reduced as highlighted in this study's rationale. This would put the countries on the path to catching up with the standards of living enjoyed by countries with higher per capita income levels and well developed financial sectors as convergence theory suggests.

The recent targeting of the developing countries' financial sectors as a core area of intervention by ADB is an indication of the vital role that the financial sector plays in inducing growth (Zhuang et al., 2009). As the MSG countries studied have been the recipients of ADB's financial sector development assistance packages over the last three decades by virtue of their membership to the World Bank, this research has provided new insights and evidence to support economic policy formulation and prioritise resources to the most productive uses and sectors of the economy.

In summary, this research provides a comprehensive framework that explains that the process of savings-investment intermediation played a positively significant role in the economic growth of the MSG countries. The finding of a positive and significant association between FD and growth actually pushes the discussion of the finance-growth nexus back in the direction initially advocated by the McKinnon and Shaw School. This study has also made a significant contribution to the endogenous growth and financial intermediation theories by being the first study to investigate the contentious issue of finance-growth nexus in the MSG countries.

Further, one of the formidable challenges confronting MSG governments and policy makers is the issue of determining the factors responsible for stimulating sustainable economic growth with the ultimate aim of increasing the general standard of living for the masses. Though the list of factors continues to expand apparently without limit (Khan & Senhadji, 2003), financial sector development has been considered as one of the possible determinants of economic growth. This has been supported by the endogenous growth theory. This empirical work has offered support for the suggestion that FD is a possible determinant of growth as hypothesised by the *"finance-leading growth hypothesis"*.

Finally, considerable challenges to financial system development and economic growth remain in the Pacific region and other developing countries in the same stage of financial sector development. In line with the endogenous growth theory some of these challenges and risks are endogenous in nature. This means governments and policy makers must prudently manage those factors that they can control to achieve the best possible economic outcomes. Consistent with findings from a growing literature this study's findings indicate that FD is one such determinant of growth. Hence, the policy recommendations proposed here have the potential to: (1) stimulate the growth of financial intermediation and deepen financial deepening; (2) diversify and broaden the income stream of the financial services sector; and (3) make the financial sector more competitive. Diversification of the income stream has the effect of creating a stable financial services sector, while competition may stimulate both static and dynamic efficiency improvements in the financial services sector (Claessens et al., 2002).

Such shifts in policy practices and paradigms are certainly in line with prudent financial sector management practices in market-based economies elsewhere. The outcomes will have a positive causal influence on the performance of the real economies of the countries studied. The absence of empirically supported policy advice that may have contributed to ineffective policy formulation by policy makers and governments in the MSG countries, which in turn may have resulted in inefficient systems of resource allocation with negative effects on financial sector development and economic growth, has been challenged by this study. However, the avenues of research into the various dimensions of the factors that influence FD and growth in the MSG economies that are identified and proposed in this study are worth considering in future research to either refute or confirm the findings of this research.

