

**PROTOCOL FOR TESTING THE MCKINON-SHAW HYPOTHESIS ON
SUB SAHARAN AFRICA: A META ANALYSIS OF THE EVIDENCE.**

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1. BACKGROUND

1.1 Introduction

A large body of literature has examined the importance of financial liberalisation in ameliorating government intervention (coined as financial repression) in money and credit markets. They argued that financial repression has led to inefficient allocation of resources, increased the segmentation and fragmentation of financial markets, reduce the availability of loanable funds, constrained investments and stagnations in the economy. (Denizer et al 1998)

These issues have taken force following the seminal work of McKinnon Shaw (1973) who provide the basis for analysing financial sector development and policy implication in economic development. They propose the importance of interest rate liberalisation and the elimination of all forms of financial repression in order to enhance economic growth.

1.2 Aims and rationale for review

Financial liberalisation theorem postulates the important role of financial sector development as a necessary tool to support economic growth. This is due to its role in transforming deposits by making them available to lending agents with investment needs, increasing the volume of savings by discouraging firms to invest in low yielding projects hence improving the efficiency of investment and also increasing the rate of return on money which in turn increases the quality and quantity of investment. (Acemogul and Zilibotti, 1997; Serven, 2002)

Many countries have witnessed huge strides towards reforming their financial system (see Figure 1 below) as part of their growth promoting policies which were propagated by the World Bank and IMF, this was anticipated to lead to deeper financial markets, reduce capital accumulation constraints, enhance the efficiency of financial intermediary services and resource allocation (Levine, 2004). This policy initiative has not fully impacted the developing economies as they have failed to reap the benefit of liberalisation. More countries have found that their financial markets after financial liberalisation have become less stable, and have experienced more fragile and

exacerbated excessive risk taking (Kaminsky and Schmukler, 2003; Demirguc-Kunt and Detragiache, 1999)

The deepening of the financial sector facilitated the integration with the global financial markets, leading to a more equitable and efficient allocation of resources (Galindo et al, 2007; Chari and Henry, 2008; Abiad et al 2008). It also led to output volatility, instability and crises in the financial system (Kaminsky and Schmukler, 2003; Demirguc-Kunt and Detragiache, 1999), this raised the questioning of the authenticity of financial liberalisation propaganda leading to governments in some countries to reconsider financial market control. (Stiglitz, 2000)

The inconclusiveness of results in various studies is mirrored through different macroeconomic framework as countries face different stages of institutional and economic development (Bakaert et al, 2003; La Porta et al, 1998; McLiesh et al, 2007; Acemoglu and Johnson, 2005). Studies have used different geographic units, different types of data, different indicators and different analytical methods leading to a lack of consensus. (Arteta et al 2001)

This study reviews the economic theory and available evidence by conducting a systematic review and meta-analysis to ascertain whether financial liberalisation as expounded by McKinnon Shaw has enhanced economic growth in Sub Saharan Africa.

1.2 Objective of the study

The overall research problem being investigated by this study is to quantitatively analyse the heterogeneous empirical literature on the finance growth nexus.

The objectives are threefold:

Firstly, to analyse the validity of McKinnon Shaw hypothesis by testing whether financial liberalisation enhances economic growth in Sub Saharan Africa

Secondly, to analyse the factors that affect the estimates of the relation between financial development and economic growth

Thirdly, to analyse the effect of publication bias in order to ascertain whether there pose an inherent selection bias towards various outcomes

1.3 Contribution of the study

Majority of primary studies that have analysed the relationship between financial development and economic growth (Beck and Levine, 2004; Chang and Caudill, 2005; Ang, 2008; Yu et al 2012). These studies have shortcomings in that they cover only a small fraction of the available studies, they are based on the subjectivity of the researcher, their results are inconclusive and ambiguous, there exist a wide variation in effect sizes. Furthermore, their estimated effects are limited to estimation characteristics, proxy measures used, countries included or span of data in the estimation. This study differs from the above narrative reviews by conducting exhaustive search using explicitly stated criteria in an attempt to include all studies and enable replicability. (Carney and Geddes, 2002) Furthermore by employing Multivariate Meta Regression analysis which uses moderator variables to control for various specification and estimation characteristics, it allows the segregation of the role of other control variables and theoretical methodological issues to explain a wide variation in effect sizes found in primary studies.

On reviewing the literature, two studies have been found to systematically review the impact of financial development on economic growth. Bumann et al (2012) and Valickova et al (2013). Bumann, et al (2012) conducted meta-analysis on the effect of financial development on economic growth on a group of developed, developing and a mixture of developed and developing countries. By using the t statistics of 60 studies they found that on average there is a positive effect of financial development on growth however the significance of the effect is weak. The grouped studies showed that results do not differ across different countries, moreover the combination of measures used to measure financial development and types of countries do not find significant results. They also find that financial liberalisation measures have been more effective before 1970's and during 1990's confirming the effectiveness of financial liberalisation policies on the era of financial repression. Furthermore, they found that from year 2000 onwards, the effect is weak indicating that most countries would have implemented the liberalisation policies leading to a marginal effect.

