

FINANCIAL DEVELOPMENT AND POVERTY
ALLEVIATION

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by

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Abstract

In this thesis I empirically examine the role of formal financial sector development in poverty alleviation. Three important contributions to the literature are made. In Chapter 2 I find that financial development aids the incomes of the poor in certain regions, whilst it may be detrimental to the poor's income in others. This contrasts with the evidence that economic growth is universally important for poverty reduction. Chapter 3 investigates the relationship between finance and health. My results show that a 10% increase in financial depth reduces infant and child mortality by approximately 1%. Additionally, I find that those who have bank accounts are less likely to cancel doctors' appointments, cease the use of regular medication, and cut back on staple food consumption. This is through accessing deposits or borrowing to pay for medical treatment. These findings are consistent with the theory that a well developed financial system may permit individuals to maintain their health levels when faced with an unexpected illness. These findings build on the literature by examining non-monetary aspects of poverty. Chapter 4 examines the relationship between financial access and poverty reduction. I find that a 10% increase in financial breadth may reduce absolute poverty by 0.2%. The results suggest that increasing ATM provision (and the most basic services of financial intermediation) is important for poverty reduction relative to offering more complicated financial instruments to the poor. These findings make a significant contribution to our understanding of how the financial system may be used as a tool to alleviate poverty.

To my family and friends

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Declaration

I declare that the work presented in this thesis is entirely my own. The chapter titled “Finance is good for the poor but it depends where you live” has a working paper version uploaded to the Leicester University discussion papers website and has been published in the Journal of Banking and Finance.

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Introduction

In September 2000, eight development targets were created by the United Nations (UN). These became known as the Millennium Development Goals (MDGs) and included; halving the proportion of people living on less than \$1 a day, reducing child mortality rates by two-thirds and achieving universal primary education. The time frame to complete these goals was fifteen years. Currently in 2013, based upon current trends, many of these targets will not be achieved. For example, only a 25% reduction in the under 5 mortality rate will have been accomplished.

There are regional disparities in average per capita income and the plight of Africa is a concern. With thirty-three of the world's less developed countries (LDCs) located on this continent, increasing these nations' incomes, and addressing their additional development problems, are of utmost importance.¹ Success in poverty reduction over the past fifty years has been variable. Notably, China and India have achieved large reductions in poverty, whilst other countries have had less success. The break up of the Soviet Union exasperated prior poverty problems, where many newly formed independent countries, for example Ukraine, witnessed increased levels of poverty, as they tried to adjust from a planned to a more market based economy.

A strong, developed and well functioning financial sector is highly correlated with low levels of poverty and average incomes. World Bank and International Monetary Fund (IMF) reforms have often promoted formal financial sector development in order to increase growth rates and living standards. This thesis examines whether

¹The definition of being categorised as an LDC is having per capita income less than \$975.

or not financial development indeed reduces poverty. The contributions include:

- The effects of financial development on the income of the poor are not homogeneous. In particular, increased financial development may be poverty abating in OECD countries and in South Asia. However, in Latin America and the Caribbean it may impede poverty reduction. This is in comparison to economic growth, where I find further evidence that increases in economic growth are good for the poor. The evidence from this thesis suggests that multilateral agencies should not provide policy advice based upon a “one-size fits all” model, if they wish to use financial sector reforms as an instrument to reduce poverty.
- Chapter 3 investigates the relationship between financial development and health, something that has not received much scholarly attention. I find that increased financial depth reduces infant and child mortality. Furthermore, I find that the use of finance prevents the neglect of health related expenditures in times of economic crisis. Using both a macroeconomic and a microeconomic dataset, this allows me to test the various hypotheses of how the financial system may impact health outcomes. As poor average health levels may result in households’ being unable to escape poverty traps, if finance offers an opportunity to improve health, as being important in itself, it may allow families to escape such traps and will reduce poverty. I contribute to the literature by showing that financial development may assist in poverty reduction by increasing health outcomes and not just by increasing income.
- I investigate whether an increase in physical financial access (measured by the number of financial terminals in a country) is poverty reducing. Using a fixed

effects estimator and a new database from the Financial Access Survey (FAS), I find that an increase in financial access may reduce the \$1 and \$2 a day rates of poverty. However, I find that financial access is ineffective at raising the income of the poor. An instrumental variable estimator suggests that these results are not a consequence of endogeneity. The instrumental variables used in these estimations are subject to further scrutiny where their exogeneity is tested by adopting a recently developed diagnostic test. Additionally, I assume that ATM machine penetration best measures the savings channel of financial intermediation, whereas bank branch penetration offers wider services and may capture the credit channel more effectively. This assumption allows me to further contribute to the literature by re-enforcing the conclusions that the savings channel may be a more important method of reducing poverty, as opposed to the credit channel.

Chapter 1

Literature review

1.1 The finance-growth nexus

1.1.1 The theory

Schumpeter's (1911) suggestion that finance may cause growth led to the emergence of a broad literature over the course of more than a century. Further proponents of the theory that finance may increase growth (supply led hypothesis) include Goldsmith (1969) and McKinnon (1973). They all suggest that finance may increase growth by promoting technological innovation and state that before any growth may be achieved, or technological progress made, the availability of finance is imperative.

A contradictory argument was made by Robinson (1952), who suggested that “where enterprise leads, finance merely follows” advocating a demand-led hypothesis. This conjecture suggests that finance just transfers an economy from low to high growth sectors and even in the absence of finance, economic growth may still be achieved from low value sectors such as agriculture.

With two contrasting yet plausible theoretical arguments, a third hypothesis also appears in the literature. Whilst, a well developed financial system may shepherd technological change and increase economic growth (supply-led hypothesis), this economic expansion may create a demand for financial services resulting in a bi-causal link between finance and growth.

Pagano (1993) using an endogenous growth model shows the potential ways financial development may effect growth. Equation 1.1 shows output (Y_t) as a linear function of the aggregate capital stock, where A is the social marginal productivity of capital and K_t the capital stock.

$$Y_t = AK_t \tag{1.1}$$

Assuming a stationary population, a per period depreciation rate of investment δ , and one good which is produced to be either consumed or invested, gross investment becomes:

$$I_t = K_{t+1} - (1 - \delta)K_t \quad (1.2)$$

Assuming a closed economy with no government, savings equal gross investment and the process of financial intermediation “eats into” a proportion of savings hence:

$$\phi S_t = I_t \quad (1.3)$$

To carry out financial intermediation, resources need to be expended to obtain information researching projects, scrutinising managers and for transaction facilitation $1 - \phi$. The more developed the financial system is, the greater ϕ is, and a lower amounts of savings go to carry out financial intermediation.¹ Growth from equation (1.1) is calculated as:

$$g_{t+1} = \frac{Y_{t+1}}{Y_t} - 1 = \frac{K_{t+1}}{K_t} - 1 \quad (1.4)$$

Dropping the time scripts and substituting equation (1.2) into (1.4) yields:

$$g = A \frac{I}{Y} - \delta \quad (1.5)$$

Denoting gross savings S/Y as s and substituting (1.3) into (1.5) it is shown how financial development can affect growth.

$$g = A\phi s - \delta \quad (1.6)$$

Equation 1.6 shows that finance impacts growth via A , increasing the social marginal productivity of capital, through ϕ , where a greater proportion of savings may be in-

¹In reality it not expected that $\phi = 1$. Operating costs such as administrative fees, and interest rate spreads between savers and borrowers may prevent ϕ from attaining a value of 1, although a more efficient financial sector may move ϕ much closer to 1 as opposed to an inefficient financial system.

vested and through the private savings rate s .

The various functions that financial intermediaries provide are; project evaluation, providing greater opportunities for risk sharing, matching savers and borrowers, allocating credit, providing liquidity and acquiring and distributing information. The better developed the financial sector, the more efficiently these roles will be provided, hence ϕ will be higher. This further stimulates economic growth.

The ability to evaluate profitable investments (those that are the most technologically innovative), is a key role of financial intermediaries. Goldsmith (1969), and recently Greenwood and Jovanovic (1990) reiterate the superior ability financial institutions possess, in acquiring and processing information about investments at the lowest cost. This allows credit to be directed to the most promising entrepreneurs/firms, who will introduce new improved products and production processes.

The fixed cost to acquire information about investments is high. It requires time and skill to collect this information for a wide range of enterprises, managers and economic conditions. In the absence of financial intermediaries, each individual investor would have to pay this fixed cost. Financial institutions allow for this fixed cost to be paid only once. With their informational advantage, financial institutions may select the most promising investments, encouraging higher economic growth.

Once a promising endeavour has been selected, financial intermediaries play a key role in monitoring managers. This is to make sure that firms are run in the best interests of their creditors. This saves resources and time, as in the absence of financial intermediaries, each individual investor would be required to monitor the project and a free rider problem may occur. With superior information, financial institutions are better equipped to detect whether moral hazard is occurring. Moreover, pending intermediaries have diversified investment portfolios and can pay their depositors their interest; the problem of who will monitor the financial intermediary is overcome.

The practice of matching savers and investors, providing liquidity and reducing risk all facilitate prolonged and greater growth.

Financial institutions reduce the transaction costs of channelling savers monies to borrowers. By offering a multilateral contract between itself and the firm, it prevents many individual borrowers from drafting individual-specific contracts of different lengths and returns, for the exchange of savings for securities. Firms benefit as they only need to convince one body about the soundness of the investment, meanwhile savers are happy to relinquish their savings to a bank due to its reputation, or government backing. Moreover, the ability to mobilise and agglomerate savings from multiple investors promotes investments of the efficient scale. Some rich investors may be able to fund business endeavours of the efficient size without financial intermediaries, but the average investor would only be able to provide credit at the inefficient scale. If a single investor could finance a large entrepreneurial project, a financial institution still offers a benefit to the investor in its ability to reduce liquidity risk. Savers do not like to relinquish control of their deposits for long time periods. As a result, long term, high return investment projects, that require lengthy capital commitments, may not be financed. Financial intermediaries can convert assets into a medium of exchange quickly and easily by pooling savings together reducing liquidity risk. Pooling together deposits also prevents an individual's savings being tied into a single project, further reducing risk. A financial intermediary may accomplish this by investing in an appropriate mixture of liquid low return and long term illiquid projects.

The financial system despite all its merits may impede economic growth. There are some sceptics that suggest that the recent economic crisis may have harmed growth rates of late, where studies have also focussed on the issue that there may be a phenomena known as too much finance. Arcand et al. (2012) suggest that when finance reaches a certain threshold its positive effects on economic growth may disappear. Plausible explanations for this suggestion include that when financial systems

reach a certain size (too large relative to the size of the domestic economy), they become the economy's master as opposed to being the economies servant. This harms further economic development. A further suggestion is that a dominant financial system may attract talent from other sectors of the economy. This is because highly skilled individuals are being diverted to the financial sector due to its size and power (and high salaries), at the expense of other industries that require this highly skilled labour. This has led to productivity decreases in these industries and thus lower overall economic growth, Kneer (2013). A further hypothesis of how finance may harm economic growth is suggested by Cilek et al. (2013). When financial institutions create complicated financial instruments and sell them to unsophisticated investors, growth may be impeded. These new financial instruments may only raise the profits of their engineers and those associated with marketing the products, but in reality these instruments distort society's savings, leading to inefficiency in bank lending.

1.1.2 The empirical evidence

The resurging empirical evidence on the finance-growth nexus begins with a paper by King and Levine (1993). Their results show a positive relationship between finance and growth. Using a dataset consisting of eighty countries from 1960-1989 the authors find that the initial levels of financial development predict subsequent growth rates over the thirty year time period.²

Testing the direction of causality between finance and growth has been examined by various authors, (Demetriades & Hussein (1996); Arestis & Demetriades (1997); Rousseau & Watchel (1998)). Although evidence is mixed on its direction, the supply-led hypothesis tends to be favoured. Demetriades and Hussein (1996) find little support for the demand-led hypothesis, although a bi-causal relationship

²The authors measure growth by the real per capita growth rate, physical capital accumulation and the improvements in the efficiency with which economies employ physical capital.

is seen in seven countries from their total sample of sixteen. Arestis & Demetriades (1997) measure financial development by including both bank based and market based variables. They find that nations that favour an intermediary based financial system such as Germany, follow the supply-led hypothesis, whilst nations that favour a market based financial system, such as the United States follow the demand-led hypothesis. Rousseau & Watchel (1998) find that when finance was not so sophisticated, during the process of rapid industrialisation (1870-1929), finance appeared to cause growth adding support to the supply-led hypothesis.

Despite the supply-led hypothesis not being rejected, to overcome endogeneity concerns of simultaneity, various cross country instrumental variable studies and panel estimators have been employed (Beck et al. (2000); Graff (2002); Rioja & Valev (2004)).

Beck et al. (2000) use legal origins as instrumental variables in their study and show that finance has a positive impact on total factor productivity growth, which feeds through to overall GDP growth. Graff (2002) employs a dynamic panel study and shows finance mattered for growth over the 1970-1990 period, but shows that the supply-led hypothesis is far from stable and may have been driven by certain sub-periods in his study. Rioja & Valev (2004) contribute to the literature by finding the effects of finance on growth differ depending on the level of a country's economic development. The findings suggest; for low income countries, the effect of financial development on economic growth is predominantly through the capital accumulation channel, whilst for middle and high income countries, it contributes mainly through increased productivity growth.

Demetriades and James (2011) examine finance and growth in Africa, one of the world's poorest regions. Their contribution to the literature shows that the links between financial development and economic growth may be region specific. In Africa, the authors find that as incomes increase, savings are indeed mobilised, as bank balance sheets grow. However, these savings are not utilised and offered as

loans due to information asymmetries and weak contract enforcement in this region, preventing finance from causing growth.

Extending the King & Levine (1993) dataset, Rousseau & Watchel (2011) show that the finance-growth nexus was driven mainly by the 1970s and early 1980s. When the most recent sample period 1990–2003 is examined, the finance and growth relationship almost disappears. This suggests a weakened relationship between these two variables, further complicating the link between finance and growth.

Whilst the finance growth nexus has been intensely examined, the literature on the finance-trade-growth nexus is far less studied. Bordo and Rousseau (2012) examine this phenomenon where they find that finance is imperative to growth through their whole sample period, but that trade and openness only influence growth later on in the economic development process. This further adds to the literature suggesting that the financial system is of importance to economic growth.

Financial development may be broken down into two parts, bank based and market based development, Levine (2002). Demerigüç-Kunt and Levine (1996) find that bank based financial systems, like those in Japan and Germany have similar growth rates to countries that are serviced primarily by a market based system, for example the United Kingdom and the United States. However, the authors find that the two systems complement one another and nations with better stock markets tend to have better banks.

Levine and Zervos (1998) show that stock markets provide different services to banks, but both components of financial development are positively and significantly related to economic growth. On the other hand, Beck & Levine (2004) find stock market development and banking sector development have independent impacts on economic growth. However, the overall consensus does support the argument that only the overall level of financial development is what matters for growth, not its composition.

The variables used in past studies to measure financial sector development are

depth based indicators. These variables may not perfectly measure the key roles performed by financial intermediaries, for example, reducing information asymmetries and monitoring managers. Despite this, the majority of the existing empirical evidence shows a positive relation between financial development and income per capita. Moreover, if growth is inclusive to all citizens globally, it may equally play a role in poverty reduction.

1.2 Economic growth and poverty reduction

Figure A shows that income per capita is negatively correlated with poverty. On the basis of this relationship, previous World Bank and IMF programs have promoted economic growth to reduce the number of impoverished citizens across the globe.

Theoretically, greater economic growth may reduce poverty by two channels. First, it may be assumed that any gains in average per capita income may be proportionally felt by the poor, and thus, the poorest incomes will rise simultaneously with average incomes.³ Alternatively the “trickle down hypothesis” suggests that a time lag exists before the poor benefit from economic growth. For example, economic growth may initially generate greater profits for existing firm owners and current employees. Their higher incomes may generate greater demand for products which will result in firm expansion. Firm growth may generate demand for additional employees including the unskilled poor, who may then reap the benefits of economic growth.