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APPENDICES

Appendix 1: Raw datasets for variables used: 1976-2010

Nation	Year	LL	PC	FSD	DCP	RGDPC[a]	TRAD	AID	IMR	LE	GOV	GCAP	FDI	INF	GDP [b]	Pop[c]
PNG	1976	0.25	0.15	0.18	13.07	823	0.63	50.66	89.60	49.94	99.01	18.65	1.38	7.66	2.38	2.89
PNG	1977	0.25	0.12	0.19	13.01	764	-1.37	49.21	87.20	50.65	101.29	21.60	1.21	4.53	2.27	2.97
PNG	1978	0.29	0.11	0.21	12.58	808	-8.02	43.01	84.80	51.39	103.48	22.62	2.00	5.80	2.46	3.05
PNG	1979	0.28	0.11	0.20	12.52	801	1.35	32.71	82.70	52.15	100.11	23.48	1.93	5.77	2.51	3.13
PNG	1980	0.31	0.13	0.21	16.25	762	-11.50	30.13	80.00	52.53	110.14	25.21	2.97	12.06	2.45	3.22
PNG	1981	0.30	0.17	0.21	19.65	739	-20.55	29.31	78.30	53.53	120.50	27.25	3.45	8.05	2.44	3.30
PNG	1982	0.29	0.18	0.21	20.65	725	-21.15	29.54	76.70	54.06	123.66	32.16	3.63	5.54	2.46	3.40
PNG	1983	0.28	0.18	0.21	19.50	730	-16.10	30.66	74.80	54.45	117.26	29.44	5.42	7.90	2.55	3.49
PNG	1984	0.33	0.22	0.25	22.03	704	-13.30	28.11	73.40	54.70	113.70	27.00	4.53	7.42	2.52	3.58
PNG	1985	0.36	0.24	0.28	23.35	710	-7.15	27.58	71.90	54.85	110.33	19.83	3.44	3.71	2.61	3.68
PNG	1986	0.38	0.27	0.30	26.07	732	-4.84	24.20	70.40	54.95	107.78	19.74	3.43	5.45	2.76	3.77
PNG	1987	0.39	0.29	0.32	24.93	734	-5.29	21.60	69.00	55.05	106.51	20.51	2.96	3.34	2.84	3.87
PNG	1988	0.30	0.24	0.26	25.38	737	-6.06	18.33	67.90	55.20	108.67	27.21	4.20	5.45	2.92	3.96
PNG	1989	0.33	0.28	0.29	29.23	709	-7.43	15.81	66.80	55.42	112.10	23.22	5.74	4.48	2.88	4.06
PNG	1990	0.35	0.29	0.30	28.58	671	-3.97	20.46	65.30	55.71	108.32	24.44	4.83	6.95	2.79	4.16
PNG	1991	0.33	0.26	0.29	26.13	717	-5.23	16.26	64.40	56.05	109.89	27.40	3.08	6.97	3.06	4.26
PNG	1992	0.32	0.22	0.29	21.12	796	6.12	15.63	63.10	56.40	97.85	23.30	2.38	4.31	3.48	4.37
PNG	1993	0.32	0.18	0.29	16.87	918	19.55	10.28	62.00	56.74	84.30	17.63	1.25	4.97	4.11	4.48
PNG	1994	0.30	0.15	0.27	16.25	948	17.34	9.17	61.00	57.06	86.23	21.37	1.03	2.85	4.36	4.60
PNG	1995	0.29	0.15	0.26	14.55	893	23.43	11.54	60.00	57.35	82.66	21.94	9.80	17.28	4.21	4.72
PNG	1996	0.33	0.14	0.28	13.39	928	12.99	10.01	59.10	57.63	88.99	22.75	2.16	11.62	4.49	4.84
PNG	1997	0.36	0.15	0.32	17.29	846	3.04	10.33	58.00	57.91	100.89	21.06	0.58	3.96	4.21	4.97
PNG	1998	0.35	0.18	0.32	20.23	863	5.78	16.16	57.10	58.19	94.78	17.91	2.89	13.57	4.40	5.10