Valickova et al (2013) on the other hand, looked at most of the countries in the world by grouping them as South Asia, Asia, Europe, Latin America, MENA, Sub Saharan Africa and the rest of the world including most of OECD countries. They retrieved 1334 estimates from 67 studies finding a wide estimate variation on individual studies but overall a positive and statistically significant effect. They found that differences in result are the outcome of both research design and heterogeneity in underlying effect. Furthermore studies that do not take account of endogeneity on average exaggerate the effects of financial development on growth. Also in less developed countries effects are weaker than developing countries while studies utilising stock market variables are associated with a larger positive effect on economic growth. They further concur with Bumann et al (2012) in that the effect of financial development on growth declines after 1980.

The study described in this protocol is believed to depart and contribute to existing literature in various ways:

Firstly, the thesis will focus on developing countries encompassing only Sub Saharan Africa in order to explicitly analyse countries in similar stage of development, unlike Bumann et al (2012) who have grouped the countries from developed and developing but have lumped the developing countries all together. This is in respect to Deidda and Fattouh (2002); De Gregorio and Guidoth, 1995; Rousseau and Watchel (2011) and Yu et al, (2012) who report different growth effect on the level of financial development across different countries. Sub Saharan Africa is more bank based unlike other developing countries which are more market based. () Thus by confining the study to Sub Saharan Africa we will be in a position to see more clearly the effect of financial development on economic growth as they are a relatively homogeneous set of countries with adequate controls for country wide differences in economic, social and institutional characteristics.

Secondly, unlike Valickova et al (2013) who only analysed published studies which have been peer-reviewed, we will analyse both published and unpublished studies. Using only published studies as explained by Sterne et al (2000) and Thornton and Lee (2000)

will cause a biased summary effect leading to a biased conclusion about the relationship between financial development and economic growth

Thirdly, this review will strive to be systematic and explicit in all steps undertaken in the discovery of studies, quality appraisal, analysis and justification thereof, unlike Bumann et al (2012) and Valickova et al (2013) who have not thoroughly explained and detailed the search strategy of inclusion/exclusion criteria's undertaken to enable independent validation, how the studies were assessed in terms of quality and methodological issues, this can lead to methodological flaw which can eventually bias the conclusion. (Mulrow, 1987). Moreover, the search terms employed did not use sufficient words to capture all the determinants in question in order to provide an objective and comprehensive studies on the subject.

2 Definitional and conceptual issues

2.2 Measures of Financial development

Financial development is defined differently by different economists:

Baswir (2007:1) defines financial development as “an integral part of overall economic liberalisation by specifically promoting the role of the market and minimising the role of the state in determining who gets and gives credit and at what price.”

Similarly, Baden (1996:2) notes that, “financial liberalisation is the removal of government ceilings on interest rates and other controls on financial intermediaries”

World Economic Forum (WEF) defines financial development as the “factors, policies and institutions that lead to effective financial intermediation and markets as well as deep and broad access to capital and financial services.” (WEF 2012...p1) These financial systems comprises of financial institutions like deposit taking institutions such as commercial banks, non-deposit taking institutions such as lending institutions, insurance, Microfinance and financial markets such as stocks, bond markets, foreign exchange and derivative markets. (WEF 2012)

Based on the definitions above, this thesis will define financial liberalisation as the abolition of excessive government intervention in money and credit markets on the pricing and allocation of credit. We will follow the conventions in the literature by conceptualising

financial development through indicators of commercial banking and stock market growth as they are readily available in contrast to other indicators of financial development which are less common in the literature and consequently are likely to be supported by a limited number of studies.

2.2.1 Commercial Banks

Proxy indicators of financial development include changes in the commercial banking sector; these can be operationalized as the financial depth, bank ratio and financial activity.