The link between income inequality, poverty reduction and economic growth was first noted by Kuznets (1955). The Kuznets hypothesis was based upon a migration model where the population would shift from agriculture to industry. Movement from agriculture (low income and low inequality) to industry (greater mean income and inequality) would initially increase incomes and inequality, but further move-

³This may require government intervention by implementing redistribution policies.

ments would then only increase incomes, but reduce inequality. Therefore in the early stages of economic development, inequality increases with rising incomes, and then inequality decreases at the later stages of development. Graphically this may be shown as a curve with an inverted U-shape. Various studies empirically tested the Kuznets hypothesis, for example Ahluwalia (1976) and Milanovic (1995). It was not until Deininger & Squire (1998), who included the distribution of land, in addition to income, who found little evidence in support of the Kuznets hypothesis.

A more specific study on economic growth on poverty was conducted by Ahluwalia et al. (1979) examining growth projections on the incomes of the lower quintiles.⁴ Studying thirty-six developing countries, the authors show that for all subsets of countries (split to those with per capita incomes below \$350, between \$350-750, and above \$750) poverty was likely to fall with growth. In Taiwan, Yugoslavia and Korea the authors further show that the poorest 60% of the population benefited from economic growth as much as the top 40% of the population. This offers further evidence that increased economic growth is conducive for poverty reduction. The authors offered additional policy advice from the study and promoted growth enhancing policies such as trade liberalisation. In particular they recommended liberalising trade in the products that the poor may be able to export.

The growth and poverty literature was reinvigorated by Dollar & Kraay (2002). They examine whether the incomes of the poorest quintile rise proportionately with average incomes. Using a dynamic panel approach and studying ninety-two countries over forty years, they find that “growth is good for the poor.” The covariates used in their study were several institutional and policy variables including financial development. These variables were selected as they have been found to be growth enhancing in previous studies. The author’s results show that these conditioning variables were insignificant in their regressions and therefore did not accrue or offset

⁴Examining the income of the poorest quintile still contains a distributional element, however, the study does not solely examine changes in the gini coefficient or further direct measures of income inequality.

the incomes of the lowest quintile.

Kraay (2006) contributes to the literature by examining the relationship of economic growth on the headcount rate, the poverty gap, the poverty gap squared and the Watts index.^{5,6} His results show that all four measures of poverty are negatively and significantly correlated with annual growth rates. Kraay finds that between 69-97% of the variation in changes of poverty are from the average growth component, assuming poverty reduction may occur due to (i) higher rates of average economic growth, (ii) a high sensitivity of poverty to economic growth and (iii) the poverty reducing distributional component of economic growth.

Studying poverty alleviation in China, Ravallion & Chen (2007) find that from 1980-2001 the proportion of people living in poverty fell from 53% to 8%. Examining the sectoral components of poverty reduction, the authors find that primary sector growth was more successful in reducing poverty than the secondary or tertiary sectors. Moreover, the results from the study show that agricultural growth reduced inequality in both rural and urban areas, as well as reducing the inequality between them. This result emphasises the importance of agricultural growth in poverty reduction. However, the authors also find that if China had experienced balanced growth, poverty would have fallen to its 8% level from 53% in ten years rather than twenty years without any expense on total economic growth.⁷

⁵The poverty gap measures the amount of money in per capita terms, by which each individual falls below the poverty line. The non-poor are calculated as having a zero shortfall. The total shortfall then provides the total sum of money required to make up for the gap between the existing incomes of the poor and the official poverty line.

$$PovertyGap = \sum_{i=1}^N (Z - Y_i)$$

Where Z denotes the poverty line, Y income, and subscript i for each individual below the poverty line.

⁶The Watts index is a measure of poverty sensitive to the distribution. It uses a logarithmic approach to measure the incidence of poverty assuming that transferring \$1 to the poorest person in society is a far larger contribution to transferring \$1 to a richer but yet still impoverished citizen.

$$WattsMeasure = \frac{1}{N} \sum_{i=1}^N (\ln(Z) - \ln(Y_i))$$

Subscripts are the same as those used in the prior footnote.

⁷The authors define balanced growth as all three sectors growing at the same rate. The primary sector share of GDP in 1981 was 32%, the secondary sector share was 50%, and the remainder was

Loayza & Raddatz (2010) find that not only the size of economic growth, but its composition matters for poverty alleviation. Decomposing growth into agriculture, industry and services respectively, the author's results show that sectors such as agriculture, construction and manufacturing which are more labour intensive in relation to their size, and utilise unskilled labour intensively, have the strongest effects on poverty alleviation.⁸

Revisiting their earlier work Dollar et al. (2013) further demonstrate that economic growth is good for the poor. Working on household data as opposed to economic growth data from national accounts the researcher's back up their earlier conclusions and find that the poor on average benefit equiproportionally from average economic growth. When the authors further examine the policies and institutions that may offset or accrue the income of the poor they find that the majority of their conditioning variables are insignificant. This includes the measure of financial development selected by the authors. Although the authors chosen measure of financial development differs from their original paper in 2002, it is just one of several measures of financial sector development that they may have possibly used.

The evidence on the relationship between economic growth and poverty reduction is extremely robust, which suggests that increases in economic growth may be poverty reducing. If financial development contributes to higher economic growth, then it may indirectly reduce poverty rates. However, financial development may also directly reduce poverty rates.

from the tertiary sector, and these percentages would have been required to remain constant over time for balanced growth.

⁸In the study the agricultural, construction and manufacturing sectors all had labour intensity ratios greater than one.

1.3 Poverty alleviation and finance

Whilst the finance-growth link has been exhaustively studied, recent attention has been directed on how the role of formal financial institutions may reduce poverty.

1.3.1 Theoretical foundations

Rajan and Zingales (2003) suggest that a healthy financial system allows for competition to emerge which may undermine the strength of powerful incumbents. Thus, moving away from a limited and uncompetitive financial system that is full of cliques, may allow poor households and small businesses to prosper. Moreover, if imperfect capital markets are responsible for sustaining a persistent class of poor dynasties, financial development may eradicate such imperfections and become income inequality and poverty reducing.

Levine (2008) provides a theoretical hypothesis of how finance may alleviate poverty and lower inequality through intergenerational mobility. If the poor are offered financial access, then by funding educational and business endeavours, they may escape poverty over a generation.

His model incorporates dynasties i and generations t , and shows how the income of a dynasty $Y(i, t)$ may be affected by financial development.

$$Y(i, t) = h(i, t) * w(i, t) + a(i, t) * r(i, t) \quad (1.7)$$

The income of a dynasty is affected by its human capital $h(i, t)$ at the wage rate $w(i, t)$, and by its wealth of assets $a(i, t)$ dependent on the rate of return on these assets $r(i, t)$. Considering a bequest motive, where savings from generation t to $t+1$ is a convex function of wealth ($a' > 0$ and $a'' > 0$), wealth differences will persist in the long run and the long-run distribution of wealth will depend on its initial distribution.

Let us consider human capital:

$$h(i, t) = H[b(i, t), s(i, t)] \quad (1.8)$$

Human capital is a function of ability b (mean reverting over various generations of a dynasty) and schooling s , where both are complimentary inputs in human capital production, thus, $\partial H/\partial b > 0$, $\partial H/\partial s > 0$, and $\partial^2 H/\partial b \partial s > 0$.

Entrepreneurial talent $e(i, t)$ varies between individuals and the generations of a dynasty. The returns to opening a business depend positively on entrepreneurial talent. To become an entrepreneur it requires the payment of a fixed cost.

Let us consider two cases, one assuming financial underdevelopment and the second, assuming perfect capital markets. With financial market frictions, human capital accumulation is no longer socially efficient. This harms economic growth and prevents poverty reduction. This is because schooling becomes a joint function of both ability and parental wealth $a(i, t - 1)$. Therefore;

$$s(i, t) = S[b(i, t), a(i, t - 1)] \quad (1.9)$$

and,

$$h(i, t) = H[b(i, t), S[b(i, t), a(i, t - 1)]] \quad (1.10)$$

Hence, poor smart children receive too little education and less intelligent rich children receive too much. For entrepreneurs, with imperfect capital markets, lenders may require collateral before funding a business endeavour. Thus accumulated assets will play a role in securing funding. The rate of return on assets $r(i, t)$ then becomes;

$$r(i, t) = R[e(i, t), a(i, t - 1)] \quad (1.11)$$

where both $\partial R/\partial e > 0$ and $\partial R/\partial a > 0$. Thus, the initial distribution of wealth determines which dynasties may obtain external finance. Poor individuals with great

ideas do not receive funding, whilst wealthy rich individuals, with average ideas have their projects funded and remain rich. With inefficient innovation, growth is harmed and this prevents the whole income distribution from shifting right.

With perfect financial markets, the $a(i, t - 1)$ term now vanishes from equations 1.9, and 1.10. This means that schooling purely depends on intelligence, $s(i, t) = S[b(i, t)]$ and economic opportunity no longer depends on dynastic wealth. With no dynasties cut off from external finance due to greater financial development, the rate of return on savings is purely determined by entrepreneurial ability. Hence, $r(i, t) = R[e(it)]$ where $R' > 0$ and society's resources are provided to the most talented and not just the most wealthy. This reduces income inequality and the prevalence of poverty. Furthermore, society benefits as higher rates of economic growth are achieved.

Even if financial institutions do not offer the poor credit, they may provide the poor a profitable means to save. Over several generations, accumulated savings may provide enough wealth $a(i, t)$ so that the poor may be able to self-finance business ventures or even human capital investments.

Financial development may prevent transitory poverty by providing the poor an opportunity to consumption smooth during a crisis. The ability to withdraw savings from financial institutions may prevent a family from falling below the poverty line in an economic crisis. Furthermore, if a household is credit worthy, they may be able to borrow and prevent the demise of the household. Financial intermediaries allow safe storage of accumulated savings/assets, which are protected from theft and are highly liquid. In the absence of financial intermediaries, the poor store their wealth in grain, livestock, jewellery or other physical assets, Rosenzweig & Wolpin (1993). These assets do not improve productivity, often have high rates of depreciation, are difficult to store and in the case of livestock, accumulated savings may be lost in the case of death. Moreover, if a common negative economic shock occurs affecting all the poor simultaneously, in the absence of intermediaries the consequences could

be disastrous. With a common shock, poor households may concurrently sell identical assets, leading to an excess supply. With some assets unable to be sold, whilst others sold at a lower price, this may still leave a household vulnerable to extinction.

1.3.2 Empirical evidence

The recent empirical evidence begins with Honohan (2004). He was among the first to empirically examine the finance-poverty nexus. His findings show that financial depth is negatively associated with the \$1 and \$2 a day poverty headcount rate, where a 10 percentage point increase in the ratio of private credit to GDP may reduce the poverty ratios by 2.5-3 percentage points.

Examining the role financial development may have on the poor's welfare, Dhejia & Gatti (2005) find credit access may reduce child labour. The authors suggest that in the absence of credit markets, households use child labour as a substitute to smooth transitory income shocks.

The Indian social banking experiment (1977-1990) was a branch expansion program. The Indian Central Bank created a licensing policy that stated "if a commercial bank opened a branch in a currently branched area, it had to open four branches in locations where bank branches were absent." Burgess & Pande (2005) use this natural experiment to identify the relationship between rural bank branch expansion and rural headcount poverty. The authors find that rural branch expansion led to a decline in rural headcount poverty by 14-17 percentage points, roughly half the fall in poverty across the time period. Furthermore, the authors show that the Central Bank licensing policy aided in the development of a large rural bank branch network. By 2000, the policy extended the number of rural savings accounts to 126 million and rural loan accounts to 25 million.

Jalilian & Kirkpatrick (2005) investigate the role of financial development on growth, inequality and relative poverty (measured by income of the poorest quin-

tile). The authors find that a unit change in financial development increases the income of the poor by 0.3% in developing countries. When examining the finance-inequality relationship, the authors find evidence of a financial Kuznets curve, following the theoretical predictions of Greenwood & Jovanovic (1990). The theoretical underpinnings of the financial Kuznets curve is that in the early stages of economic development, income inequality will increase. This is because the fixed costs to join financial intermediaries are high, therefore it is primarily the rich who benefit from increased financial development. When the economy reaches a later stage of the growth cycle, the cost of joining the financial systems falls. Hence, it is now affordable for more people, in particular the poor to join the financial system, further increasing growth, yet reducing inequality.

A study on finance and inequality by Clarke et al. (2006) examines whether the Greenwood & Jovanovic (1990) hypothesis is supported by their data, or whether any alternate hypotheses between finance and inequality may exist. The alternate two predictions are that finance may be positively related to inequality, following the claims of Rajan & Zingales (2003), or whether financial development may reduce income inequality, proposed by Banjeree & Newman (1993). The former hypothesis suggests that interest groups may curtail financial access to the poor. Therefore, even with growth in financial markets, the poor may still be denied the opportunities to increase their economic well-being, so inequality increases. The inequality decreasing hypothesis by Banjeree & Newman (1993) suggests that with financial underdevelopment, greater hurdles exist to finance indivisible investment, hence, only the rich can borrow perpetuating income inequality. With greater financial sector development, capital market imperfections are overcome, therefore a negative relationship should be observed between finance and inequality, benefiting the poor. Only when GDP is omitted from their empirical specification do Clarke et al. (2006) find evidence of an inverted U-shaped relationship, supporting the Greenwood & Jovanovic (1990) theory. When GDP is included in the regressions, finance enters with

a negative and significant coefficient, supporting the Banjeree and Newman (1993) theory.

Examining finance and income inequality in India from 1951–2004, Ang (2010) measures financial development by a variety of variables. These include; traditional depth measures, banking density proxied by the number of bank offices to the population, and an indirect indicator of financial development, the modern sectors value added in total GDP.⁹ Examining financial development and financial liberalisation, Ang finds that financial development is effective at reducing income inequality in India, whilst financial liberalisation is detrimental to India’s income distribution. Additionally, the author shows that stock market development has no statistically significant impact on income inequality. Ang’s findings suggest that the financial repression policies implemented by India were pro-poor and their removal through liberalisation led to a less favourable income distribution. This provides interesting evidence to multilateral agencies, who often advocate financial liberalisation policies as part of reform packages to developing countries.

Beck et al. (2007) examine the effects of finance on; the growth of income inequality (measured by the gini coefficient), growth in the lowest income share (a measure of relative poverty), and growth of the headcount ratio (a measure of absolute poverty). Their main finding suggests that approximately 60% of the impact of financial development helps the poorest quintile through aggregate growth and 40% through reductions in income inequality. Furthermore, the authors show that private credit is negatively associated with the growth of the gini coefficient and find no evidence to support the Greenwood and Jovanovic hypothesis. The results show that if Brazil had a private credit ratio to GDP of 63% as opposed to 33%, then over the period of 1961-2000 the income share of the lowest quintile would have been 3% as opposed to 2.4%. Moreover, if Peru had a private credit ratio of 47% like Chile’s as opposed to its own ratio of 17%, the percentage of people living on less than a

⁹The modern sector is the share of industrial and service sector’s value added to GDP.

\$1 a day would have been only 5% as opposed to 12%, further suggesting financial development is poverty reducing.

Akhter & Daly (2009) suggest that financial instability is an unintended negative consequence that arises with greater financial development. The authors show that financial development is conducive for poverty reduction; however, financial instability which accompanies financial development is harmful to the poor. Using two measures of financial development, private credit to GDP to measure the credit channel, and M2/GDP to measure the savings channel, the authors find both are beneficial for poverty reduction.¹⁰

The causal link between finance and poverty reduction is tested by Perez-Moreno (2011). Theory dictates that as poverty levels fall, demand for financial services may be stimulated. Additionally as income inequality falls, the pressure on policy makers to create a larger and more efficient financial system may increase financial development. Perez-Moreno finds that finance causes poverty reduction. He fails to find any evidence that poverty reduction may increase financial development, depicting a uni-causal link between finance and poverty. In contrast to Akhter & Daly (2009), Perez-Moreno's results suggest that the credit channel is insignificant at reducing poverty, unlike the savings channel. He also finds that the main time period where finance reduced poverty was between 1970–1990.¹¹

Guillaumont Jeanneney & Kpodar (2011) further examine the role of finance on poverty, whilst considering the negative effects of financial instability on the poor that accompany financial development. The authors show that financial development is good for the poor unlike financial instability, and the benefits of financial development for the poor outweigh the costs. The harmful consequences of financial instability include; payment system disruptions, unwarranted bank closures and

¹⁰The authors state that the commonly used variable private credit is more useful to examine the credit channel of financial deepening, whereas liquid liabilities (M2/GDP) may be a better proxy for examining the savings channel – or specifically, the McKinnon conduit effect.