PNG	1999	0.32	0.18	0.28	17.65	856	10.79	9.98	56.30	58.48	89.77	16.37	8.53	14.93	4.49	5.24
PNG	2000	0.32	0.17	0.29	17.19	813	16.07	13.20	55.40	58.80	83.07	21.89	2.72	15.60	4.37	5.38
PNG	2001	0.31	0.16	0.29	16.89	792	16.35	12.46	54.40	59.12	86.92	22.95	2.03	9.30	4.37	5.52
PNG	2002	0.30	0.15	0.27	15.27	788	-3.63	12.56	53.50	59.47	97.09	21.19	0.61	11.80	4.46	5.66
PNG	2003	0.28	0.14	0.25	13.59	802	7.96	9.48	52.60	59.83	84.61	19.92	3.33	14.71	4.65	5.80
PNG	2004	0.27	0.12	0.24	13.62	787	6.73	8.78	51.90	60.19	86.75	20.00	0.78	2.10	4.68	5.95
PNG	2005	0.29	0.12	0.26	14.04	798	16.72	6.49	51.10	60.57	90.44	19.83	0.78	1.84	4.86	6.10
PNG	2006	0.35	0.15	0.32	17.21	797	16.79	5.70	50.10	60.94	83.71	19.80	0.23	2.37	4.98	6.24
PNG	2007	0.43	0.18	0.40	21.07	834	8.31	5.07	49.20	61.32	87.19	19.58	1.62	0.91	5.33	6.40
PNG	2008	0.53	0.23	0.50	23.71	868	14.86	3.44	48.50	61.70	87.27	19.96	-0.38	10.76	5.68	6.55
PNG	2009	0.67	0.29	0.62	32.01	895	-1.69	5.20	47.70	62.07	99.2	19.86	5.35	6.92	6.00	6.70
PNG	2010	0.60	0.29	0.56	31.77	936	-2.43	4.58	46.90	62.44	97.23	17.81	0.31	6.02	6.42	6.86
Fiji	1976	0.31	0.16	0.22	16.4	2294	14.09	14.09	35.10	61.83	104.73	21.49		11.43	1.35	0.59
Fiji	1977	0.32	0.18	0.24	18.1	2370	12.14	12.14	34.10	62.13	102.76	23.18		7.01	1.42	0.60
Fiji	1978	0.34	0.19	0.26	18.11	2373	9.81	9.81	33.00	62.42	104.4	22.76		6.11	1.45	0.61
Fiji	1979	0.32	0.18	0.25	19.7	2610	8.17	8.17	32.10	62.72	106.34	31.05	1.00	7.81	1.62	0.62
Fiji	1980	0.33	0.20	0.26	19.18	2509	7.00	7.00	31.20	63.01	104.94	31.84	3.02	14.49	1.59	0.64
Fiji	1981	0.33	0.21	0.27	22.08	2607	7.79	7.79	30.30	63.30	114.4	34.84	2.93	11.18	1.70	0.65
Fiji	1982	0.33	0.23	0.28	22.09	2482	7.03	7.03	29.70	63.58	106.41	25.56	3.08	7.03	1.66	0.67
Fiji	1983	0.35	0.25	0.31	24.1	2351	7.45	7.45	28.90	63.85	105.43	21.14	2.84	6.70	1.61	0.69
Fiji	1984	0.36	0.25	0.31	25.47	2491	6.85	6.85	28.40	64.12	101.08	18.92	1.98	5.29	1.74	0.70
Fiji	1985	0.37	0.28	0.32	26.62	2355	7.42	7.42	27.70	64.38	100.34	19.07	1.90	4.42	1.68	0.71
Fiji	1986	0.36	0.27	0.32	25.15	2491	7.29	7.29	27.00	64.63	97.78	18.22	0.62	1.80	1.79	0.72
Fiji	1987	0.39	0.28	0.35	26.85	2319	5.64	5.64	26.40	64.87	96.72	16.03	1.37	5.66	1.67	0.72
Fiji	1988	0.41	0.28	0.37	25.92	2357	8.35	8.35	25.90	65.11	96.85	12.88	2.85	11.76	1.70	0.72
Fiji	1989	0.42	0.29	0.38	30.83	2663	6.02	6.02	25.20	65.34	97.68	13.43	0.74	6.19	1.93	0.72
Fiji	1990	0.44	0.32	0.40	34.16	2870	5.77	5.77	24.60	65.57	104.81	14.28	6.87	8.19	2.09	0.73
Fiji	1991	0.52	0.38	0.47	39.32	2767	4.91	4.91	24.10	65.79	103.17	15.71	0.37	6.50	2.03	0.74
Fiji	1992	0.52	0.38	0.48	38.24	2840	6.19	6.19	23.40	66.01	103.04	12.77	6.76	4.88	2.11	0.74