Financial depth as measured by the money supply M1, M2 and M3. These measure the size of the financial sector. M3 the broader aggregate money supply which is less liquid in comparison to other aggregates (Favara, 2003; Deidda and Fattouh, 2002) M3 is preferred to M2 in economies where money is mostly used as a store of value. (Yu et al, 2012) Khan and Senhadji (2003) argue that countries with underdeveloped financial systems should not use M2 as a proxy to financial development as high level of monetisation might be associated with underdevelopment. Some authors prefer to use the difference between M3 and M1 to GDP to counteract the pure transactional aspects of narrow monetary aggregates. (Yilmazkuday 2011 and Rousseau and Wachtel, 2002) The measures of financial depth have shortcomings in a sense that they are purely quantitative and fail to reflect the quality of financial services. Furthermore, they may include deposits of other financial intermediaries which raise issues of double counting (Levine 1997)

Another proxy used to measure financial development is bank ratio, defined as the ratio of bank credit to the total of bank credit and domestic assets of the central bank. This ratio shows how credit enhances the allocation of resources to the economy. Levine (1997) notes the weaknesses with this measure; first it does not take into account other institutions which perform this financial function. Secondly, it does not stipulate the beneficiaries of credit allocated, thirdly, it does not gauge how efficient bank performs. Another measure is the ratio of commercial bank assets to the sum of commercial bank and central bank assets

2.2.2 Stock Markets

As the financial sector develops, hence is the size of the stock market. This provides savings mobilisation to enable economic growth by financing of long term massive projects which would not have been feasible to finance. (Greenwood and Smith, 1996; Levine, 1991) It further facilitates the easiness of raising capital through its liquid markets mechanisms thus lowering the cost of capital. (Bencivenga et al, 1996; Neusser and Kugler, 1998)

Several researches have used various measures to proxy the impact of the stock market to the economy. (Atje and Jovanovic, 1993) These include the stock market capitalisation ratio (Chakraborty, 2010; Yu et al. 2012) stock market activity (Manning, 2003; Shen et al. 2012) and turnover ratio (Beck and Levine, 2004; Liu and Hsu, 2006)

Stock market capitalisation ratio refers to the total value of listed shares relative to GDP. This ascertains the overall size of the stock market and its ability to allocate capital more efficiently and facilitate risk diversification. The stock market activity is the total value of traded shares relative to GDP, which measures the extent to which stock market is used to trade. The turnover ratio on the other hand, is the total value of traded shares relative to the stock market capitalisation. It measures the efficiency of the stock market to provide liquidity assets. (Pagano, 1993; Demirguc-Kunt and Levine, 1996; Rousseau and Wachtel, 2000)

This study will make use of commercial banks and stock market measures of financial development as they represent the size, activity and efficiency of the financial sector.

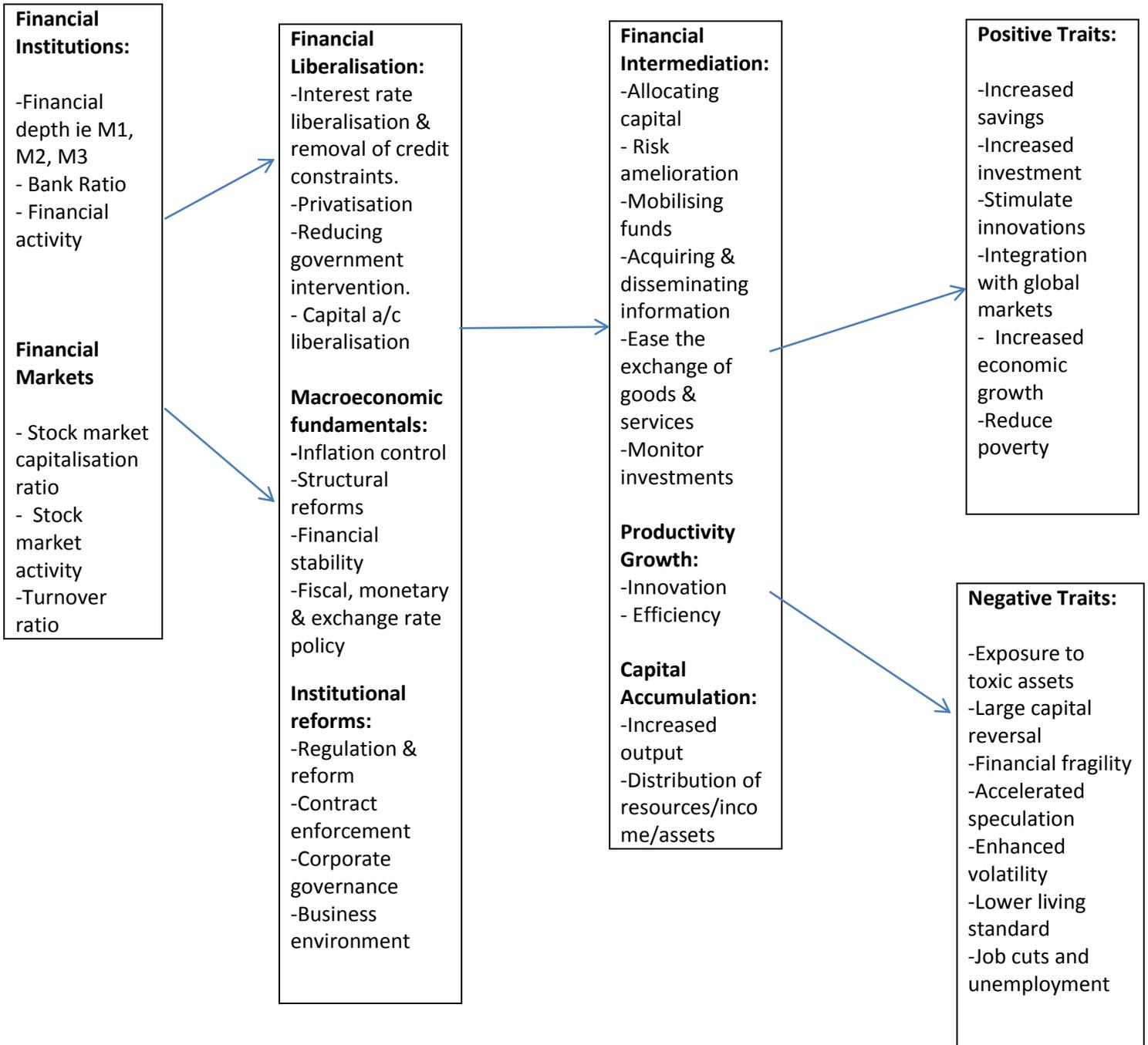
The above section outlines and defines the key concepts that will be addressed in this thesis, illustrated below is a simple logic model to demonstrate the effect of financial development on economic growth