¹¹Perez-Moreno measures the credit channel of financial development by private credit to GDP, and to measure the savings channel or the McKinnon conduit effect, he uses liquid assets of the financial system, mainly M2 and M3 ratios to GDP.

fluctuations in the investment rate. All these factors may be growth-retarding and are harmful to the poor. Moreover, the authors find that greater geographic banking coverage reinforces its favourable impact of finance on poverty reduction. The authors further find that even if credit availability is limited, the poor still benefit from financial institutions as they provide the poor with a profitable means to save.

1.4 The determinants of finance

Legal origin, natural endowment, interest group theory and press freedom have been suggested to explain cross country variation in financial development. The available empirical evidence has shown that financial depth is highly correlated with these variables and they have been continually used as instruments in empirical work.

1.4.1 Law and finance

The law and finance theory suggests that different legal traditions offer different rights to private investors, La Porta et al. (1997). Two broad legal traditions exist, common law, that stems from a British origin, and civil law, which derives from Roman law. Overall five legal origins have been identified, British, French, Germanic, Scandinavian and Socialist. With the exception of British common law, the other legal origins are types of civil law. The latter, Soviet law encompasses early Germanic influences but with a Byzantine tradition and was later modified in the 19th century with more socialist norms.

The legal system may influence financial development through two channels. The first is through the protection of private property and the rights of investors. This is the political channel. The second is through the adaptability of the legal code to changing economic circumstances. Nations that inherited the British common law,

tend to have a legal system that protects private property owners against the crown, facilitating financial development in contrast to countries inheriting civil law traditions. As civil law placed the government above the courts, nations that inherited this legal system tend to be more financially underdeveloped, in particular those who inherited French civil law.¹² In civil law tradition, judges were relegated to minor bureaucratic roles, thus the judiciary was diminished, resulting in a powerful state having the potential to divert societies resources to favourable ends. Private property rights are key for successful contractual agreements, which form the basis of financial transactions. Therefore strong property rights such as seizing collateral or firm ownership, protect investors from expropriation by entrepreneurs. This provides financiers an incentive to exchange their funds for securities. In many developing and rural communities, abundant agricultural land may be the only form of collateral. If ownership of this land is clear and the state may not seize control of this land, financial institutions may be more willing to locate in such regions and extend credit further increasing financial development.

The adaptability of the legal system is proposed to affect cross country variation in financial development. French civil law is far less adaptable than the Germanic civil code or even British common law. When French civil law was conceived by Napoleon, it was considered complete. Thus, future amendments were seen as unnecessary, preventing the law being dynamic. In contrast British common law and German civil law is open to interpretation. Judges can mould and create law as circumstances change to the needs of its citizens. As dynamic legal codes provide judges with discretion, inefficient laws may be challenged in court and replaced with efficient ones. This repeated litigation allows for legislature to keep up with changing financial circumstances, which promotes financial development.

Subsequent work by La Porta et al. (1998) show that further legal aspects matter for financial development. Strong legal enforcement may substitute for weak rules as

¹²The remaining civil law legal codes tend to fall between the two aforementioned systems.

abused investors may be compensated by active and well functioning courts. Additionally, high accounting standards that disclose information about a firm promote investment and financial development. If a compensatory case is presented in court, for the claim to be successful, high accounting standards are required to verify the assets or the income of a firm.

The empirical evidence shows that nations who have the most developed financial markets are those that inherited a British legal system. The most financially underdeveloped nations are those who inherited the French legal code. In between the two extremes lie the Germanic and Scandinavian systems, La Porta et al. (1997). The authors also find that the adaptability of the legal system is more important for the development of the financial sector, than the role played by the political channel. This finding is later supported by Beck et al. (2003). However, Beck et al. (2003) find when including the endowment theory into the specification jointly with legal origins, the endowment theory outperforms legal origin in explaining cross country differences in financial development.

Using firm level data for over four-thousand companies in thirty-eight different countries, Beck et al. (2005) show that French legal origin countries face higher financing constraints than British common law nations. The results from this study offer little support for the political channel of legal origin, suggesting that nations with greater adaptability of the legal system have more developed financial sectors. In nations where judicial decisions are based on principles of equity and not statutory law, firms encounter fewer financing obstacles. With an adaptable legal system, the obstacle of securing long term funding may be reduced by 15 percentage points.

Djankov et al. (2007) examine the role legal origin plays on private credit, through creditor rights and private and public credit registries. The authors show that countries with stronger legal protection of creditors have deeper credit markets and legal origin has no further effect on private credit, apart from its influence on creditor rights. Using a difference-in-difference strategy to examine creditor right

reforms, the results suggest a one percentage point increase in creditor rights may raise private credit between 6.5-8 percentage points. However, the introduction of both private credit bureaus and public credit registries may increase private credit by 7-8 percentage points. Compared to British common law countries, French legal origin states tend to have weaker creditor rights thus are more likely to be financially underdeveloped. However, they are more likely to have public credit registries or private credit bureaus, which the authors find to be beneficial in increasing credit volumes. This appears to be a rare example of successful state intervention to increasing financial development.

1.4.2 Endowment and finance

The theory of natural endowment stems from work by Acemoglu et al. (2001) who examine the formation of institutions. Based upon historical colonisations, the disease environment played a large role in the ability for colonisers to settle. In areas that were inhospitable for European settlement, for example the tropics, where diseases such as malaria and yellow fever were prevalent, early settler mortality rates were high.¹³ In areas where the disease environment was low, for example New Zealand, Australia and North America, settler mortality was low, encouraging settlement. In settlement states, institutions were shaped following a colonisation strategy that promoted private property, checked the power of the state and offered institutions that reflected the colonisers home state; Neo-Europe's. In states where settlement was difficult, colonies formed extractive states where the aim was to withdraw as many commodities as possible. In these states, institutions were formed to make sure the elite remained in power and allow the possibility for continued ex-

¹³In areas where malaria was endemic, the local population had genetic immunity to the disease. Likewise with yellow fever, if locals had suffered a light case of yellow fever early in life and survived, they developed lifelong immunity to the disease.

traction.¹⁴ Post independence, the characteristics of these institutions remained and were passed on through various generations. In extractive colonies, the remaining elite continued to seek power as they had no incentives to change the institutions and carried on extracting the former colony for personal gain. On the contrary, in states that favoured settlement, the values and traditions that were established by colonisers remained, resulting in sustained competitive institutions. Therefore in extractive states where institutional quality was low, to maintain power and prevent a threat from other segments of the population, the coverage of finance may have been limited. This would have left these nations financially underdeveloped relative to former settler colonies where institutional quality was high.

Beck et al. (2003) empirically test the endowment theory and find that high settler mortality rates are negatively associated with financial development. They also use a different measure for endowment, absolute latitude. The results show that countries closer to the equator are less financially developed than those nations that live in temperate climates further supporting the theory by Acemoglu et al. (2001). The authors provide empirical evidence for the law and finance theory, however, when the two theories enter their empirical specification simultaneously, the results show that initial endowment explains more cross country variation in financial development.

1.4.3 Political economy and finance

Rajan & Zingales (2003) propose a political economy argument to explain the disparities in financial development across the globe. In 1913, nations happened to be more financially developed than they were in 1980. Only until the late 1990's did financial development catch up and even surpass its early levels. The authors

¹⁴The Congo was a leading example of such extractionary policy, where King Leopold of Belgium claimed that colonies should be taken advantage of, where the exploitation of natural and human resources were for the sole benefit of the colonising state.

suggest that financial sectors remain underdeveloped due to the interests of powerful incumbents in the industrial and financial sectors. The theory states that only when both trade and capital accounts open up internationally in tandem, will incumbents wish to develop the local financial sector.

Opening the economy up to trade will create competition for established incumbents from abroad, lowering their profits and internal cash flows, generating a requirement for external finance. As opposed to lobbying for greater financial development, industrial incumbents may strive for greater financial repression and use their leverage to direct more financial flows in their own direction. They may even lobby the government for greater loan subsidies to compete internationally, reducing the requirement of financial development.

Opening up a nations capital accounts allows industrial incumbents to seek international finance. However, with a lack of industrial competition, the industrialists will have low demand to access these external funds. Moreover, due to informational asymmetries, it is unlikely that small domestic firms will be financed by foreigners. The only way potential entrants may threaten the existing industrial incumbents is through greater domestic financial development. This creates an incentive for the elite to hinder local financial sector growth, even if it comes at an expense.

Therefore it requires a combination of product market and financial market openness to prevent incumbents opposing financial development. This is because product market openness means industrial incumbents cannot politically restrict any outside competition and lobbying for financial repression is not possible if capital may flow freely across borders. With open capital markets, existing financiers lose their monopoly of supplying funds to their clients. Their profits would then be determined by identifying good investments, managing risk and monitoring managers, therefore losing their prior advantages. Hence, to recoup their profits they may extend their services to young and new firms, and with greater product market competition, it may no longer be profitable to keep existing relationships with inef-

ficient incumbent firms. Additionally, the most competitive industrial incumbents, who may borrow internationally will not worry about domestic entry and have no opposition to greater financial development.

Empirically testing their hypothesis, Rajan & Zingales (2003) find that financial development is positively correlated with trade openness in periods where cross-border capital flows are high and negatively correlated with trade openness when cross border capital flows are low. This offers some support that a political economy argument may explain the cross country variation in financial development.

1.4.4 Culture and finance

Religious composition and ethnolinguistic fractionalisation both theoretically may affect financial development.¹⁵ When a majority group comes into power, it may implement policies that may expropriate or repress rival groups, to protect its future power. Moreover, discrimination against rival groups may further curtail overall financial development by refusing financial services to specific groups. Therefore it may be assumed that states that are ethnically diverse or have many small concentrations of varying religions are more financially underdeveloped than states that are not.

Religious composition is said to influence a nations views on property rights, competition and the role of the state, La Porta et al. (1999). Catholic and Islamic cultures tend to create powerful bonds between state and church limiting competition and private property rights protection, detrimental to financial development. Additionally, Islamic law forbids usury, therefore loan markets may not emerge in nations predominantly Muslim further contracting financial development. On the other hand, the Catholic church often encourages the formation of credit unions that offer attractive savings schemes and cheap loans by limiting the interest payable.

¹⁵Ethnolinguistic fractionalisation measures the probability that two randomly chosen individuals from a country will be from differing ethnic backgrounds.

These schemes offer advantages for cheap financial service supply as the fixed costs of provision have already been paid. For example, even in the most remote villages, a Church hall may be used as an intermediary, increasing financial depth and overall financial development.

1.4.5 Press freedom and finance

The financial system is subject to the Akerlof (1970) market for lemons problem. As financial markets are informationally sensitive, Djankov et al. (2003) proposes that greater media freedom mitigates these informational asymmetries, which may facilitate financial sector growth. Moreover, the right to publish information that may expose corruption, scandals and ponzi-schemes provides an incentive for firms and financial institutions to behave accordingly. Therefore financial development may prosper based upon a trustful environment. With greater information, depositors are more likely to deposit money knowing that it is secure, and intermediaries may be willing to exchange funds for securities. This is because with greater press freedom a firms malpractice may be easily exposed via the media, which may aid with monitoring and reduce moral hazard. Moreover, with greater press freedom, information about promising young firms may increase. As these young firms may be the most promising to lend to, financial institutions may want to extend their coverage and locate closer to these firms increasing financial development.

1.5 Summary

This chapter summarises the key literature regarding the topic of financial development. Theoretical arguments and the existing empirical evidence suggest that greater financial development is growth enhancing. This may indirectly reduce

poverty rates as further evidence provided in Chapter 1 has shown that growth is good for the poor. Recent literature argues that financial development has a direct impact on poverty. The summary of the literature has shown that financial development may accrue any income gains of the poor and thus lower poverty directly, and also reduce income inequalities. Certain questions are still worth exploring from the basis of these findings. Mainly, which channel of financial development is relatively more important for poverty reduction, the savings channel or the credit channel? With limited studies exploring the accessibility and the usage of the financial system due to data limitations, this is a further gap in the literature. Most studies that suggest finance is poverty abating, is based upon evidence using financial depth indicators. These measures may not adequately capture the inclusiveness of the financial system as deep financial systems may have a narrow outreach. This may offer limited information about the poor's financial usage. To rectify this issue would vastly enrich the literature. The remainder of this thesis attempts to address these concerns, with Chapters 2, 3 and 4 providing the main body of this thesis.

Chapter 2

Finance is good for the poor but it depends where you live

2.1 Introduction

Since the turn of the millennium, and up until the financial crisis, growth of the world economy has been relatively strong. Growth with equity is a challenge that most governments have tried to establish, with sceptics suggesting both cannot be accomplished simultaneously. Dollar & Kraay (2002) in an influential paper asked; “does the per capita income growth of the poor rise proportionally, less than proportionally, or more than proportionally to average per capita income growth?” Their findings suggest that this is the case, hence, emphasise the importance of economic growth for poverty reduction.

If growth is good for the poor, then growth enhancing policies should be encouraged. Literature suggests that certain policies and institutions exist that may further stimulate economic growth. In their paper, Dollar & Kraay suggest that trade openness, government consumption, the inflation rate, the rule of law and financial development may influence economic growth. Furthermore, a claim laid down is that these policies may even accrue or offset the income growth of the poor.

This is not to suggest that further factors may influence the economic growth process. Education is one tool that has been attributed to growth amongst others.

A rough battery of empirical evidence supports Dollar & Kraay’s suggestions, in which openness to trade has been found to increase long run GDP per capita growth. Using the Sachs Warner index as a measure of openness, Greenaway et al. (1998) find that when this indicator variable takes the value of one, highlighting an open economy, growth may be increased by 46%. Easterly & Rebelo (1993) report that government consumption is harmful to growth; however, Dorwick (1996) shows that government consumption may be growth enhancing if it is maintained between a region of 10-18%. There is substantial evidence that inflation is harmful to growth. Barro (1996a) finds that an increase in inflation of ten percentage points retards growth by 0.2-0.3%, hence, over a thirty year period, growth may be reduced by 7%. Examining past work on the role of strong property rights and/or rule of law

Knack & Keefer (1995) mention their importance for growth. Barro (1996b) empirically tests this hypothesis finding a strong legal system is required for favourable growth rates.

The literature on financial development and economic growth is extremely rich where early theoretical suggestions such as those by Schumpeter (1911) highlight the importance of finance for economic growth. Critics have challenged this view, suggesting finance merely follows growth, Robinson (1952). King & Levine (1993) in their interestingly titled paper “Schumpeter might be right” test these theories empirically and find that finance may cause economic growth. Moreover, the paper’s results have since been complemented by further studies, including time series approaches and those using panel data (Arestis & Demetriades (1997); Luintel & Kahn (1999); Levine et al. (2000); Levine (2003)).

Recently, Rousseau & Watchel (2011) examine whether or not the finance-growth nexus has become extinct. The authors take the King & Levine (1993) data and thoroughly examine the robustness of this relationship finding that the results fail to carry over when more data is added to the research question. On closer inspection they find, when splitting the sample into 5 year periods, that the 1970s and early 1980s were the main drivers of the finance-growth relationship. Hence, from 1990 onwards the data was susceptible to the Lucas critique.

If financial development is no longer growth enhancing as the results from Rousseau & Watchel seem to suggest, a question emerges; does financial development still benefit the poor?

If finance is available to the poor, then it may provide the poor with a means to save. In less developed countries (LDCs) cases exist where money is stored under a mattress, which may be problematic and hamper a household’s ability to move up the social ladder. First, this money is vulnerable to theft, and keeping track of where all the money is hidden within a household is challenging. Second, during periods of macroeconomic instability, which may include periods of hyperinflation,

savings accounts which are indexed to inflation may prevent this money from eroding away in value, a benefit for the poor. With a lack of savings accounts the poor may waste accumulated assets on the purchase of unnecessary physical capital, for example oxen for farming. These physical assets do not improve productivity or offer any major returns to the poor; they are just purchased for their ease of monitoring/storage and are highly illiquid when acquired. Moreover the presence of savings accounts may prevent transitory poverty by providing opportunities to utilise savings and consumption smooth during difficult times.

Furthermore, savings accounts in financial institutions may help the poor as accumulated savings over a generation may allow a family's offspring to pay for, and attain higher levels of formal education if parents are altruistic. This allows inter-generational mobility through the classes to be established more easily.