Fiji	1993	0.53	0.39	0.49	39.44	2849	5.38	5.38	22.80	66.22	107.11	15.98	5.58	5.21	2.15	0.75
Fiji	1994	0.52	0.41	0.47	40.45	2882	3.07	3.07	22.30	66.43	103.06	13.49	3.70	0.82	2.21	0.77
Fiji	1995	0.52	0.42	0.48	40.14	2990	2.83	2.83	21.80	66.64	99.56	22.66	3.53	2.17	2.32	0.78
Fiji	1996	0.50	0.41	0.46	38.99	3097	2.71	2.71	21.20	66.84	96.00	16.70	0.11	3.05	2.43	0.78
Fiji	1997	0.48	0.39	0.43	33.54	3211	2.83	2.83	20.70	67.04	97.40	18.31	0.74	3.37	2.55	0.79
Fiji	1998	0.42	0.34	0.37	29.28	3105	3.23	3.23	20.20	67.23	97.50	28.18	6.46	5.71	2.49	0.80
Fiji	1999	0.37	0.28	0.33	26.06	3121	2.35	2.35	19.70	67.42	100.40	22.79	-1.71	1.97	2.52	0.81
Fiji	2000	0.42	0.33	0.37	31.97	3372	2.41	2.41	19.20	67.61	105.10	17.26	0.04	1.09	2.74	0.81
Fiji	2001	0.39	0.33	0.35	28.72	3303	2.41	2.41	18.70	67.79	108.05	16.13	2.49	4.27	2.69	0.81
Fiji	2002	0.37	0.31	0.32	28.38	3359	2.73	2.73	18.30	67.98	102.44	19.74	1.66	0.76	2.74	0.82
Fiji	2003	0.41	0.32	0.35	31.32	3462	2.86	2.86	17.80	68.16	108.38	21.99	1.74	4.17	2.83	0.82
Fiji	2004	0.44	0.34	0.38	38.24	3482	2.89	2.89	17.30	68.34	116.60	19.33	9.19	2.83	2.85	0.82
Fiji	2005	0.46	0.38	0.40	44.36	3655	2.57	2.57	16.90	68.52	112.19	22.98	5.18	2.37	3.01	0.82
Fiji	2006	0.49	0.43	0.44	51.57	3700	2.04	2.04	16.40	68.68	119.74	22.48	13.29	2.49	3.06	0.83
Fiji	2007	0.57	0.48	0.51	50.44	3649	1.54	1.54	16.00	68.83	115.39	21.15	9.99	4.80	3.05	0.84
Fiji	2008	0.65	0.54	0.61	53.34	3610	1.23	1.23	15.60	68.97	120.95	24.42	8.62	7.73	3.05	0.84
Fiji	2009	0.74	0.61	0.72	54.38	3466	2.46	2.46	15.40	69.10	113.52	21.8	1.95	3.69	2.95	0.85
Fiji	2010	0.61	0.57	0.66	52.39	3436	2.14	2.14	14.90	69.23	111.80	20.73	6.15	5.54	2.95	0.86
SI	1976					836	-25.53	112.64	57.10	57.53			5.88	4.26	0.17	0.20
SI	1977					902	-8.28	76.14	54.80	57.99			4.76	8.62	0.19	0.21
SI	1978	0.22	0.06		10.78	955	-2.82	81.33	52.60	58.39			4.12	6.26	0.20	0.21
SI	1979	0.26	0.13	0.25	15.98	1124	-8.32	47.27	50.40	58.71			2.29	8.06	0.25	0.22
SI	1980	0.29	0.20	0.28	21.19	1018	-2.92	60.48	48.40	58.89		25.07	1.43	13.09	0.23	0.23
SI	1981	0.22	0.24	0.21	23.55	1051	-9.01	37.47	46.50	58.88	140.38	23.37	0.12	16.40	0.25	0.24
SI	1982	0.19	0.25	0.18	22.14	1006	-18.08	36.50	44.40	58.68	125.52	20.66	0.55	12.98	0.25	0.24
SI	1983	0.25	0.29	0.24	21.69	904	-13.39	39.31	42.90	58.30	133.83	25.31	0.24	6.23	0.23	0.25
SI	1984	0.21	0.22	0.19	17.41	939	-7.38	20.14	41.80	57.79	119.27	15.81	0.78	11.05	0.24	0.26
SI	1985	0.24	0.28	0.22	22.78	937	-1.57	23.84	40.70	57.25	130.48	18.08	0.29	9.57	0.25	0.27
SI	1986	0.24	0.32	0.22	23.09	903	-16.50	32.85	39.60	56.75	138.66	18.53	1.47	13.57	0.25	0.28