LOGIC MODEL TO ANALYSE THE IMPACT OF FINANCIAL DEVELOPMENT ON ECONOMIC GROWTH



Financial Systems

Activities /Intervention



3 Methods

3.2 Search Strategy

3.2.1 Selection of Studies

In the first stage of research we will conduct a systematic search of the literature on the impact of financial development on economic growth in Sub Saharan African countries. To enable the capture of all possible search terms, extensive search strings for all possible search terms for the concepts of the study will be developed with the assistance of an information specialist for comment. However, as some databases do not work with long strings, smaller yet intensive strings will be employed to suit such databases. Appropriate controlled terms will also be utilised to suit different databases. EPPI reviewer will be used as our data storage and management platform to upload all search results. Our search will include studies that have been both published in peer review publications and published in grey literature with a publication date of 1990's onwards; this is to take into account the fact that most countries have undertaken financial reforms from late 1980's.

Once on EPPI Reviewer, The first step will consist of a preliminary screening of the papers by reading the articles title, abstract and keywords to identify papers that are not relevant or have no enough information to judge eligibility. In this level, a citation will only move to the next screening level if it does not refute the PIOS criteria (Population-Independent Variable-Outcome Variable – Study design) as suggested by the University of York (CRD, 2009):

- Exclude if not from Sub Saharan (Population)
- Exclude if studies whose regression analysis does not represent Financial development as the key independent variable of interest versus control variable (Independent Variable)
- Exclude if studies whose regression analysis does not represent Economic growth as the dependent variable (Outcome)
- Exclude if not an empirical study (Study Design)
- Include if it meets the inclusion criteria or if it is not clear from the title and abstract

The second step will be to refine the first step as we will encounter many papers that might not meet the selection criteria, to accomplish this more detailed look at the text of full papers will take place.

Thirdly, once more relevant papers have been sifted through; detailed categorisation will be used to identify specific characteristics of studies at hand. Data and information will be extracted on study characteristics, estimation methods, published versus unpublished, country regions, journal quality etc. All data extracted will be stored electronically on EPPI Reviewer 4 (Thomas et al 2010) and meta-analysis will be conducted using Stata 14 (StataCorp, 2015). The overall search and screening process will be illustrated in a flow diagram.

3.2.2 Assessment of Methodological robustness/Quality of included Studies

To assess the methodological quality, studies will be analysed during the Meta regression stage. Stanley et al, (2008) insists the use of all studies available as they are useful in identifying specific research dimensions among a wide variation in independent variables in research methods, models and data. Thus this study will be as comprehensive and inclusive as possible by including all studies. To ascertain the effects of quality on meta-analysis results, study quality will be coded and included as moderator variable. Various measures of quality assessment will be used. Firstly, each estimates precision will be used as a proxy for quality. This is calculated as the inverse of the estimates standard error. According to Stanley and Doucouliagos (2012) studies estimate precision is statistically more robust than other forms of quality as they are not subjective.

Also impact factor of journal of where the study was published will be used, these will be retrieved from Social Science Citation Index (SSCI). A higher weight will be assigned to journals with a larger impact factor. Furthermore, the number of citations each study has received as reported in SSCI or SCOPUS will be used to determine quality.

By coding and quantifying these dimensions of quality in Multiple MRA, the study will be able to ascertain the effect of quality on reported estimates.