If we assume a fixed cost to be an entrepreneur, with perfect financial markets, a poor entrepreneur could go to a bank, highlight his business plan, and the ability of financial institutions to monitor and recognise good investments may allow poor entrepreneurs (those with the greatest entrepreneurial ability and the most talent) to have society's funds directed to them, as opposed to those with average ideas and existing wealth/established connections/collateral to take out a loan. This provides the necessary opportunities for the poor to move up the social ladder.

Research on finance and poverty alleviation is more recent and in its infancy compared to studies on finance and aggregate growth. Claessens & Perotti (2007) provide a summary of the existing literature, where Beck et al. (2007) discover fascinating empirical results.

Beck et al. (2007) complement the study of Dollar & Kraay (2002) with a stricter focus on the impact of financial development on poverty, specifically examining the Gini coefficient, the income share of the poor, and the percentage of people living on less than \$1 a day.¹ Their conclusions indicate that financial development

¹Recent updates state the new poverty line is \$1.25 a day as suggested by Ravallion, Chen & Sangraula (2008) "Dollar a day revisited."

is poverty reducing. Furthermore, they find that 40% of income growth from the poorest quintile is a result of reductions in inequality, but 60% due to the impact of financial development on aggregate growth. Hence, not only is financial development in their study positively associated with income growth of the poor, but their results suggest, that financial sector reforms, which reduce market frictions may also lower inequality, without the incentive problems which redistribution schemes that include generous social security payments create.

Hence, I do not just focus on finance and its effects on poverty, but I consider whether or not aggregate growth has an impact on the poor in tandem. The motivation of this study is to examine first whether, unlike the results found by Rousseau & Watchel on the finance-growth nexus, do Dollar & Kraay's (2002) findings remain with the inclusion of more data.

Second, I complement the Beck et al. (2007) study by using additional measures of financial development such as those used by King & Levine (1993) which were found to break down by Rousseau & Watchel (2011) when modern data was included. Moreover, I choose to include a market based measure of financial development in the hope to prove that for poverty reduction it is just the overall level of financial development that matters, regardless of whether the development comes from the bank side or the market side. In addition, I choose to strictly follow the Dollar & Kraay methodology in the hope that the relationship between finance and poverty proposed by Beck et al. (2007) withstands further scrutiny.

This study, when including further data covers over one hundred countries and spans over fifty years. I expect to find that growth is good for the poor, and that my results are at least as significant as those provided by Dollar & Kraay (2002). Furthermore, I aim to add to the Beck et al. (2007) study and show that financial development is imperative to the income growth of the poor, irrelevant of the financial development indicator used.²

²Financial development is defined in the next section, as are the ways it is measured.

2.2 Data and methodology

The original data is from Dollar & Kraay (2002), available to download from the World Bank.³ The extended dataset comes from World Bank databases and Table 2.1. presents the descriptive statistics of the new data.

When the descriptive statistics are broken down into regions, both South Asia

Table 2.1: Descriptive statistics of the main variables

Variable	Obs.	Mean	Standard Deviation	Minimum	Maximum
Income of the poor	568	6.830	1.283	3.369	10.07
GDP	568	8.033	1.164	4.740	10.76
Trade Openness	495	0.474	0.413	0.017	3.075
Government Share	522	0.143	0.054	0.011	0.400
Inflation	544	0.165	0.324	-0.073	2.636
Rule of Law	508	0.242	0.937	-1.844	2.000
Commercial Bank	495	0.795	0.188	0.126	1.000
Private Credit	495	0.363	0.299	0.014	1.803
Liquid Liabilities	458	0.782	5.759	0.015	121.7
Stock Market	233	0.345	0.447	0.000	2.659

Notes: Income of the poor and GDP reported as natural logarithms.

and sub-Saharan Africa exhibit an average income and income of the poor much lower than the sample that contains all the nations in the dataset. As expected the control group show average incomes and incomes of the poor much greater than the worldwide average. When examining the financial variables there is far greater variability between the regions and the various indicators of financial development. This shows the vast differences in the financial systems across the globe and may suggest that its impact on poverty may be varied throughout the world. Table 2.2 shows the descriptive statistics of the income and financial variables for the different regions.⁴

The dependent variable is the GDP per capita income share of the lowest quintile.⁵ This measure is used as it is consistent with the study of Dollar & Kraay, which I am trying to extend and check who's initial results hold, but also because

³www.worldbank.org/research/growth

⁴Only the means of the aforementioned variables are presented for brevity.

⁵For the new waves of data I use and agglomerate the UN-WIDER Inequality Database <http://www.wider.unu.edu/research/Database> to calculate the new income shares.

Table 2.2: The variability between the regions income and financial indicators

Region	Income of the poor	GDP	Commercial Bank	Private Credit	Liquid Liabilities	Stock Market
Control	8.451	9.474	0.930	0.607	0.678	0.708
EAP	6.941	8.025	0.874	0.523	0.979	0.535
ECA	7.019	7.937	0.777	0.211	0.300	0.103
LAC	6.575	8.118	0.750	0.271	1.389	0.201
MENA	6.774	7.953	0.757	0.401	0.629	0.269
SA	5.951	6.864	0.713	0.187	0.346	0.113
SSA	5.152	6.586	0.658	0.151	0.249	0.230

Notes: Income of the poor and GDP reported as natural logarithms.

it is a variable that is abundant.⁶

Financial development in this instance is measured as the depth of the financial system. Ideally, further measures that show the outreach of the financial system (breadth) would be useful, for example data showing the amount of access the finance system provides, but sadly due to data scarcity this cannot be accomplished. Private credit as a ratio of GDP is one of the most frequently used measures of financial development and measures the channelling of savers' funds to private projects, one main function of financial intermediaries. This variable was used by Beck et al. (2007) in their own particular extension of Dollar & Kraay.

Further measures of financial development are also well used in the literature. King & Levine (1993) use liquid liabilities as a ratio of GDP.⁷ This variable was found to be significant in the study of King & Levine (1993) on aggregate growth but became insignificant in the Rousseau & Watchel (2011) paper when they extended the former authors' data. Hence, I choose to include this measure of financial development due to the interesting experiences this variable has shown in the literature.

I incorporate a market measure of financial development. The chosen variable is Stock Market Capitalisation. Empirical results suggest that stock markets may

⁶As there is limited data on further measures of the poor such as the headcount ratio it may not be worthwhile examining these variables as observations would be extremely low.

⁷Liquid liabilities is measured as M3 as a ratio of GDP and is also known as broad money. It measures the overall size of the banking system. Hence it shows the extent of the formal financial intermediary sector relative to economic activity.

increase growth, Levine & Zervos (1998), with further conclusions from the authors highlighting that banks provide different services than those provided by stock markets stressing their importance. Moreover, research suggests that countries with better developed stock markets also have better developed banks. In entrepreneurial projects where disagreement exists about investing in a venture, a well financed minority of investors may still be able to finance the project through the purchase of shares, where a bank may be reluctant to invest without a clear majority in agreement of funding the enterprise. This may be important for poor entrepreneurs, who may only be able to convince a minority of investors of their project. Other research states that the overall development of the financial sector is important regardless if the development is from banks or markets, furthermore highlighting the inclusion of this variable.

Ideally, a measure for the stock market such as the turnover ratio, or even value traded, would have been appropriate to use in the study as this shows the liquidity of the stock market. One important factor of trading in the stock market is that for a saver, a saver's stocks may be transferred into cash quickly; however, as data is limited, the measure stock market capitalisation as a ratio of GDP is used.⁸

The control variables selected in the study follow Dollar & Kraay (2002) and are selected here to make sure that, when their results are checked for the Lucas critique, everything remains consistent. Beck et al. (2007) favoured a different approach, replacing the rule of law variable with the average years of school attainment to control for human capital. As opposed to controlling for GDP per capita growth at the mean level, as Dollar & Kraay (2002) and I do, they control for income by using growth of the lowest income share.⁹

I measure the income of the poor as the income share of the lowest quintile.

⁸For the Dollar & Kraay sample using Stock Market Capitalisation led to a sample of only 53 observations, with Value Traded this figure was far smaller.

⁹When the correlations were examined prior to running the regressions, it was found that including both rule of law and schooling would cause multicollinearity problems, and as I was following Dollar & Kraay (2002) more specifically than Beck et al. (2007), I chose the former.

When updating the sample, if data from the same named source exists and is updated for country (i), I use that source irrelevant of quality ratings. If the data from the same named source does not exist for future waves, I select the observation based on two certain criteria: I try and choose the observations with the highest quality ratings while simultaneously trying to select the data sources that are most frequently used in the already existing dataset from Dollar & Kraay (2002).

The new data for the remaining variables is selected following the Dollar & Kraay (2002) procedure, where I select the last observation for a particular cross section (i) used by Dollar & Kraay, and then move forward a minimum of 5 years, selecting data for the next decade until time expires for that particular cross section. In some cases a particular cross section permitted the inclusion of more than one additional time period (t), as revisions in data meant that some data in the penultimate decade were now available. Hence, at times, two or three waves were added to certain cross sections, but this was a rarity.¹⁰

Table 2.2 shows how the number of observations and cross sections increase when I add further data while examining the financial variables. The far larger number of observations and cross sections in my study provides greater worldwide representation in my estimations and increased flexibility for the number of instruments used when using a System Generalised Method of Moments (GMM) estimator. Furthermore, the Dollar & Kraay data spans across four decades with observations from 1956 to 1999. The additional wave(s) include observations until 2008, thus further modernising this study.

An important observation is that when Beck et al. (2007) run their system estimator using private credit, they have two hundred and forty-five observations whilst I have close to three-hundred when a full set of controls are imposed. Therefore I have a richer dataset. The data also spans into a time when the world economy suffered a shock with the global financial crisis. Despite not being my primary research

¹⁰The reasoning for using this methodology is to prevent the sample to be over-dominated by those countries whose income distribution data is more frequent and abundant.

question, it may be interesting to see whether or not the crisis did have any effects on the income growth of the poor in comparison to Beck et al. (2007).

Initially, I carry out cross country regressions where I regress the per capita

Table 2.3: Comparisons between the two samples

	Dollar & Kraay (2002)		Updated Sample	
	Obs.	Cross Sections	Obs.	Cross Sections
Basic Specification	269	85	414	115
Commercial Bank	232	76	367	108
Private Credit	221	74	362	109
Liquid Liabilities	204	65	332	103
Stock Market	53	30	143	69

income of the poor on the natural logarithm of average per capita income. Unlike other methods, which use one observation per cross section, I use all available data in order to preserve degrees of freedom, hence run pooled cross country regressions.¹¹

Equation 2.1 is initially estimated using ordinary least squares and then using instrumental variables. Instrumenting for mean income is carried out by using growth in mean income prior to time (t).

$$Y_{i,t}^P = \alpha + \beta Y_{i,t} + \mu_i + \epsilon_{i,t} \quad (2.1)$$

$$Y_{i,t}^P - Y_{i,t-k}^P = \beta(Y_{i,t} - Y_{i,t-k}) + (\epsilon_{i,t} - \epsilon_{i,t-k}) \quad (2.2)$$

It would be quite common to find unobserved country specific effects (μ_i) to exist such as those in equation 2.1, hence, I regress equation 2.1 in differences, equation 2.2. I expect individual country effects to have some influence on the results, where certain countries located in advantaged regions and abundant with resources may have a positive effect on the income growth of the poor, but to what extent I cannot be sure. Nevertheless differencing sweeps away these individual effects.¹² I then es-

¹¹See Beck et al. (2007) for detailed information on this technique.

¹²Note that here the α and the μ_i term get differenced away.

estimate equation 2.2 using ordinary least squares and then an instrumental variable approach. When applying the instrumental variable estimator to equation 2.2, a further instrument is used, the level of mean income at the beginning of the period.

Despite removing the unobserved country specific effects by estimating the equation in differences 2.2, it would be more ideal to exploit both the cross sectional and time series variation in the data. As a result I use a panel estimator and the favoured estimator is System GMM proposed by Blundell & Bond (1998). Assuming that the coefficients of 2.1 and 2.2 are the same, we may regress our relation as a system. The proposed estimator not only manages to fully control for country-specific effects, but also may deal with endogeneity concerns.

$$Y_{i,t}^p = \alpha + \beta Y_{i,t} + \gamma' X_{i,t} + \mu_i + \epsilon_{i,t} \quad (2.3)$$

$$Y_{i,t}^p - Y_{i,t-k}^p = \beta(Y_{i,t} - Y_{i,t-k}) + \gamma'(X_{i,t} - X_{i,t-k}) + (\epsilon_{i,t} - \epsilon_{i,t-k}) \quad (2.4)$$

Equations 2.3 and 2.4 introduce additional variables into the specification in the (X) matrix. Some of the control variables may be endogenous. Dollar & Kraay claim endogeneity concerns may exist for financial development and inflation, but not openness to trade.^{13,14} As I strictly follow Dollar & Kraay (2002), the covariates I instrument for are income only, as my results, as those found in Dollar & Kraay (2002), show the tests of overidentifying restrictions pass even when instrumenting for income only. This provides indirect evidence that the X variables are uncorrelated with the error terms. Second, if I was to instrument for all possible endogenous variables using appropriate lags, then GMM may become inconsistent.¹⁵

¹³Beck, Demeriguc-Kunt & Levine (2007) treat financial development as endogenous and instrument it using absolute latitude of a nation's capital indexed between 0 and 1, and by legal origin.

¹⁴Dollar & Kraay (2002) fail to mention about the rule of law but one would expect that this variable may be endogenous.

¹⁵When instrumenting for these variables in the final regressions, the instrument count becomes almost double to the number of cross sections and GMM becomes inconsistent, as the number of

The GMM estimator controls for endogeneity using internal instruments where it uses specified lagged variables in level terms as instruments for the regression in differences, and in the level equation, chosen lagged differences are used as instruments.

The chosen estimator requires that there exist more instruments than endogenous regressors, hence the equation is over identified.¹⁶ Two specification tests exist to check the validity of the instruments, the Hansen J-Test and the Sargan Test. A second assumption is required when using this estimator that no second order serial correlation exists; however, the estimation procedure requires the presence of first order serial correlation. If these two main assumptions are not violated, hence, both null hypotheses are not rejected from the specification tests, then the coefficient estimates are efficient.

In all the regressions, I run a hypothesis test to see if growth is good for the poor. This follows suit to Dollar & Kraay, where I test whether the coefficient on average per capita income is one. If the coefficient on (β) is not significantly different from one then the incomes of the poorest quintile grow systematically with average incomes.

2.3 Results

Table 2.3 shows the replicated results of Dollar & Kraay using Stata where Table 2.4 shows the results when the data is updated. In all specifications it is seen that average growth is positive and significant with a coefficient close to one. Table 2.3 suggests that the null hypothesis of income growth of the poor being proportional to mean income growth, is only rejected in column one. However, this rejection seems to be a positive rejection where a 1% increase in mean income growth would

instruments becomes too large.

¹⁶It is also stated that the number of instruments used should be far less than the number of cross sectional units.

increase growth of the poorest quintile by more than 1%.

When the data is extended, the results appear to be stronger. For the benchmark case, it may be stated that growth is good for the poor, and that the original results from Dollar & Kraay (2002) are robust to the Lucas critique. With the additional data, the specification test that $(\beta = 1)$ is rejected on three occasions, in columns 1, 2 and 5 of Table 2.4. Moreover, in all three instances, the nature of the rejection posits that income growth of the lowest quintile grows more than proportionally to average per capita income growth.

One variant of the specification is to test whether the slope of average growth

Table 2.4: Simple growth regressions

	Income Quintile 1	Income Quintile 1	Differenced Income Quintile 1	Differenced Income Quintile 1	System
Intercept	-1.762*** (0.211)	-2.720** (1.257)			-1.259*** (0.501)
GDP	1.072*** (0.024)	1.187*** (0.151)	0.983*** (0.079)	0.904*** (0.119)	1.012*** (0.060)
P-Ho $\beta = 1$	0.003	0.215	0.834	0.421	0.836
P-OID				0.177	0.235
T-NOSC					-0.800
Obs.	269	269	269	269	269
Estimator	OLS	IV	OLS	IV	GMM

Notes: Standard Errors in parenthesis.
P-Ho $\beta = 1$ is the p-value associated with the hypothesis test that GDP=1.
P-OID is the p-value associated to the Sargan test of overidentifying restrictions.
T-NOSC is the t-stat associated with no second order serial correlation.
(*) (**) (***) Indicates (10%) (5%) (1%) significance.

on the system estimator varies by region. The Dollar & Kraay results show that for most regions, the overall effect of the coefficients is approximately one; however, the coefficient for the omitted category, the developed countries, shows an elasticity of 1.35%.