SI	1987	0.24	0.30	0.23	20.10	899	-15.34	46.95	38.70	56.41	122.40	23.43	4.39	10.99	0.26	0.28
SI	1988	0.30	0.26	0.26	19.63	921	-11.30	31.65	37.70	56.28	127.76	23.96	0.54	16.74	0.27	0.29
SI	1989	0.34	0.26	0.29	20.42	957	-20.28	24.44	36.80	56.38	139.24	19.95	3.49	14.93	0.29	0.30
SI	1990	0.30	0.26	0.26	13.56	993	-22.78	23.48	35.90	56.70	135.77	20.26	3.45	8.74	0.31	0.31
SI	1991	0.33	0.25	0.29	11.46	990	-18.93	16.79	35.10	57.21	143.02		4.53	15.05	0.32	0.32
SI	1992	0.23	0.16	0.21	11.95	1072	-17.16	17.70	34.10	57.82	127.95		3.74	10.75	0.35	0.33
SI	1993	0.25	0.18	0.23	12.07	1060	-6.76	18.46	33.40	58.45	130.49		5.69	9.17	0.36	0.34
SI	1994	0.27	0.15	0.24	11.96	1113	-10.01	13.91	32.70	59.08	133.38		0.45	13.26	0.39	0.35
SI	1995	0.26	0.11	0.23	11.79	1191	-10.78	11.07	32.00	59.70	122.15		0.39	9.63	0.42	0.36
SI	1996	0.24	0.13	0.23	12.66	1177	-3.74	9.08	31.20	60.30	120.36		1.05	11.77	0.43	0.37
SI	1997	0.23	0.18	0.24	13.36	1126	-3.75	9.39	30.50	60.91	126.92	7.63	5.96	8.08	0.42	0.38
SI	1998	0.23	0.21	0.22	14.61	1131	-13.81	13.29	29.70	61.54	116.48	6.76	1.87	12.40	0.44	0.39
SI	1999	0.25	0.21	0.21	14.97	1083	-3.65	11.98	29.20	62.19	106.42	6.19	2.05	8.02	0.43	0.40
SI	2000	0.28	0.23	0.23	16.01	904	5.30	27.54	28.40	62.83	114.54	6.63	2.99	7.89	0.37	0.41
SI	2001	0.26	0.22	0.21	19.75	809	-10.85	27.81	27.70	63.45	119.38	6.74	-2.33	6.93	0.34	0.42
SI	2002	0.23	0.20	0.19	18.86	765	-22.03	14.23	27.20	64.03	110.41	5.18	-0.13	10.93	0.33	0.43
SI	2003	0.28	0.23	0.24	19.00	792	-20.70	29.36	26.60	64.57	105.27	9.41	-0.54	8.27	0.35	0.44
SI	2004	0.30	0.24	0.25	17.91	833	-16.83	40.48	25.90	65.05	111.44	11.39	1.60	6.99	0.38	0.46
SI	2005	0.34	0.25	0.29	20.57	914	-11.29	57.26	25.50	65.49	120.53	13.76	4.49	7.33	0.43	0.47
SI	2006	0.40	0.27	0.34	25.05	925	-21.06	51.06	24.70	65.89	121.10	14.60	7.46	11.22	0.45	0.48
SI	2007	0.44	0.33	0.37	27.6	957	-16.38	41.93	24.20	66.28	118.94	13.25	10.99	7.67	0.48	0.50
SI	2008	0.48	0.41	0.41	30.35	998	-20.81	32.93	23.50	66.67	119.68		14.70	17.32	0.51	0.51
SI	2009	0.54	0.53	0.45	31.5	925	-23.22	34.31	23.00	67.07	114.88		19.91	7.09	0.48	0.52
SI	2010	0.49	0.47	0.43	26.87	965	-16.08	42.20	22.50	67.47	130.17		35.06	1.05	0.52	0.54
Van	1976					1351	-9.58	69.03	58.90	56.09			5.61		0.14	0.10
Van	1977					1298	-4.28	32.75	56.80	56.70			1.31	5.74	0.14	0.11
Van	1978					1481	-7.66	33.14	54.80	56.70			2.59	6.41	0.16	0.11
Van	1979	0.73	0.32	0.64	30.24	1496	-16.73	83.49	52.10	57.32			4.10	4.17	0.17	0.11
Van	1980	0.74	0.33	0.64	34.16	1289	-8.89	87.63	49.70	57.94	112.00		4.09	11.24	0.15	0.12