3.2.3 Database selection

Both published and unpublished studies will be used in our analysis. To retrieve the published studies, various databases will be used including:

- Econlit
- JSTOR,
- IDEAS
- SSRN
- EBSCO
- ISI web of knowledge
- Scopus
- Econpapers
- Science Direct
- ProQuest Social Science
- International bibliographic of social sciences, ASSIA (Applied Social Science Index and Abstract)
- Resource for Economists on the internet (RFE)
- Google scholar.

To identify unpublished studies databases used include:

- World Bank e-library
- Havard Kennedy e-library
- Asian Development Bank e-library
- National Bureau of economic research
- Campbell database
- 3ie database
- OECD
- Research 4 DFID
- UN
- IMF e-library.

Further searches will be conducted on specific journals such as:

- Review of Financial studies

- Journal of Finance
- Journal of Financial Economics
- Review of Economics and Statistics
- Journal of International Money and Finance
- Journal of Development Studies
- Journal of Development Economics
- African Journals Online
- JISC Journal Archives
- World Bank Economic Review.

Furthermore manual searches will be used to complement studies that will not be picked through electronic searches and also to generate grey literature and unpublished studies such as:

- Business and Dissertation Abstracts
- Inter-American Development
- British library for Development Studies
- DEREc (Development Assistance Committee Evaluation Resource Centre)
- FRANCIS (Humanities and Social Sciences Studies)
- Social Science Citation Index
- PRISMA (Hispanic, Latin America & Caribbean journals through ProQuest)
- Conference Proceedings Citation Index- Social Sciences
- EPPI Centre website

Snowballing approach will be used where a systematic review of reference list of studies will be used to find new studies.

3.2.4 Concept/keyword specification

Searches in databases will be conducted using the text mining technique suggested by CRD (2009), this will be conducted as “Title”, “Abstract”, “Keyword” and “Text” searches. These will be driven by the following specifications:

Search 1: Concept– Financial Development

Synonyms: Financial n4 Develop* OR Financial n4 Dereg* OR Financial n4 Liberal* OR Financial n4 Integr* OR Financial n4 Global* OR Financial n4 Regulat* OR Bank* n4 Privat* OR Financial n4 Market n4 Develop* OR Financial n4 Market n4 Reform* OR Financial n4 Reform* OR Bank* n4 Reform* OR Interest n4 Rate* n4 Reform* OR Credit n4 Reform*:ti, ab, kw OR Credit n4 Control* OR Credit n4 Market n4 Reform*:ti, ab, kw OR Credit n4 Market n4 Control* OR Bank* n4 Control* OR Bank* n4 Regul* OR Bank* n4 Deregul* OR Bank* n4 Liberal* OR Market n4 Liberal* OR Stock n4 Market n4 Liberal* OR Stock n4 Market n4 Develop* OR Capital n4 Account n4 Liberal* OR Capital n4 Market n4 Liberal* OR Bank* n4 Sector n4 Growth*

(Use in “Title” “Abstract” and “Keyword” search)

Search 2: Concept – Empirical Studies

Synonyms: Empirical OR Quant* OR IV OR OLS OR Regress* OR Economet* OR Analy* OR Statistic* OR Testing OR Estim* OR Measur* OR Variable* OR T n1 stat* OR Standard error OR Stat* w1 Significan* OR Data OR Random n1 effect* OR Fixed n1 effect* OR Model* OR Predict* OR Robust OR Time n1 Series OR Panel OR Longitudinal OR Cross n1 section* OR Quasi n1 Experimen* OR Correlat* OR Coefficient* OR Macroec*

(Use in “Title” “Abstract” and “Keyword” search)

Search 3: Concept – Sub Saharan Africa

Synonyms: Sub w1 Sahara* w1 Africa OR Africa OR African n1 Union OR African n1 Economic n1 Community OR South* w1 Africa OR Emerging w1 Econom* OR Develop* w1 Econom* OR Develop* w1 Countr* OR Africa* w1 Countr* OR Africa* w1 Econom* OR Angola OR Benin OR Botswana OR Burkina Faso OR Burundi OR Cameroon OR Cape Verde OR Central w1 African w1 Republic OR CAR OR Chad OR Comoros OR Congo OR Congo w1 Brazzaville OR Congo n2 Democratic n2 Republic OR Congo w1 Kinshasa OR Côte d'Ivoire OR Djibouti OR East n1 African n1 Community OR EAC OR ECOWAS OR Economic n1 Community n2 West n1 African n1 States OR Equatorial n1 Guinea OR Eritrea OR Ethiopia OR Gabon OR Gambia OR Ghana OR Guinea OR Guinea-Bissau OR Kenya OR Lesotho OR Liberia OR Madagascar OR Malawi OR Mali OR Mauritania OR Mauritius OR Mozambique OR Namibia OR Niger OR Nigeria OR North w1 Sudan OR South w1 Sudan OR Rwanda OR Rhodesia OR Senegal OR Seychelles OR Sierra Leone OR Somalia OR South n1 Africa OR South n1 West n1 Africa OR Southern n1 African n1 Development n1 Community OR SADC OR South Sudan OR Sudan OR Swaziland OR Tanzania OR Togo OR Uganda OR Zambia OR Zimbabwe OR Zaire OR LMIC OR LAMI