The elasticity of the poors' incomes with respect to average incomes in Latin America is 0.34, which is very low, and Dollar & Kraay (2002) state this result is attributed to the unusually poor performance of instruments in the sample.

Table 2.5: Simple growth regressions - update sample

	Income Quintile 1	Income Quintile 1	Differenced Income Quintile 1	Differenced Income Quintile 1	System
Intercept	-1.567*** (0.124)	-4.029*** (1.322)			-1.494*** (0.182)
GDP	1.044*** (0.145)	1.345*** (0.161)	0.980*** (0.049)	1.065*** (0.100)	1.040*** (0.023)
P-Ho $\beta = 1$	0.003	0.033	0.690	0.517	0.080
P-OID				0.141	0.579
T-NOSC					0.630
Obs.	414	414	414	414	414
Estimator	OLS	IV	OLS	IV	GMM

Notes: Standard Errors in parenthesis.
P-Ho $\beta = 1$ is the p-value associated with the hypothesis test that GDP=1.
P-OID is the p-value associated to the Sargan test of overidentifying restrictions.
T-NOSC is the t-stat associated with no second order serial correlation.
(*) (**) (***) Indicates (10%) (5%) (1%) significance.
(*) (**) (***) Indicates (10%) (5%) (1%) significance.

Table 2.6: Growth rates varying by region

	Dollar & Kraay	Updated Sample
Intercept	-4.308*** (1.421)	2.437 (1.737)
GDP	1.355*** (0.153)	0.641*** (0.182)
GDP*EAP	-0.413** (0.173)	0.327* (0.182)
GDP*ECA	-0.290 (0.474)	0.386** (0.188)
GDP*LAC	-1.019*** (0.368)	0.449** (0.193)
GDP*MENA	-0.243 (0.285)	0.399** (0.183)
GDP*SA	-0.239 (0.188)	0.390** (0.186)
GDP*SSA	-0.230 (0.256)	0.233 (0.202)
P-Ho $\beta = 1$	0.020	0.049
P-OID	0.133	0.461
T-NOSC	1.571	1.09
Obs.	269	414

Notes: Standard Errors in parenthesis. Estimated by System GMM.
P-Ho $\beta = 1$ is the p-value associated with the hypothesis test that GDP=1.
P-OID is the p-value associated to the Sargan test of overidentifying restrictions.
T-NOSC is the t-stat associated with no second order serial correlation.
(*) (**) (***) Indicates (10%) (5%) (1%) significance.
Regional Dummies are included in the regression.

Table 2.7: Additional control variables

	Openness	G'ment Cons	Inflation	Rule of Law	Openness	G'ment Cons	Inflation	Rule of Law
Intercept	-0.858 (0.705)	-1.065* (0.580)	-0.963 (0.594)	-0.642 (0.602)	-0.969*** (0.344)	-0.802*** (0.280)	-0.782*** (0.282)	-0.445 (0.365)
GDP	0.993*** (0.078)	1.019*** (0.065)	1.002*** (0.063)	0.950*** (0.070)	0.998*** (0.037)	0.990*** (0.032)	0.979*** (0.030)	0.931*** (0.043)
Openness	-0.039 (0.150)				-0.016 (0.058)			
G'ment Cons		-0.568 (0.461)				-0.503 (0.408)		
Inflation			-0.135 (0.154)				-0.074 (0.055)	
Rule of Law				0.082 (0.062)				0.071 (0.046)
P-Ho $\beta = 1$	0.850	0.772	0.975	0.481	0.961	0.745	0.481	0.111
P-OID	0.870	0.869	0.585	0.486	0.796	0.712	0.757	0.677
T-NOSC	-0.55	-0.40	-0.22	-0.76	1.18	1.09	0.97	-0.02
Obs.	223	237	253	268	359	374	413	362

Notes: Standard Errors in parenthesis. Estimated by System GMM.

P-Ho $\beta = 1$ is the p-value associated with the hypothesis test that GDP=1.

P-OID is the p-value associated to the Sargan test of overidentifying restrictions.

T-NOSC is the t-stat associated with no second order serial correlation.

(*) (**) (***) Indicates (10%) (5%) (1%) significance.

Regional dummies are included in the regression.

Table 2.8: Additional control variables - finance

	Openness	G'ment Cons	Inflation	Rule of Law	Openness	G'ment Cons	Inflation	Rule of Law
Intercept	-0.964 (0.675)	-1.072 (1.429)	-0.799 (0.945)	-0.381 (1.519)	-1.112** (0.543)	-1.124* (0.591)	-0.985** (0.473)	-2.330** (1.092)
GDP	0.997*** (0.088)	1.031*** (0.191)	0.955*** (0.141)	0.923*** (0.301)	0.940*** (0.061)	1.016*** (0.069)	0.949*** (0.062)	1.099*** (0.084)
Commercial Bank	0.036 (0.212)				0.134 (0.280)			
Private Credit		0.089 (0.146)				0.214 (0.184)		
Liquid Liabilities			0.018* (0.011)				0.023** (0.010)	
Stock Market				-0.266** (0.103)				-0.156 (0.095)
P-Ho $\beta = 1$	0.970	0.871	0.752	0.797	0.322	0.821	0.414	0.235
P-OID	0.832	0.324	0.544	0.416	0.309	0.756	0.650	0.111
T-NOSC	-0.55	-0.46	-0.14	0.10	0.26	0.68	0.78	1.06
Obs.	219	205	189	53	301	292	266	110

Notes: Standard Errors in parenthesis. Estimated by System GMM.

P-Ho $\beta = 1$ is the p-value associated with the hypothesis test that GDP=1.

P-OID is the p-value associated to the Sargan test of overidentifying restrictions.

T-NOSC is the t-stat associated with no second order serial correlation.

(*) (**) (***) Indicates (10%) (5%) (1%) significance.

Regional dummies are included in the regression.

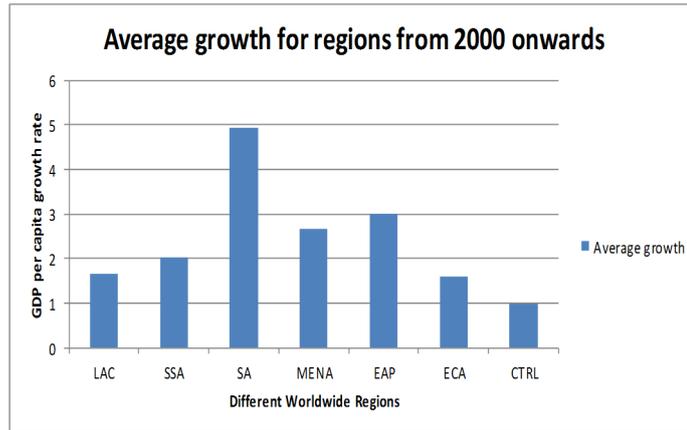


Figure 2.1: The average annual growth rate for the seven regions 2000-09

When the sample is extended, the results differ by a large degree. Here with the addition of a decade's worth of data, the growth coefficient for the control group shrinks to over half its size, and the slope coefficients for the regions switch signs.¹⁷ Moreover, the overall effects exhibit interesting results, as in the new sample all the coefficients with the exception of sub-Saharan Africa are very close to unity, and are all significant. If we compare that to the control group, it is shown, that if growth rates for all countries were equal, a catching up effect in terms of income growth would take place for the poor in those regions relative to the control group's poor.

It may be plausible to suggest that the results seen in Table 2.5 have occurred due to the intensity of mean economic growth as a determinant on the income growth of the lowest quintile. Over the period from 2000-09, when the sample has been updated, with the exception of the financial crisis, most regions have had growth rates that have outperformed those of the control group. It may be for that very reason that the results exhibit a catching up effect for the income growth of the poor relative to the control group. This is clearly evident in Figure 2.1 where the control group has had an average annual growth rate of 1% far less than all the other regions.

This highlights an important consideration, as it may be the case that when examining financial development, the effects may differ between the control group,

¹⁷The control group is Western Europe, USA and Canada.

Table 2.9: Analysing finance and regional interactions

	Commercial Bank	Private Credit	Liquid Liabilities	Stock Market
GDP	0.937*** (0.056)	1.008*** (0.066)	1.026*** (0.106)	0.935*** (0.080)
Commercial Bank	0.538** (0.262)			
Private Credit		0.354* (0.194)		
Liquid Liabilities			0.244** (0.096)	
Stock Market				-0.011 (0.074)
Fin*EAP	-0.144 (0.124)	-0.232* (0.134)	-0.219** (0.092)	-0.242** (0.112)
Fin*ECA	0.077 (0.120)	0.686*** (0.237)	0.523*** (0.201)	-0.076 (0.322)
Fin*LAC	-0.754*** (0.112)	-1.540*** (0.240)	-1.426*** (0.326)	-0.957*** (0.328)
Fin*MENA	-0.142 (0.169)	-0.163** (0.083)	-0.155 (0.130)	0.245 (0.232)
Fin*SA	0.105 (0.169)	0.929** (0.364)	0.516* (0.279)	1.248* (0.668)
Fin*SSA	-0.474** (0.200)	-1.039*** (0.345)	-0.808** (0.407)	-0.255** (0.117)
P-Ho $\beta = 1$	0.929	0.879	0.924	0.026
P-OID	0.564	0.891	0.806	0.426
T-NOSC	0.16	0.66	0.70	0.78
Obs.	301	292	266	110

Notes: Standard Errors in parenthesis. Estimated by System GMM.

P-Ho $\beta = 1$ is the p-value associated with the hypothesis test that GDP=1.

P-OID is the p-value associated to the Sargan test of overidentifying restrictions.

T-NOSC is the t-stat associated with no second order serial correlation.

(*) (**) (***) Indicates (10%) (5%) (1%) significance.

Regional dummies are included in the regression.

sub-Saharan Africa, and all remaining regions just as they do with the growth regressions in Table 2.5.

Beck et al. (2007) tested the relationship between financial development and the level of economic development, finding that this interaction was insignificant, hence income growth of the poor did not vary with the level of GDP per capita. I on the other hand, posit that regions may act differently to financial development and apply the idea that locality and space may be more influential than varying levels of GDP per capita alone.

The inclusion of control variables to vary the specification yield results similar to Dollar & Kraay (2002). Included are trade openness, government consumption, the presence of inflation, and the rule of law quality. These variables are included one at a time following the authors' methodology, and the results in Table 2.6 show all the coefficients are correctly signed, with similar magnitudes as in the Dollar & Kraay paper.

In all regressions, average GDP per capita remains positive and significant and yields a coefficient close to one indicating that the relationship between mean income growth and that of the income growth of the poor is robust. Moreover, both the tests for overidentifying restrictions and no presence of second serial correlation are passed with their respective p-values in the non rejection zone of the null hypotheses.

I show the effects of finance on the poor in Table 2.7. Here columns 1-4 present the results for the original sample size and columns 5-8 for the extended period. The variable commercial bank assets to total bank assets is successfully replicated in column one using the Dollar & Kraay data. This variable is positive and insignificant, which is also the case when the sample is extended. The addition of private credit in column two yields a coefficient which is also positive and insignificant, one main difference to the results found by Beck et al. (2007). In their study, the authors found private credit to be a significant determinant to the income growth of the poor, and

the same applied for their other measures of poverty. In the extended sample which covers the Beck et al. (2007) time period, private credit enters insignificantly. This seems to suggest that the relationship between financial development and poverty alleviation is sensitive to the specification chosen to examine poverty.

When examining further measures of financial development, liquid liabilities enters positively and significantly. This reflects the overall size of the banking sector in relation to economic activity. Here in both sample periods the results are significant and the coefficient is greater when the larger data set is used; however, both coefficients are in line with previous estimates in the literature. The variable stock market capitalisation is negative and significant in column 4, indicating finance is detrimental to income growth of the poor, but becomes insignificant when the sample is lengthened.¹⁸

The results indicate that past findings from the finance and poverty literature are susceptible to the specifications and control variables used, but also to the measure of financial development. Here, private credit, which shows the financial resources provided as credit to the private sector, is insignificant. Yet, when liquid liabilities is used as a financial development indicator, the results are significant. It may be that what the poor really require are deposit accounts, or methods to save money which liquid liabilities may pick up more effectively than private credit. Hence, the results suggest that opportunities to save may matter more for the poor, as opposed to borrowing opportunities to expand businesses or become entrepreneurs.

Additionally, the data also provides a challenge of differentiating whether credit is going to a firm or the household. In general there is no way of knowing whether the variable private credit shows credit going to the household level for consumption expenditure or whether it is directed to the firm level. If it is the latter then one may hope poverty is reduced indirectly, as the credit to the firms will offer it opportunities to expand and hire more formal sector workers, thus helping the poor. However,

¹⁸This particular result is very sceptical due to the small sample size.

if credit is being extended to the household it is difficult to know if this is being wasted on consumer expenditure, or consumption loans that may offer the poor to attain a higher level of utility currently, or maintain a consumption smoothed expenditure, or whether these funds are being used to finance self-investment by individuals which may increase the incomes of the poor in future.

Once more, all the specification tests are passed, and examining the coefficient on mean growth, it keeps its strong significance and the hypothesis of ($\beta = 1$) is not rejected.

Table 2.8 takes the results from Table 2.7 further, interacting the financial development variable with worldwide regions. Beck et al. (2007) mention how over their sample period the population living on less than \$1 a day in Thailand fell dramatically, but how the rate doubled in Venezuela, and how certain countries located in certain regions experienced large increases in their Gini coefficients whilst others noticed a fall. Moreover, I choose to examine regional variation as I am motivated by ideas of spatial economics, where contiguity of countries that share borders may be categorised more closely than by mere economic development. This may be explained that countries in similar areas of the world, who share linguistic, cultural and religious factors, may be more closely linked to one another, than nations with similar levels of per capita incomes. Therefore in terms of matching the similarities of nations, a closer match may be found when examining these alternative factors as opposed to matching countries up purely by income levels.

The results in Table 2.8 show that, depending on which region of the world a country is situated, it has a severe impact whether financial development is good for the income growth of the poor. More importantly, three of the financial development indicators all now enter positively and significantly providing evidence that a “one size fits all” model may not be the case when examining finance and the poor, an additional contribution to the existing literature.¹⁹

¹⁹It must be noted that these coefficients represent the values for the control group.

The three banking sector measures of financial development enter positively and significantly for the control group.²⁰ The market based measure stock market capitalisation is the only financial variable that is insignificant.

Examining the interactions between financial development and the regions, the first bank based measure commercial bank assets has significant interactions for the Latin America & Caribbean region and the sub-Saharan African region. When testing for the linear combinations, this financial measure then returns a positive and significant coefficient for Eastern Europe & Central Asia, and for South Asia.

Examining additional measures of finance, private credit returns a regression with all the interactions significant. When testing for their linear combinations, Eastern Europe & Central Asia, and South Asia suggest that an increase in private credit in these regions, may increase growth of income of the poorest quintile. The Latin American region and sub-Saharan African region suggest that finance may be negatively associated with incomes of the poorest quintiles, where an increase in private credit will lead to reductions in income growth of the poor in those areas.

Liquid liabilities have significant regional interactions for all areas except for the Middle East & North African zone. When testing for the linear combinations, all the regions maintain their significance with one exception, the area of Sub-Saharan Africa.

Column 4 containing the financial development variable stock market capitalisation shows that finance is insignificant in the control region, Eastern Europe & Central Asia, and in the Middle East & North Africa. When the linear combinations are tested, a further region, East Asia & the Pacific, loses its significance. The remaining significant regions, sub-Saharan Africa and Latin America & the Caribbean suggest finance is detrimental on income growth of the poor. The only remaining positive and significant region is South Asia where an increase in Stock Market Capitalisation may result in an increase in income growth of the poor. A second matter

²⁰Commercial bank assets, private credit and liquid liabilities are the bank based measures of financial development used in the paper.

of consideration is required when the stock market indicator of finance is used as a measure of financial development. It has already been noted that the overall number of observations fall to a small amount, but, an additional issue is how many observations remain in the various regions. In certain regions, not all nations in that locality may have fully functioning stock markets, for example, sub-Saharan Africa. Therefore caution has to be established when interpreting these results and wishing to create policy advice from them, where Table 2.10 highlights the importance of this issue. This is because offering policy advice for a region based on sub-sample consisting of very few countries from that locality may lead to disastrous consequences.