Van	1981	0.64	0.35	0.56	36.15	1310	-2.33	75.83	47.40	58.54	101.08		7.21	26.85	0.16	0.12
Van	1982	0.71	0.34	0.65	34.45	1415	-9.96	65.81	45.40	59.12	100.63		7.06	6.67	0.17	0.12
Van	1983	0.77	0.31	0.71	31.91	1824	-6.00	63.99	43.20	59.66	112.72	23.81	5.33	1.65	0.23	0.12
Van	1984	0.75	0.28	0.69	29.94	1906	2.44	49.06	41.40	60.17	104.56	19.86	5.49	5.52	0.24	0.13
Van	1985	0.91	0.30	0.84	29.22	1883	-13.19	50.67	39.20	60.06	120.35	25.82	3.74	1.07	0.24	0.13
Van	1986	1.13	0.31	1.05	31.85	1803	-19.34	46.80	37.50	61.08	130.05	28.59	1.70	4.77	0.24	0.13
Van	1987	1.12	0.31	1.05	32.23	1770	-17.54	77.06	36.10	61.50	128.47	33.11	9.85	16.04	0.24	0.14
Van	1988	0.99	0.31	0.93	32.98	1739	-13.55	45.39	34.40	61.91	124.60	26.71	7.28	8.76	0.24	0.14
Van	1989	1.17	0.31	1.11	33.35	1754	-16.43	48.37	32.70	62.33	125.50	33.02	6.35	7.75	0.25	0.14
Van	1990	1.29	0.32	1.23	36.23	1791	-18.31	47.97	31.40	62.76	125.86	33.23	8.28	4.76	0.26	0.15
Van	1991	1.18	0.32	1.13	32.41	1952	-10.53	41.45	30.00	63.20	115.13	26.07	13.49	6.47	0.29	0.15
Van	1992	1.08	0.34	1.03	38.27	1882	-2.93	29.82	28.60	63.65	109.67	21.08	13.49	4.06	0.29	0.16
Van	1993	1.05	0.37	1.00	37.72	1911	-4.40	29.41	27.20	64.10	109.24	21.24	13.81	3.57	0.31	0.16
Van	1994	0.98	0.35	0.93	36.17	1907	-2.22	26.07	25.90	64.56	108.36	23.21	13.58	2.30	0.31	0.16
Van	1995	1.03	0.35	0.97	37.72	1948	-2.08	25.07	24.80	65.01	108.73	22.64	13.27	2.23	0.33	0.17
Van	1996	1.10	0.35	1.04	36.57	1957	2.13	16.9	23.60	65.9	107.16	19.71	13.35	0.91	0.34	0.17
Van	1997	1.07	0.33	1.01	34.86	1968	3.14	15.00	22.60	66.33	98.27	18.84	11.81	2.83	0.34	0.17
Van	1998	1.02	0.31	0.96	32.46	1976	5.59	23.91	21.60	66.75	110.16	17.15	7.77	3.28	0.35	0.18
Van	1999	1.04	0.35	0.97	35.96	1946	-5.96	20.51	20.60	67.16	116.48	18.99	5.00	2.00	0.35	0.18
Van	2000	0.98	0.35	0.91	31.55	2019	3.67	27.37	19.70	67.56	108.80	19.91	7.45	2.46	0.37	0.19
Van	2001	1.02	0.35	0.96	33.43	1903	-4.54	21.62	18.60	67.94	111.86	18.35	6.98	3.65	0.36	0.19
Van	2002	1.11	0.40	1.05	37.22	1772	-6.23	17.76	17.80	68.30	113.80	18.77	5.41	1.96	0.34	0.19
Van	2003	1.03	0.41	0.97	38.68	1788	-4.82	14.95	17.00	68.65	104.81	17.33	5.75	3.02	0.36	0.20
Van	2004	0.99	0.42	0.93	39.93	1818	-5.04	13.21	16.10	68.99	104.98	19.20	5.45	1.42	0.37	0.21
Van	2005	1.00	0.43	0.94	43.78	1862	-7.17	11.79	15.30	69.32	107.11	20.17	3.37	1.20	0.39	0.21
Van	2006	0.96	0.43	0.90	42.60	1948	-8.02	12.66	14.40	69.64	106.57	22.68	9.98	2.04	0.42	0.22
Van	2007	1.07	0.47	1.00	42.85	2022	-6.16	11.07	13.80	69.94	105.36	24.84	6.47	3.96	0.45	0.22
Van	2008	1.20	0.53	1.12	54.81	2094	-12.08	15.46	13.20	70.24	112.67	32.60	7.40	4.83	0.48	0.23
Van	2009	1.33	0.60	1.26	65.07	2113	-7.93	17.49	12.50	70.54	108.01	25.07	5.44	4.25	0.49	0.23