OR Low n2 Middle n1 Income n1 Count*OR Third World OR Develop* n1 World OR Develop* n1
Countr* OR Develop* n2 Nation*

(Use in “Title” “Abstract” and “Keyword” search)

When searching the countries, attention has been given to include countries that have changed their names since 1980's, countries that have merged to form another country, new countries that have emerged as a result of splitting from one another.

Combine Search 1, 2 and 3 results with “AND”

Time Period: From 1990 – 2015

Month of access: June 2015

The first search is on the intervention which refers to the policies referring to financial liberalisation. The second search is on the study type, this is to enhance the scope of analysis needed and remove all theoretical studies, the third is on geographical area. An example of the search strategy for EconLit is listed above. This strategy will be modified to suit different databases. Also reference lists of included studies will be searched for potential studies.

3.2 Selection (inclusion/exclusion) criteria

After specifying the search strategy, studies will be selected to be included in the Meta regression by using the following criteria:

- Studies that analyse the direct effect of financial development on Economic growth. Studies selected will encompass measures of financial development as stipulated on section 2.1
- Studies whose regression analysis represent Economic growth as the dependent variable and Financial development as the key independent variable of interest versus control variable
- To increase comparability of estimated effects, studies whose dependent variable is the growth rate of total GDP, GDP per capita, savings and investment will be included in the analysis.
- Both published and unpublished studies will be used in the analysis
- Empirical Studies will only be included in the Meta analysis, pure theoretical studies will be excluded. In this regard, studies should provide sufficient

statistical information such as the t-statistic, standard error and degree of freedom or sample size. This is to enable the calculation of correlation coefficient for individual estimate.

3.3 Methodological issues

3.4.1 Heterogeneity

This is the presence of variation in true effect sizes in a set of different studies. This problem is manifested due to the fact that the effects in the population which the studies represent are not the same. This can account on differences in country or region, time period, dependent variable measure, functional form used, and econometric methods used etc. (Stanley, 2008) The sources of variability can be distinguished between within study variability and between study variability.

Within study variability is where study results differ as a result of sampling error and systemic differences due to the research process. (homogeneous case) To obtain an average effect size, a fixed effect model is applied. The fixed effect method assumes that there is no heterogeneity among study results and statistically this is equivalent to the hypothesis that all effect sizes are equal, ie $Q_1 = Q_2 = \dots = Q_k = Q$

Where Q is the true common underlying effect and the subscripts refer to a total of K studies.

On the contrary, between study variability is where study results differ by more than the sampling error (heterogeneous case) and can encompass from both sampling error as well as random difference between studies. A random effect model will be used to accommodate both within and between study variability. To test for the presence of heterogeneity the Cochran's Q test will be used. This test has a chi-squared distribution with degrees of freedom fewer than the number of estimates (Cooper and Hedges 1994; Sutton et al 2000) The Chi test is a statistical test analysed by adding the squared deviations of each study's effect estimate from the overall effect estimate thus weighing the contribution of each study by its inverse variance.

The Chi test has shortcomings in that it is widely known to have poor/low power to establish true heterogeneity among studies (Sidik and Jonkman, 2007; Suttons and Higgins, 2007) furthermore, it has been noted that the Q test simply states of the statistical significance of the heterogeneity but does not inform of its extent (Suttons and Higgins, 2007) Stanley, (2008) however notes that the Q test will always detect the presence of heterogeneity in most studies even with its low power, he suggests the deployment of multiple meta regression analysis to explain potential heterogeneity.

Following the weakness of the Q test, Higgins and Thompson (2002) suggest I^2 to reiterate the amount of heterogeneity in Meta-analysis.

$$I^2 = (Q - df/Q) * 100\%, I^2 \in (0\%, 100\%)$$

Where Q is the statistical heterogeneity and df is the degrees of freedom.