The results show wide variation in the effects of financial development on the

Table 2.10: The number of observations of stock market capitalisation to GDP regionally

Region	Observations	Percent of sample
Control	45	20.0
EAP	39	16.0
ECA	29	12.5
LAC	56	24.0
MENA	24	10.5
SA	20	08.5
SSA	20	08.5

Notes: Observations based on the variable stock market capitalisation being available.

income growth of the poor between regions. The interesting question is why is this the case? It may be seen that, in general, finance has been extremely good for the income growth of the poor in South Asia and the Control group, while this is the contrary in Latin America. There is weak evidence from the results suggesting that finance is also harmful in sub-Saharan Africa, whilst beneficial in Eastern Europe & Central Asia.

There are several possible hypotheses that may explain why finance has been fruitful in some regions and not others.

First, it may be that despite a deep financial sector, access is not universal. In India between 1977–1990, the Indian Social Banking Experiment took place where rural poverty fell dramatically, Burgess & Pande (2005). Here policy stated that a commercial bank could only open a branch in a location with existing bank branches, if it opened branches in four locations with no bank branches. The benefits to the poor were great; hence, in terms of policy, it may be that governments should focus on providing opportunities to expand financial access as opposed to purely focusing on depth. This should result in only those who voluntarily exclude themselves to be absent from the financial sector.

In the control region, political pressures normally result in wide access and allow the poor to access finance; however, in regions such as South Asia where finance has been fruitful, past government policy broadening access may be the reason why the poor benefit from finance unlike in other regions such as Latin America & the Caribbean.

Second financial illiteracy of the population coupled with exploitive predatory behaviour of lenders may drive the results from Table 2.8. The poor may only require simple transaction accounts to take part in a market economy, but, being financially illiterate they may be provided with or ask for checking accounts, where severe overdraft charges may be incurred when the timing of payments goes wrong. It may also be a case where the naive poor are taken advantage of by predatory lenders who do not inform the borrower of all the conditions of the loan, crippling the poor with spiralling charges, where the poor may have been better off not participating in the financial sector. Educational advice such as teaching sound money management and legal systems that strictly enforce caveat emptor may prevent these adverse effects from occurring, as would stringent regulatory policy designed to make sure financial intermediaries do not abuse their position of power regarding their services.

Financial liberalisation is associated with increased competition, privatisation and foreign ownership, which may expand financial access for the poor once it be-

comes unprofitable to lend to existing wealthy clientele, Gormley (2004) and Mian (2006). In certain worldwide locations it may have taken longer for profit to dry up when serving existing clients, hence a disparity exists for why finance is beneficial in some regions as opposed to others.²¹ However, Ang (2010) found liberalisation in India specifically led to a worsening of the income inequality problem, where as the region of South Asia in this study, which composes of India, showed great gains from financial development. Hence there may be an argument that forced liberalisations or hasty liberalisation may be detrimental to the income growth of the poor, many of which were common in Latin America during the sample period. The results presented here on financial development indicate a “one size fits all” model may not be accurate of the world. These results may carry over for financial liberalisation, hence, policy advice would be to plan country specific liberalisations and not base any plans on experiences of countries that have previously liberalised their financial systems. Moreover, the issue of financial instability may be playing a role where Akhter & Daly (2009) found in their study that if financial instability accompanies financial development, then this instability is detrimental to the well being of the poor. It may be that some regions faced this financial instability when developing their financial systems as opposed to others which may be an additional factor driving these results. These hypotheses, however, should perhaps be researched more in their own right.

Differences in the efficiency of the financial institutions may partially explain the results from Table 2.8. In regions where finance has benefited the poor it may be that loans were targeted at good enterprises that have grown, increased formal sector jobs (which in turn can provide poor individuals documentation to open their own financial accounts – a barrier in many LDCs), increased wages, hence benefited the poor. This may be as opposed to in Latin America & the Caribbean where lending has occurred to badly targeted SMEs who have not grown as expected, hence, lim-

²¹This may be attributable to the Bel-India problem.

iting the opportunities of the poor and not providing any income growth prospects for the lowest quintile. This leads us to financial policy advice suggesting that banks should perhaps implement greater screening of clients' business proposals prior to lending.²²

Finally, country specific effects of big-players within regions may influence the results. If theories of spatial economics are correct, it may be the case that neighbouring nations may adopt similar practices to the big-players, and as a result, individual specific effects from a country may have transmitted into the regions. This certainly may explain why Latin America may have a negative coefficient attributed to it, whilst South Asia has a positive coefficient. In Latin America, Brazil is the largest national economy, and where financial development has increased over time, poverty and inequality have remained relatively high despite their notable decreases. On the other hand India, the so called big-player in South Asia, has experienced a huge decline in inequality and poverty with a fairly stable growth in financial development. These questions I leave unexamined for future research.

2.4 Conclusion

Adding new waves of data to the existing research undertaken by Dollar & Kraay, I complement their findings that average incomes of the poorest quintile in a country rise and fall proportionally with average incomes. The addition of pro-growth policies in my estimations are also robust to the scrutiny of new additional data. It may be stated that governments that seek low levels of inflation, pursue open trade regimes, strengthen their legal systems and curb their government spending will create good platforms for average income growth. As income growth for the poorest fifth in society grows proportionally with average income growth, the results suggest

²²This debate has also been opened in light of the financial crisis where loan officers of the "big-banks" were predicted to not have screened their clients adequately.

to alleviate poverty by raising the per capita incomes of the poorest quintile; basic growth-enhancing policies still have a role to play.

Specifically focusing on finance and using further measures of financial development, I find financial development may alleviate poverty, but not universally. It is imperative to realise a “one size fits all” model does not work as different regions react differently to financial development when we consider income growth of the poorest quintile. The extreme variation can be specifically seen comparing South Asia, where financial development is successful in raising the income of the poorest quintile, with the region of Latin America & the Caribbean, where evidence suggests the contrary.

Governments may be required to intervene to promote financial provision for the poor, for at least the short term. Examples of schemes to increase outreach in the short run may be to use the already existent postal network to provide finance by extending the post office’s services. Here, high fixed and sunk costs have already been spent, so financial transactions may be provided at marginal cost. This should overcome the difficulties of providing for low income clients who only require small transactions until the private sector is ready to cater for them. This may occur once technological innovation has advanced to make it profitable to do so, or when already existent revenue streams have dried up serving high net worth customers.

I highlight that the poor profit as much as everyone else to overall per capita growth universally, but, with respect to financial development, this is not the case and certain regions respond better than others.

Chapter 3

Finance and health

3.1 Introduction

As many households make considerable out of pocket payments for health care, it is interesting to ask the question; how important is a well developed financial system to support expensive health care costs? As medical bills are usually unpredictable, it would be implausible to assume an individual may judge how to allocate his/her health spending. Hence, finance may be a key method to cope with the economic hardship from an unexpected illness.

This paper examines the relationship between financial development and health outcomes using two strategies. The first investigates infant and child mortality rates using aggregate data for one-hundred and eighty-two countries, spanning from 1972 to 2007. Financial development is measured using private credit, liquid liabilities and bank deposits as ratios of GDP. As unconsidered external factors may jointly explain changes in financial development and infant/child mortality, the preferred estimator is fixed effects, which controls for this form of endogeneity. The results suggest that a 10% increase in financial development may reduce infant and child mortality by approximately 1%.

The second strategy uses micro data to examine whether financial inclusion is related to the neglect of purchasing health treatment during a prominent period of the global financial crisis, specifically in 2010. Using a probit estimator on a cross sectional dataset, I find that households that own a bank account, debit card and/or credit card, are less likely to skip scheduled doctor's appointments, cease the use of regular medication, and cut staple food consumption in times of economic crisis.

As improved health is a sign of improving welfare, I contribute to the literature by showing that financial development may not just increase incomes but improve welfare levels, in particular health outcomes. The results from this study suggest that the relationship between financial development and health warrants greater attention.

The financial system is of importance when it comes to health care as the finan-

cial cost of illness may be high. Furthermore, if insurance markets are absent or in their infancy, credit access, or the use of deposits may act as the main method to finance healthcare. This does not mean that even in nations where insurance markets are well developed, finance renders itself irrelevant to pay for health treatment. Even in nations with rich health insurance markets, sometimes insurance may not cover, or fully cover an individual's claim. This means that to supplement the treatment cost, out of pocket payments for healthcare may be required. These may end up being considerable amounts especially when indirect expenditures are included in the total price.

Illness not only affects a household's income through treatment cost, but the loss of earnings encountered is an added expense to sickness. Further indirect expenses include; travel and accommodation costs to specialist treatment centres, additional clothing to compensate for weight loss and in certain cases, particularly in less developed countries (LDCs), expensive non-official payments.¹

Studying households in Burkina Faso, Sauerborn et al (1996) found savings mobilisation was the first step used to pay for health care expenditures. These savings were in most cases insufficient to cover health care costs and as a result, over 52% of households were forced to sell assets if a favourable price was available. If this wasn't the case, the third strategy to cope was to borrow. In the authors' study, 16% of households resorted to borrowing.

It is not just in developing countries where the financial system may play a role in aiding health care expenditures and ultimately improving health outcomes. In a UK survey for children with cancer (CLIC Sargent), findings suggest that the financial costs of care may amount to £3,325 a year on average. To pay these medical bills 41% of households borrow at least a third of this amount, with 27% borrowing more than half.

These examples stress the potential importance of a well developed financial sec-

¹In developing countries these costs may amount to a high figure if the rural poor may only access treatment in major urban cities.

tor in improving health levels. Finance may improve health outcomes by two main methods. First, by providing access to credit in turbulent economic times, and second, via the McKinnon conduit effect. This effect suggests that even if financial institutions do not offer credit, they may offer a profitable means to save and easily access deposits, McKinnon (1973).

3.2 Existing literature and hypotheses

An abundance of literature suggests financial development may be growth enhancing, (Arestis & Demetriades (1997); Levine (1997); Levine et al. (2000)) and further literature states finance may be conducive for poverty reduction, (Honohan (2004); Beck et al. (2007); Akhter & Daly (2009); Chapter 2).

Studies that examine whether finance may improve non-monetary welfare include Dehejia & Gatti (2005) and Kang & Sawada (2008). The former authors find that wider credit access may improve children's welfare by reducing the extent of child labour. Moreover, if children are not required to work, they may attend school, generating future welfare gains. The latter study finds that during the Korean financial crisis, credit served as an insurance substitute, and those with credit access, suffered lower welfare losses than the credit constrained.

This article seeks to examine whether financial development may improve health outcomes. Thus, it investigates the "forgotten" component of human capital, if human capital comprises of both health status and education. I posit that finance may improve health outcomes through several mechanisms.

In many developing countries, out-of-pocket spending by households is the predominant method of financing health care. In India 72% of health spending is private and 89.5% of that is out-of-pocket, World Health Organisation (2010). Therefore when an illness strikes, self-accumulated funds are generally required to pay for

medicines/operations. The financial system may aid in the payment for such treatment. Savings may be mobilised to pay for any costs and if the sum of deposits are insufficient, pending the borrower is credit-worthy, loans may be granted to pay the outstanding medical bill(s). Dupas & Robinson (2013) show that if a safe place to keep money is provided, health savings increased by 66% on a study in Kenya. Without a suitable financial system in place, savings may be accumulated in non-monetary assets which are difficult to store, depreciate in value and may not achieve fair resale prices in the future. This may impede a household's ability to pay for medical treatment. In a study on India, Rosenzweig & Wolpin (1993) show that bullocks are a store of wealth. They are bought and sold depending on profit realisations, to consumption smooth in the absence of alternate mechanisms that mitigate consumption volatility. Moreover, without borrowing opportunities, further vital assets may be sold, depleting household wealth that may lead to catastrophic outcomes should a secondary shock occur.

A household may be assisted by a developed financial sector following the arrival of a new born child into the family. During pregnancy, and the first few months of a baby's life, a mother may temporarily withdraw her labour from the labour market. Utilising deposits or borrowing may permit a mother to be able to exit the labour force in order to nurture and provide for her child. This is imperative during the final trimester of pregnancy and the first few months of life, as new born infants require the most care and attention. Hatch et al. (1997) show that women working full time during pregnancy as opposed to part time, reduced foetal growth by over a third of a kilogram in an infant. Hence, reducing a mother's labour supply during pregnancy may be health promoting and reduce any risk that the child may encounter an illness, or pass away. Additionally, during the early years of an infant's life, payments for additional vitamins, medications, clothing and specialist food are crucial for the baby's development. The World Health Organisation (2011) recommends that in the neonatal period, in particular for the first 28 days of life, that the

use of vitamin A supplements is crucial to reduce infant mortality, and morbidity. Such items will require increased household expenditure in the short run that may be offset in the future. Without credit access, or if savings are stored in illiquid assets, then these provisions may not be purchased. This may be detrimental to the newborns health and leads to the first research hypothesis.

Hypothesis 1: The financial system allows for individuals to pay for health treatment or maintain healthcare expenditure, by withdrawing savings or by borrowing. The ability to consumption smooth using these methods is imperative for good health outcomes following an accident, an unexpected illness or a loss of income.

Claessens and Feijen (2006) found several channels on how finance may quell hunger. Financial development may increase cereal and crop yields, and livestock production. Additionally, financial development may lead to the increased use of productivity enhancing equipment such as fertilisers and tractors. This may result in lower amounts of undernourishment. Non-agricultural households also benefit from greater food output, as there will be a larger food supply, leading to lower food prices, and greater quantities of food available for consumption.

During the gestation period, expecting mothers often require additional nutrients to spearhead a baby's development. Greater nutrition during this period is beneficial both to mother and infant. Lapidó (2000) shows that supplements of folate, iron and iodine can reduce the risk of adverse pregnancy outcomes. Congenital disorders, including delivering a baby with low birth weight, are exceptionally common when a mother has poor nutrition during pregnancy. This increases the chances of premature delivery and increases the risk of death for the new born. Moreover, cognitive and physical impairments, due to poor nutrition when a baby is in utero, may have prolonged effects. First, the risk of child mortality increases, and if survival occurs, the child may be hampered with increased morbidity, harmful to future educational

and working productivity.

If finance may increase food output and reduce world food prices, then it may indirectly reduce infant and child mortality rates. Furthermore, if utilising deposits, or borrowing, helps to fulfil consumption needs during the pregnancy period, finance may also directly reduce the risk of these negative health outcomes. Hence, a second research hypothesis is formulated.

Hypothesis 2: Financial development may increase food output. Consumption of this extra output provides an individual a greater chance to reach his required daily nutrient intake, beneficial to human health.

The role that financial development plays in channelling savers' funds to borrowers may lead to improved health outcomes. The construction of hospitals and alternate medical facilities often require long term funding during the period of their construction. The purchase of new sophisticated medical equipment, or to replace expensive dated equipment, may require a loan which is repaid after several years. A strong financial system may help in the realisation of such investments, thus may be of importance to health outcomes. Additionally, certain pharmaceutical firms require funds for indivisible investment opportunities that in the long run may be health promoting. The role of the financial system is to recognise worthwhile investments and channel funds to the most promising firms, Levine (2005). Therefore those who are the most likely to deliver the greatest gains to health outcomes will receive funding, a further way the financial system may contribute to improved health outcomes.

The benefits that arise from the financial system provide opportunities for such investments to be reproduced at the local level. The construction of health clinics, schools, sanitation blocks and clean water facilities are all beneficial to greater health outcomes. Finance may allow for health improvements to be made through

the building of such facilities. Specific loan schemes, such as group lending is one example. Such a scheme requires that individuals jointly put up collateral and share liability on loans. This is extremely common in slum settlements across the globe. This argument leads to the third research hypothesis.

Hypothesis 3: A well functioning financial system may pool savings and channel them to large capital projects that reduce ill health.

Financial development is associated with higher rates of economic growth. Moreover, financial development has also been shown to increase the incomes of the poor disproportionately. Therefore those required to pay for their own medical expenses may now afford to fund such payments, as with greater incomes they will be richer. Individuals may also be able to purchase greater health inputs, further increasing positive health outcomes.