Van	2010	1.20	0.56	1.13	65.80	2164	-6.32	13.53	12.00	70.82	106.14	29.45	5.57	2.81	0.52	0.24

Notes: (a) Real GDP per capita (RGDPC) based on 2005 US$ in billions; (b) Real GDP figures in billions of US$ at current prices; and (c) Population (Pop) figures in millions.

Appendix 2: Definition of key terms

Term	Explanation
Finance-growth nexus	Finance-growth nexus refers to the hypothesised causal relationship between financial development (FD) and economic growth. The words finance and FD are used interchangeably, as are the words growth and economic growth
Financial system structure	Financial system structure refers to the mixture of financial instruments, markets, and intermediaries operating in an economy (Demirguc-Kunt & Levine, 2004).
Financial sector	The financial sector is the set of institutions, instruments, and the regulatory framework that permit transactions to be made by incurring and settling debts; that is, by extending credit. Financial sector and financial systems are used interchangeably in this study. Financial systems worldwide can be categorised broadly into four key parts (Ang, 2008): (1) financial institutions (FIs) comprising mainly banking institutions; (2) non-bank financial intermediaries (NBFIs) such as pension funds and insurance companies; (3) capital markets; and (4) regulatory bodies such as central banks which oversee and supervise the operations of the intermediaries. The FIs are categorised into three major groups (Levine et al., 2000; IMF, 1984): (1) central banks – comprising the central bank and other institutions that perform the functions of the monetary authorities; (2) deposit money banks – comprising all financial institutions but mostly the banks that have liabilities in the form of deposits transferable by check or otherwise usable in making payments; and (3) NBFIs.
Financial development (FD)	Financial development is usually defined as "a process that marks improvement in quantity, quality and efficiency of financial intermediary services" (Abu-Bader & Abu-Qarn, 2008, pp.805-806). The process of financial sector development involves the interaction of many activities and institutions which are both financial and nonfinancial. The term FD is used interchangeably with the following terms: financial sector growth, financial intermediation growth, financial activity, financial depth, financial sector deepening and financial system development
Economic growth	Economic growth is primarily concerned with the long-term. In this study, real per capita GDP is used as a proxy for economic growth. The common indicators of growth were mentioned in Chapter 2. The term economic growth is used interchangeably with terms such as: growth, economic development, economic performance, national output, real output growth and real sector development.
Causality	Causality or causation as used in the literature means one variable (say X) influences another variable (say Y) or variables (Ys) (LeRoy, 2004). Causality can be mono-causal (either *X* to *Y* or *Y* to *X*), bi-causal (*X* to *Y* and *Y* to *X*) or no causation (*X* and *Y* have no direct effect on each other).