I^2 represents the proportion of variation across studies that are attributed to heterogeneity. It is descriptive in expressing the inconsistency of studies result rather than a point estimate. To be able to quantify the magnitude of heterogeneity among study variance τ^2 (tau squared) will be used where the random effects model the method of moment's estimation of n studies is given by:

$$\tau^2 = \frac{Q - (n - 1)}{\frac{\sum W_i - \frac{\sum W_i^2}{\sum W_i}}{n}}$$

3.4.2 Publication Bias

This is another methodological issue that will need to be addressed in the thesis. According to (Florax, 2001) publication bias occurs when studies are reported and or published when they meet a specific threshold which can be either have negative outcome, do not report a reasonable statistical significance, or an acceptable margin of effect size. (Sterne et al 2000; Thornton and Lee 2000) This causes a biased summary effect if only published studies are included in the Meta analysis leading to a biased conclusion about the relationship between financial development and economic growth. The study will initially check for publication bias using funnel plots. This is a simple scatter plot of effect size

estimates from individual studies on horizontal axis against their precision on vertical axis. The evidence of a randomly and symmetrically distribution of estimates around the population parameter on the funnel graph shows that the research does not suffer from publication selection bias.

To explore more formally, the Funnel asymmetry test (FAT) as proposed by Stanley and Jarrell, (1989) will be conducted. This test is based on the t-statistics $t_{ij} = \beta_0 + \beta_1(1/SE_{ij}) + \epsilon_{ij}$

Where t_{ij} is the t-value of the estimated coefficient from estimate I of study j. the intercept β_0 and slope β_1 coefficients are to be tested if they are statistically different from zero. There exists publication bias if β_0 is statistically different from zero. β_0 also informs the direction of bias.

Furthermore a Precision Effect Test (PET) will be used to test the genuine empirical effect, this test is based on the slope coefficient β_1 where the presence of the effect will be detected where β_1 is different from zero.

3.4.3 Data Dependence

According to Stanley and Doucouliagos, (2012) data dependence arises when effect size estimates are computed from similar studies or authors rendering estimates within a single study not to be statistically significant with each other. To handle potential dependency Stanley, (2008) notes the use of cluster robust standard errors. This is done by treating each study as a cluster and thus causing the dependence among the reported estimates within each study to find the standard errors. This cluster robust standard errors has another benefit when using fixed effect panel methods. It corrects the exaggeration of the significance of estimated MRA coefficients in fixed effect panel methods.

Stanley, (2008) further propounds that dependency can be resolved by running MRA on the average study estimates and their standard errors. Although this leads to inefficiency as a result of fewer observations, it enables each study to be weighed equally eliminating the influence of studies with a larger number of estimates. Hunter and Schmidt (2004) further recommends in using weighted averages where sample sizes are used to determine weights.

Furthermore, Multiple MRA will be used to explain research heterogeneity and to test for statistical significant of intercept and slope coefficients will be achieved by utilising Weighted Least Squares WLS – MRA as follows:

$$\text{Effect}_i = \beta_0 + \sum_{BK} Z_{Ki} + \beta_1 SE_i + \sum \delta_j SE_i K_{ji} + \epsilon_i$$

Another important methodological problem is the segregation of independent studies. This relates to the issue of distinguishing studies that use similar data, countries etc. This thesis will treat studies as independent if they are authored by different people even if they use the same data and or time periods. (Stanley, 2001; Hunter and Schmidt, 2004)

Furthermore, as original studies are drawn from different data sources, the heterogeneity might cause some problems. To combat such a challenge, this study will nest studies within clusters characterised by a unique combination of measures such as by a group of countries, journal characteristics, financial variables used etc. simple and weighted means will be calculated at different levels of clustering, thereafter Precision Effect Tests (PETs) will be used to verify whether the evidence represent genuine effect

3.5 Codification criteria

We will codify variables reflecting study characteristics that may influence the reported estimates of the effect of financial development on economic growth. This will follow the methodology proposed by Stanley (2010). The codes will enable the thesis to capture the following information:

- Study characteristics information such as study design, study type, data used (cross sectional, time series, panel) and units of measurement for dependent and independent variable
- Estimation methods used such as OLS, 2SLS, 3SLS, GMM, Fixed effects, Random effects, endogeneity addressed,
- Control variables
- Key variables used ie banks and stock market measurement
- Published vs unpublished studies
- Direction of the link

- Journal quality (If the journal have an impact factor reported in ISI Web of science)
- Number of citation received
- Papers from economic journals versus from other disciplines

3.6 Control variables

As different studies use different sets of control variables, this will create difficulty in comparing results. In this thesis we will include a standard set of control variables typically used in the empirical growth literature by utilising the basic components of Barro's neoclassical growth model. (Barro and Sala-i-Martin 2004) these variables include; measures of international openness, the ratio of government consumption to GDP, population growth, investment ratios, rule of law, Inflation rate and democracy. The model can be stated as follows:

$$G_{it} = \beta_0 + \beta_1 op_{it} + \beta_2 gov_{it} + \beta_3 p_{it} + \beta_4 in_{it} + \beta_5 rl_{it} + \beta_6 ir_{it} + \beta_7 d_{it} + \epsilon_{it}$$

Where G represents a measure of economic growth; op is the international openness; gov is the ratio of government consumption to GDP; p is the population growth; in is the investment ratios; rl is the rule of law; ir is the Inflation rate and d is the democracy.