If financial development disproportionately increases the incomes of the poor relative to average incomes, health levels would be expected to improve. Subramanian & Kawachi (2004) suggest that the relationship between income and health status is concave. Therefore providing an extra dollar of income to a poorer individual (to be spent on healthcare), would be of greater doing than providing a wealthy individual with an additional dollar. This is as the poorer individual would have a greater requirement for more essential health inputs such as iron supplement tablets. These would provide greater gains at the margin, in comparison to a well nourished citizen who may just supplement his existing vitamin take without offering many additional benefits to his/her health.

Of course, just as finance may increase incomes, this does not indicate that health spending will increase. This would depend on individual consumption decisions, but greater financial development may offer the opportunities for greater healthcare spending through higher incomes. This leads to the final hypothesis.

Hypothesis 4: If financial development is growth enhancing, therefore increases income per capita, greater incomes may be used to pay for medical expenses that previously were not affordable.

Previous studies examining health outcomes often use infant mortality as a dependent variable, primarily as it may respond quickly to changes in its determinants. Gomanee et al. (2005a) examine whether aid allocation contributes to lower infant mortality levels, whilst Issa & Ouattara (2002) and Anyanwu & Erhijakpor (2009) examine the role increased health expenditure may have on infant mortality.

Other possible factors that may improve health outcomes include; high educational levels, good hygiene, pro-poor government expenditure, and high quality health facilities.

Education may be conducive to health outcomes as it may prevent illness. In countries where malaria is prevalent, an educated individual may identify and lower the risk of infection. By understanding the potential benefits of setting up mosquito nets inside dwellings, draining areas of standing water where mosquitoes lay their eggs and using insect repellents, malaria rates may be reduced. Subbaro & Raney (1995) show that doubling female secondary school enrolment from 10%–20% in poor countries, may lead to reductions in infant mortality by approximately 25%. Additionally, good hygiene levels and cleanliness may prevent bacterial and viral outbreaks, and further contamination fatal to health outcomes.

Pro-poor government expenditures, such as the provision of clean water facilities and adequate sanitation may be health promoting.² Günther & Fink (2011) show that “full household coverage with water and sanitation infrastructure could lead to a total reduction of 2.2 million child deaths per year in the developing world.” On

²Well developed sanitation facilities reduce the risk of insects, animals and humans becoming contaminated with excreta, thus preventing the outbreak of dangerous diseases such as hookworm. Furthermore, if these facilities prevent the contamination of faeces with drinking water, gastrointestinal and respiratory diseases may be avoided, thus abating further ailments.

the contrary, some government expenditure may be harmful to health levels such as military spending, Gomanee et al. (2005b). Understandably, spending on defence may be required to keep borders safe from neighbouring aggressors, maintaining law and order and to control uprisings from extremist groups that promote violence. However, the opportunity cost of this spending must be considered, as every unit spent on the military is one unit forgone on health spending. Additionally, if greater spending on defence is conflict promoting, this may have negative consequences on health outcomes.³

Certain other determinants may improve health status such as income levels. Income is highly correlated with the overall level of economic development, and ultimately direct health care expenditure. This would be funded by the government, but in many developing countries it is of insufficient amounts.

3.3 Data and method

I utilise two datasets, a macro panel consisting of one-hundred and eighty-two countries spanning from 1973–2007, and a cross sectional survey covering thirty-four countries and thirty-nine thousand households in 2010. The summary statistics are available in the appropriate subsections and the country lists of both datasets are available in the appendix.

This novel approach allows for all four hypotheses outlined in this chapter to be examined. Some of the hypotheses are more suited to be tested at the macroeconomic level, for example, the role the financial system plays in allocating credit to enterprises that may create products that are health promoting. The use of a microeconomic dataset then may enrich this study and test the consumption smoothing hypothesis, which is more adequately tested at the household level.

³In addition to the direct loss of life associated with combat, already existent public infrastructure, including health care facilities, may be destroyed through collateral damage, disastrous to health outcomes.

3.3.1 Macro data

The preferred estimator to examine whether finance impacts health outcomes at the macroeconomic level is fixed effects (FE) . In equation 3.1, $Y_{i,t}$ is the outcome variable infant/child mortality, $F_{i,t}$ represents financial development, $X_{i,t}$ is a matrix of explanatory variables and α_i is the country specific intercept. The error term is denoted by $\epsilon_{i,t}$ and the individual specific effect μ_i is swept away by the fixed effects transform. The subscript i indexes individual countries, whereas t indexes time.

$$Y_{i,t} = \alpha_i + \beta X_{i,t} + \gamma F_{i,t} + \epsilon_{i,t} \quad (3.1)$$

The choice of the fixed effects estimator over ordinary least squares (OLS) is to omit any potential endogeneity concerns. However, the OLS estimates will still be reported as a benchmark case. The endogeneity concern for this study is that countries with strong health care systems tend to have good banks in tandem. Furthermore, countries with strong financial systems also tend to have further infant/child mortality reducing facilities at their disposal. Therefore if this is the case, I cannot be sure that an increase in financial development may be driving reductions in infant/child mortality. The fixed effects estimator controls for these country specific characteristics and may mitigate some of these concerns.

The fixed effects estimator removes any time-invariant variables along with its transform, hence, variables that do not change over time may not be estimated. An alternate estimator that may be considered is random effects (RE). However, this estimator assumes that no correlation exists between the individual specific effects and the regressors, hence, $E[\mu_i X_{i,t}] = 0$. It would be expected that the covariates included in this specification would be correlated with the country specific effects therefore the fixed effects estimator is the suitable estimator choice.

Table 3.1: Descriptive statistics of the macro variables

Variable	Mean	Standard Deviation	Minimum	Maximum
Infant Mortality	3.503	1.022	0.798	5.282
GDP	23.89	2.447	9.403	30.16
Private Credit	3.187	0.956	-0.925	5.200
Liquid Liabilities	3.014	0.673	-0.873	5.811
Bank Deposits	3.365	0.852	-2.514	5.900
Government Expenditure	16.47	6.473	1.375	55.39
Military Spending	2.875	3.626	0.000	41.92
Sanitation Access	67.71	32.04	4.000	100.0
Education	59.57	33.45	0.596	156.6
No. of Physicians	1.290	1.298	0.010	9.670

The macroeconomic data sources are the World Development Indicators (2010), the Financial Structure Database (2009) and the UN (2010). The summary statistics for the macro data are shown in Table 3.1. The data is averaged into non-overlapping five year periods, which prevent the sample being dominated by countries that have more reliable and historic data and provides fewer gaps in the time series. A further benefit of this method is that it may smooth out business cycle effects.⁴

The dependent variables used in the study are the natural logarithms of infant and child mortality rates. They are measured as infant deaths arising from live births up to age one and child deaths up to age five. This health measure is preferred to life expectancy as it exhibits greater worldwide variation, is not heavily trended and responds to changes in its determinants far quicker than life expectancy. Moreover, improvements in life expectancy may show health improvements for the middle and upper classes far more than the poorest in society.

Financial development is measured using three different indicators, private credit as a ratio of GDP, liquid liabilities as a ratio of GDP and bank deposits as a ratio of GDP.^{5,6} The intermediation ability of the financial sector is best measured by private credit to GDP, whereas the latter two measures best show the size of

⁴Criticisms of this approach are that 80% of the data is thrown away compared to an annual panel. However, as certain macro variables used in this study are only available every five years, this argument is no longer withstanding.

⁵Liquid liabilities is also known in the literature as M3/GDP.

⁶All three financial development indicators are logged in the specification for ease of interpretation, a common procedure in the literature.

the banking system, Beck et al. (2000). The literature also suggests that when examining poverty, that private credit best measures the financial systems ability to extend credit opportunities. The other measures used in this study are more useful to examine the McKinnon conduit effect, Guillaumont-Jeanneney & Kpodar (2011). The McKinnon conduit effect states that even if financial intermediaries do not offer credit facilities, they still may render themselves useful to the poor by offering a profitable means to save. The financial development measures utilised in the macro data are all “depth” indicators. To examine the relationship between finance and health more stringently it may be more appropriate to use financial access or financial usage measures. However, as macro data measuring “financial breadth” and “usage” is very limited, this study only implements the measures of finance outlined above. This again offers support to the novel approach of separately using a macroeconomic and a microeconomic dataset to study this topic, where the microeconomic section includes these usage variables that are absent in macro data.

Financial development consists of two components, banking side development, and financial market development, e.g. the stock market, Levine (2002). In this study, it is assumed that banking sector development would be more important than market side financial development to improve health outcomes as Levine & Zervos (1998) show stock markets provide different services than banks. Hence, the market based component of financial development is ignored in this study.

The control variables used in this study follow mainly from Gomanee et al. (2005a). They include the natural logarithm of GDP per capita, government expenditure divided by GDP, government military spending divided by GDP and the percentage of the population who have adequate sanitation access. Further control variables include; female education, measured by the gross female secondary school enrollment ratio and the natural logarithm of the number of physicians per 1,000 people to control for health provision. The use of time dummies is also considered. Certain year specific shocks such as drought, war, and epidemics (notably the mass

outbreak of HIV/AIDS in Africa) may interfere with the relationship studied if ignored; therefore time dummies are also included in the specification. The inclusion of education, sanitation access and health care provision are all expected to have some impact on infant and child mortality rates. Gomanee et al. (2005b) call spending on these three forms of public services pro-poor expenditure. In their work, Gomanee et al. (2005b) find that sanitation, health and education spending are associated with greater welfare levels, regressing these expenditures on the human development index (HDI) and infant mortality rates. In particular the authors find that infant mortality rates are more responsive to public expenditure on sanitation and health than the HDI and that they also appear responsive to education spending. This warrants the inclusion of these variables in the regression specification.

3.3.2 Micro data

The micro data is available from the Life in Transition Survey (2010). This is a household data set and consists of approximately one thousand observations from twenty-nine countries, and fifteen-hundred observations for Poland, Russia, Serbia, Ukraine, United Kingdom and Uzbekistan.⁷ Pooling the United Kingdom, France, Germany, Italy, and Sweden with the remaining countries may not be suitable due to the different nature of their economies. For example, the United Kingdom allows for treatment via the National Health Service (NHS). Therefore, these nations are omitted from the regressions. When the data is checked for missing observations and non-responses, just over half the observations remain and Moldova is omitted from the survey. The summary statistics are presented in Table 3.2.

As the dependent variables in the microeconomic section are all binary I

⁷Most of the countries in the survey are Eastern European and Baltic, however, some Western European and Central Asian countries are also included in the dataset.

Table 3.2: Descriptive statistics of the micro variables

Variable	Mean	Standard Deviation	Minimum	Maximum
Skipping Doctor Visits	0.120	0.325	0.000	1.000
Skipping Medicine Purchase	0.090	0.286	0.000	1.000
Cutting Staple Food Purchase	0.351	0.477	0.000	1.000
Homeowner	0.839	0.367	0.000	1.000
Have a Bank Account	0.507	0.500	0.000	1.000
Have a Debit Card	0.394	0.489	0.000	1.000
Have a Credit Card	0.264	0.441	0.000	1.000
Income	7.745	1.275	0.831	12.69
Urban Location	0.607	0.488	0.000	1.000
Household Size	2.999	1.684	1.000	12.00
Education	0.695	0.460	0.000	1.000
Phone Access	0.627	0.484	0.000	1.000
Internet Access	0.433	0.496	0.000	1.000
Muslim Religion	0.220	0.414	0.000	1.000

estimate equation 3.2 using a probit model.

$$Y_{j,i} = \alpha_i + \beta X_j + \gamma F_j + \epsilon_{j,i} \quad (3.2)$$

Equation 3.2 explicitly takes the form $Pr(Y = 1|X) = \phi(X'\beta)$ and Pr denotes the probability that the dependent variable takes the value 1, and ϕ represents the cumulative distribution function.

The dependent variables $Y_{j,i}$ are based on questions about household behaviour during the economic crisis. The questions include; whether scheduled doctors' appointments were dismissed, whether the purchase of regular medicines ceased and whether the consumption of staple food consumption reduced.

Finance is measured using three binary variables. Therefore, the coefficient of interest is γ . The questions ask whether a household owns a bank account, a debit card, or a credit card which measures financial usage. Ownership of a bank account may represent both channels of financial intermediation, access to credit and deposits. The second may represent the McKinnon conduit effect, or the role of savings/deposits on health outcomes, whilst the latter measure, ownership of a credit card may highlight the importance of credit access.

The control variables selected follow Beck & Brown (2010) where possible. The

covariates included in matrix X are; a household's wealth, income, locality, size and its facilities. In addition the respondents education level and the family religion are selected as further controls.

Household wealth is proxied by home ownership and its income is measured by summing up all household expenditure and any remaining savings.⁸ The two variables are not highly correlated therefore both are included in the specification simultaneously. They are included as home ownership may serve as collateral and influence the use of credit. The latter variable income may deem the credit channel of the financial system irrelevant if household income is vast. The locality of the household is a binary variable that takes the value of one if the household resides in an urban area or zero if it is located in a rural area. This variable is included as one would expect that health care facilities are more abundant in urban areas. Household size measures the number of people living in the dwelling surveyed. Whether a household has internet access or owns a telephone is used to measure the facilities available to the household. These variables are selected to measure deprivation, following similar strategies recently used by the United Nations (2013) multidimensional poverty index. To measure education, a dummy variable is constructed that equals one if the household has upper secondary schooling or higher. This makes it compatible to the educational measure used in the macro section of the study. Being well educated may be conducive to health outcomes and empirical evidence supports this view, Subbaro & Raney (1995). High education levels are a preventative measure to illness, for example, knowing the importance of hygiene and when an infection requires treatment. The final control variable is a dummy variable that depicts if the household follows the Islamic faith, selected to control for any discrimination factors. Discrimination is high in Eastern Europe, where certain ethnic minorities may require additional non-official payments to access health treatment or purchase "unavailable" medication, warranting its inclusion in the specification.

⁸Expenditures were converted from local currency units to US dollars using PPP exchange rates.

In addition, country specific dummies α_i are included in the regressions.

3.3.3 The four hypotheses

Although four hypotheses are presented of how finance may impact health outcomes, given the data, it is impossible to test them directly. Through the various specifications, in both econometric sections, all four hypotheses will be examined. For example, hypothesis one may be tested using the household survey data. Hypothesis one states that in times of a negative economic shock, households may resort to accessing deposits and borrowing to maintain stable consumption paths. The microeconomic data specifically asks questions regarding household behaviour concerning health outcomes given a negative economic shock. This allows me to investigate whether or not financial inclusion may alter household behaviour. The second hypothesis may be tested using the micro data. Hypothesis two states that financial development may increase food output which is beneficial to human health. As the microeconomic data also asks the question whether a household reduced staple food consumption during the economic crisis, I can examine whether or not financial inclusion reduced this probability, which may improve health outcomes. Financial development may pool society's resources and allow for large capital projects to be undertaken. For example, the construction of hospitals that may improve health outcomes. The macroeconomic data may best test this hypothesis. Finally hypothesis four may also be tested using the macroeconomic data. If financial development increases technological adoption through lending, this may increase economic growth. With higher rates of economic growth and consequently higher average incomes, this may indirectly improve health outcomes.

3.4 Results

3.4.1 Macro results

The benchmark results are presented in Table 3.3. The first three columns examine infant mortality as the dependent variable and the final three, child mortality as the dependent variable.

In the ordinary least squares (OLS) regressions, four of the seven variables in the specification are negative and significant. Included in the regression specifications but omitted to save space are regional dummy variables and a constant term. Financial development is negatively signed and significant at the 1% level in all six specifications. The magnitude of the coefficients suggest that a 10% increase in financial development is related to a 2-3% reduction in infant or child mortality.

Other significant coefficients in the specification include government expenditure, increased sanitation access and increased female education levels. A percentage point increase in these variables is associated with approximately a 1% reduction in infant or child mortality. The coefficients with the largest negative signs are government expenditure and sanitation access, where female literacy has the lowest sign. On average, a percentage point increase in this variable is associated with a 0.8% decrease in infant mortality and 0.9% decrease in child mortality.