These are variables that capture systematic (non random) differences between studies. In presenting the results of our Meta regression, we will assess the relative importance of control variables by means of inferential tests of statistical significance. The control variables refer to systematic variations in the original studies, these may emerge from the use of different theoretical reasoning, methodological issues or some other characteristics of empirical studies.

Researches emphasis that the estimated effects depends on estimation characteristics, proxy measures for financial development, data span and countries included in the estimation (Beck and Levine 2004; Ang 2008). To determine whether the results systematically vary across different contexts in which researchers estimate the effect, we employ multivariate meta regression. The differences in the reported results may stem either from heterogeneity across countries or over time.

The control analysis allows for a closer examination of individual studies. Each study is reviewed and the main characteristics of individual studies are coded, which are then compared across all the studies. This allows us to segregate the role of other control variables and theoretical methodological issues on the study to study findings.

Control variables will be divided into two broad categories: variables related to differences in research design and variables related to real economic differences in the underlying effect of finance on growth.

3.7 Estimation procedure

The first step in our analysis will be to include studies that estimate the effect of financial development on economic growth:

$$G_{it} = \alpha + \beta F_{it} + \gamma X_{it} + \delta_t + \eta_i + \epsilon_{it} \dots\dots\dots(i)$$

Where i and t represent country and time subscripts; G represents a measure of economic growth; F represents a measure of financial development; X is a vector of control variables; δ captures a common time specific effect; η_i denotes an observed country specific effect and ϵ is an error term. To allow for comparison between different studies, we will calculate effect sizes on each individual study through the use of R which is the Partial Correlation Coefficient and t the t- statistic.

The Partial Correlation Coefficient as our effect size will be extracted from each study's t-values and degree of freedom through the following formula:

$$r = t / \sqrt{t^2 + df}$$

Where r is the Effect size to be calculated from individual studies, this effect size will be used as the dependent variable in the Meta regression analysis while independent variable will comprise of characteristics of individual studies like the methods of estimation, type of publication, sources used, sample size, etc

The standard error of the Partial Correlation Coefficient is given by:

$$\sqrt{(1 - r^2)/df}$$

The advantages for using the PCC are that it can accommodate a large set of estimate and also is a unit less measure (Stanley, 2008) the drawback on the other

hand is that it is not an economic measure and also it does not follow a normal distribution which causes an asymmetry on its own values. To counter this problem Fisher's Z transformation will be used:

$$Z = \frac{1}{2} \ln \left(\frac{1+r}{1-r} \right)$$

This transformation rectifies the standard errors of r

The t-statistic is similar to PCC in a sense that it can be comparable across estimates and also it can be calculated to estimates that have a significant level.

The drawback for a t-statistic is that it is not an economic measure, it is difficult to interpret and as it is a predictable statistical power it requires to be controlled.

3.7 Information on the Study Team

The study team consists of Anande Semwenda, who will lead the project while Dr Denise Hawkes and Dr Dylan Kneale will oversee the project. Mrs Semwenda has a background in finance and economic development. She has experience with econometric analyses having done other projects on similar context and hence has developed expertise and knowledge on the literature. She will be responsible with the overall project from content and writing of the study, systematic review, information retrieval and meta-analysis.

Dr Denise Hawkes, a programme leader Doctor in education at UCL Institute of Education have held research grants with ESRC and National UK Government Departments, and have published in a range of journals in applied economics and social policy including: the American Economic Review, Journal of Royal Statistical Society Series A and the Journal of Social Policy

Dr Dylan Kneale is a research officer at the Evidence for Policy and Practice Information Co-ordinating Centre (EPPI-Centre) in the Institute of Education. He has previously worked as Head of Policy and Research at the charity Relate, and Head of Research at the ageing think-tank ILC-UK, and Head of Research at the ageing think-tank ILC-UK.

The review team will be led by Anande Semwenda who will ensure that the review is completed in accordance with the procedures laid down in the protocol, working with MAER-Net to respond to comments on the protocol and draft review.

MILESTONE OF THE REVIEW PROCESS

PROJECT ACTIVITY	START DATE	END DATE
Submission of the draft Protocol	09/07/15	20/07/15
Review of Protocol	22/07/15	31/07/15
Final Protocol	03/08/15	10/08/15
Literature Search	12/08/15	30/10/15
Uploading of studies on EPPI Reviewer	03/11/15	15/12/15
Screening of studies	15/01/16	30/03/16
Data Extraction	05/04/16	20/05/16
Meta-Analysis and Finding	23/05/16	08/09/16
Writing and Submission of final Report	20/09/16	20/03/17

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