Military spending is insignificant in the specification as is GDP per capita. As GDP per capita is well correlated with many of the control variables this is unsurprising. The negative sign on GDP per capita is as expected. Interestingly the number of physicians is insignificant in four of the six specifications. Only when the dependent variable is child mortality does this variable enter significantly. The results suggest a 1% increase in the number of physicians is negatively related to a fall in child mortality of approximately 0.07%. These preliminary results seem to show that maternal education and access to sanitation, both preventative measures of infant/child mortality may be more important in reducing mortality rates, as

opposed to relying on a greater number of physicians to try and rescue a babies life once it has suffered a life threatening health shock.

The specification has a very high adjusted R² statistic which is common to other research papers examining determinative and preventative measures of infant mortality. However, the use of OLS may be inappropriate as endogeneity may bias the results if country specific effects exist.

Table 3.4 presents the fixed effects results on the finance-health relationship,

Table 3.3: Benchmark results on the Finance-Health relationship

Finance Measure	Infant Mortality			Child Mortality		
	Private Credit	Liquid Liabilities	Bank Deposits	Private Credit	Liquid Liabilities	Bank Deposits
GDP per capita	-0.000 (0.006)	-0.001 (0.008)	-0.001 (0.007)	-0.001 (0.008)	-0.001 (0.007)	-0.001 (0.007)
Finance	-0.202*** (0.033)	-0.248*** (0.042)	-0.207*** (0.039)	-0.198*** (0.034)	-0.263*** (0.042)	-0.219*** (0.039)
Government Expenditure	-0.009* (0.005)	-0.014*** (0.005)	-0.013** (0.005)	-0.009* (0.005)	-0.014*** (0.005)	-0.013** (0.005)
Military Spending	-0.003 (0.007)	-0.002 (0.007)	-0.001 (0.007)	-0.005 (0.006)	-0.004 (0.007)	-0.004 (0.007)
Sanitation Access	-0.010*** (0.002)	-0.011*** (0.002)	-0.010*** (0.002)	-0.012*** (0.002)	-0.012*** (0.002)	-0.012*** (0.002)
Female Education	-0.008*** (0.001)	-0.008*** (0.001)	-0.008*** (0.001)	-0.009*** (0.001)	-0.008*** (0.001)	-0.009*** (0.001)
Physicians	-0.018 (0.037)	-0.046 (0.038)	-0.039 (0.038)	-0.048 (0.039)	-0.073* (0.040)	-0.069* (0.039)
Adjusted R ²	0.89	0.89	0.89	0.90	0.90	0.90
Obs.	355	347	356	355	347	356

Notes: All regressions estimated by OLS using robust standard errors.
 (*) (**) (***) Denotes (10)(5)(1)% significance.
 Constant and regional dummies included in the specification.

estimating equation 3.1 using the macroeconomic data. The introduction of country fixed effects renders some variables that were significant in Table 3.3, now insignificant. These include government spending and sanitation access.

The fixed effects results show that along with the time dummies, two variables

Table 3.4: Fixed effects regressions on the Finance-Health relationship

Finance Measure	Infant Mortality			Child Mortality		
	Private Credit	Liquid Liabilities	Bank Deposits	Private Credit	Liquid Liabilities	Bank Deposits
Finance	-0.059** (0.031)	-0.124** (0.053)	-0.059 (0.050)	-0.056* (0.032)	-0.135** (0.057)	-0.063 (0.053)
GDP per capita	-0.029 (0.123)	-0.009 (0.115)	-0.048 (0.118)	-0.022 (0.128)	-0.001 (0.007)	-0.030 (0.122)
Government Expenditure	-0.002 (0.005)	0.001 (0.005)	-0.002 (0.006)	-0.000 (0.004)	0.002 (0.005)	-0.001 (0.005)
Military Spending	-0.001 (0.004)	-0.002 (0.004)	-0.000 (0.005)	-0.003 (0.004)	-0.004 (0.004)	-0.002 (0.004)
Sanitation Access	-0.004 (0.004)	0.003 (0.004)	-0.004 (0.004)	-0.000 (0.005)	-0.000 (0.005)	-0.000 (0.005)
Female Education	-0.003** (0.001)	-0.003** (0.001)	-0.002** (0.001)	-0.002* (0.001)	-0.002* (0.001)	-0.002* (0.001)
Physicians	0.000 (0.033)	-0.005 (0.033)	0.002 (0.033)	-0.005 (0.035)	-0.010 (0.035)	-0.003 (0.035)
Time dummy F-test	14.98(0.00)	16.56(0.00)	16.74(0.00)	14.04(0.00)	15.96(0.00)	15.75(0.00)
Overall R ²	0.14	0.22	0.14	0.45	0.50	0.42
Countries	120	118	120	120	118	120
Obs.	355	347	356	355	347	356

Notes: All regressions estimated by fixed effects.
 (*) (**) (***) Denotes (10)(5)(1)% significance.
 Constant and time dummies included in the specification.

from the seven are significant. These include female secondary education and finance. Both coefficients enter with the expected signs; hence, finance and female education are negatively associated with infant mortality.

Financial development enters the specifications significantly in four of the six columns. When private credit and liquid liabilities are the measures of financial development, finance is significant. This is unsurprising as these two measures are the more traditionally used financial development variables, when examining the effects of financial deepening on a dependent variable. When the measure of finance is bank

deposits as a ratio of GDP, the variable is correctly signed but just misses out on being significant at the 10% level. The magnitude of the finance coefficients suggest that on average a 10% increase in financial deepening may lead to a reduction in infant mortality by 1 %. A one unit increase in female secondary school enrolment may reduce infant mortality by 0.2%.

The coefficients on GDP per capita, government expenditure and sanitation access are all correctly signed albeit insignificant. The insignificant coefficient on government expenditure may be attributable to the fact that any infant/child mortality reducing spending is already accounted for in the model. This may be through doctors wages (the number of physicians), clean water and sanitation spending (the percentage of people who have access to adequate sanitation access) and through education. Hence, this coefficient may be just catching all remaining expenditure which may be “wasteful” when examining its impact on infant and child mortality. Furthermore, in Table 3.4 government military expenditure is incorrectly signed but enters the specification insignificantly.

Surprisingly the coefficients on the number of physicians is insignificant in all six columns in Table 3.4. This may be explained as follows. The variable may just specifically measure the number of physicians in a country and not their quality, or the facilities a doctor may have available at his/her disposal. For example, a nation may have one doctor per citizen, but if his/her skills are inferior and their medical tools outdated, they may not be able to save as many lives as potentially possible. A further explanation may be that preventative measures to ill health may be more important to reducing both types of mortality. This is opposed to relying on a physician to cure a sick infant or child once it has suffered a life threatening shock. This is supported by the results with the significant coefficient on female education.

The overall explanatory power of the model has an R^2 figure between 0.14-0.50. The inclusion of time dummies in the specification is extremely important. The

joint F-test on the significance of the time dummies yields a p-value of 0.00 suggesting that they are all significantly different from zero in every specification. The evidence presented in Table 3.4 overall suggests that finance may have a role to play in improving health outcomes as predicted earlier in this chapter.

It is surprising that GDP per capita is insignificant in the specification although
 Table 3.5: Further fixed effects regressions on the Finance-Health relationship

Finance Measure	Infant Mortality			Child Mortality		
	Private Credit	Liquid Liabilities	Bank Deposits	Private Credit	Liquid Liabilities	Bank Deposits
Finance	-0.055** (0.025)	-0.099** (0.043)	-0.042 (0.040)	-0.052** (0.025)	-0.106** (0.043)	-0.042 (0.040)
Aid	-0.540 (0.544)	-0.493 (0.530)	-0.556 (0.535)	-0.533 (0.575)	-0.479 (0.564)	-0.547 (0.567)
Government Expenditure	-0.001 (0.005)	0.001 (0.005)	-0.001 (0.005)	0.001 (0.005)	0.002 (0.005)	-0.000 (0.006)
Military Spending	-0.001 (0.005)	-0.002 (0.005)	-0.000 (0.005)	-0.003 (0.005)	-0.004 (0.005)	-0.003 (0.005)
Sanitation Access	0.003 (0.003)	0.003 (0.004)	0.003 (0.004)	-0.001 (0.005)	-0.001 (0.005)	-0.001 (0.005)
Female Education	-0.003** (0.001)	-0.003** (0.001)	-0.003** (0.001)	-0.003** (0.001)	-0.003** (0.001)	-0.003** (0.001)
Physicians	0.007 (0.034)	0.002 (0.033)	0.008 (0.033)	0.008 (0.034)	0.000 (0.035)	0.005 (0.035)
Time dummy F-test	131.0(0.00)	113.2(0.00)	121.7(0.00)	129.0(0.00)	112.4(0.00)	118.6(0.00)
Overall R ²	0.13	0.10	0.16	0.32	0.40	0.27
Countries	120	118	120	120	118	120
Obs.	354	346	355	354	346	355

Notes: All regressions estimated by fixed effects.
 (*) (**) (***) Denotes (10)(5)(1)% significance.
 Constant and time dummies included in the specification.

it does enter with the correct negative sign. The high correlation between GDP per capita and many of the additional covariates may partially explain this finding. Moreover, the inclusion of GDP may result in the additional covariates entering the specification insignificantly. Table 3.5 re-runs the regressions of the preferred

specification in Table 3.4 omitting GDP per capita and replacing it with a control variable that measures aid to GDP.⁹ Aid to GDP is introduced into the specification as there is an abundant amount of literature that suggests that aid may reduce poverty and in particular infant mortality, (Gomanee et al. (2005a); Gomanee et al. (2005b); Masud & Yontcheva (2005)). However, the robustness of this conclusion has recently been questioned, Mukherjee & Kizhakethalackal (2013).

The results from Table 3.5. show that the main findings remain unchanged when the specification is altered. Both the financial development and female education variables remain statistically significant in the regressions. However, the latter variable becomes significant at the 5% level throughout the six columns when GDP per capita is omitted from the specification. This further highlights the importance of education in infant mortality reduction. Aid enters the specifications with the correct sign but is insignificant. The overall fit of the specification falls slightly in comparison with Table 3.4 and one observation is lost when the GDP per capita variable is replaced with aid. However, the number of groups remain unchanged.

3.4.2 Micro results

Table 3.6 uses data from the Life in Transition Survey (LITS) and offers some additional ways of testing the relationship between finance and health outcomes. More importantly it examines this relationship using microeconomic data. This is an important addition to the study as the data allows us to see who uses financial services, and how household specific education and income quantities affect the outcome variables. This is superior to relying on country averages and making assumptions such as “a deeper financial sector indicates more financial access and usage.” Additionally, the construction of this dataset from the questionnaire is specifically based on household responses to an exogenous negative economic shock. Therefore the

⁹The omission of GDP per capita without introducing aid to GDP ratios does not alter the results.

household survey data can examine whether, ownership of financial accounts are negatively related to detrimental health outcomes due to a hostile economic shock. Unfortunately, caveats exist with the micro data. For example a previous wave from this questionnaire prior the economic crisis of late 2007 is not comparable with the new wave and so far no follow up questionnaires have been produced, making the results from Table 3.6 based upon a cross section.

The results presented in Table 3.6 show that finance is negatively correlated with the decision to miss a doctor's appointment, cease the use of regular medication, and skip staple food consumption during a negative economic shock.

The first three columns examine the role that finance and the various covariates have on the decision to cancel or not attend a doctor's appointment. The marginal effects of the coefficients are shown in Table 3.7.¹⁰ Two of the three measures of finance are highly significant with magnitudes between 0.09–0.19 depending on the specification. The highest coefficient is found on the variable where the respondents were asked whether they have a bank account. The other two financial variables used include; whether the individual owns a debit card, and whether they own a credit card.¹¹ The former is significant and the latter is insignificant. This may suggest that a household will use savings to pay for medical treatment, but, may be less reluctant to borrow money for treatment costs, or pay for medical treatment using credit.

Further important coefficients in the first three columns of Table 3.6 include household wealth and income. Household wealth is shown to be negatively associated with skipping medical appointments, however it enters the specifications insignificantly. The variable household income is negative and significant in all three

¹⁰The results remain unchanged even when clustering the standard errors at the highest form of aggregation, the country level.

¹¹It may be assumed that a debit card may proxy for the McKinnon conduit effect on health outcomes in this survey. This is because very rarely does a debit card allow for continued spending if no money is available in the bank account. Therefore it may capture the utilisation of savings and consumption smoothing. On the other hand, a credit card enables the bearer to make purchases almost as if they have been provided a loan therefore may be more useful to examine the credit channel of finance on health.

Table 3.6: Probit regressions on health outcomes

Finance Measure	Skipping medical visits			Skipping required medication			Skipping staple food consumption		
	Bank Account	Debit Card	Credit Card	Bank Account	Debit Card	Credit Card	Bank Account	Debit Card	Credit Card
Finance	-0.1187*** (0.035)	-0.086*** (0.033)	-0.037 (0.039)	-0.272*** (0.038)	-0.140*** (0.036)	-0.069* (0.040)	-0.247*** (0.027)	-0.076*** (0.026)	-0.162*** (0.028)
Wealth	-0.008 (0.041)	-0.005 (0.041)	-0.005 (0.041)	0.011 (0.046)	0.015 (0.046)	0.015 (0.046)	-0.012 (0.032)	-0.009 (0.032)	-0.011 (0.032)
Income	-0.040** (0.016)	-0.045*** (0.016)	-0.047*** (0.016)	-0.075*** (0.018)	-0.083*** (0.018)	-0.085*** (0.018)	-0.191*** (0.014)	-0.200*** (0.014)	-0.194*** (0.014)
Urban Location	0.072** (0.028)	0.073** (0.028)	0.071** (0.028)	0.136*** (0.031)	0.139*** (0.031)	0.136*** (0.031)	0.135*** (0.022)	0.135*** (0.022)	0.134*** (0.022)
Household Size	0.039*** (0.009)	0.039*** (0.009)	0.039*** (0.009)	0.033*** (0.010)	0.034*** (0.010)	0.033*** (0.010)	0.065*** (0.008)	0.065*** (0.008)	0.065*** (0.007)
Education Level	-0.1146*** (0.031)	-0.152*** (0.031)	-0.157*** (0.031)	-0.188*** (0.034)	-0.192*** (0.034)	-0.200*** (0.034)	-0.182*** (0.025)	-0.191*** (0.025)	-0.186*** (0.025)
Phone Access	-0.092*** (0.028)	-0.092*** (0.028)	-0.095*** (0.028)	0.033 (0.031)	0.033 (0.034)	0.027 (0.031)	-0.035 (0.023)	-0.038 (0.023)	-0.040* (0.023)
Internet Access	-0.108*** (0.032)	-0.122*** (0.032)	-0.126*** (0.032)	-0.203*** (0.036)	-0.222*** (0.036)	-0.227*** (0.036)	-0.290*** (0.025)	-0.312*** (0.025)	-0.294*** (0.025)
Muslim Dummy	-0.063 (0.057)	-0.050 (0.057)	-0.041 (0.057)	0.159** (0.062)	0.174*** (0.062)	0.186*** (0.062)	-0.029 (0.044)	-0.011 (0.045)	-0.012 (0.044)
Countries	28	28	28	28	28	28	28	28	28
Obs.	17057	17057	170057	17057	17057	170057	17057	17057	170057
Pseudo R-Squared	0.10	0.10	0.10	0.11	0.10	0.10	0.10	0.09	0.09

Notes: Country dummies and the constant are included in the regression. Robust standard errors reported.
 (*) (**) (***) Denotes (10)(5)(1)% significance.

Table 3.7: Marginal effects for Table 3.6

Finance Measure	Skipping medical visits			Skipping required medication			Skipping staple food consumption		
	Bank Account	Debit Card	Credit Card	Bank Account	Debit Card	Credit Card	Bank Account	Debit Card	Credit Card
Finance	-0.036*** (0.007)	-0.017*** (0.006)	-0.007 (0.007)	-0.040*** (0.006)	-0.020*** (0.005)	-0.010* (0.006)	-0.096*** (0.010)	-0.030*** (0.010)	-0.063*** (0.010)
Wealth	-0.002 (0.008)	-0.001 (0.008)	-0.001 (0.008)	0.002 (0.007)	0.002 (0.005)	0.002 (0.007)	-0.005 (0.012)	-0.004 (0.012)	-0.004 (0.012)
Income	-0.008** (0.003)	-0.009*** (0.003)	-0.009*** (0.003)	-0.011*** (0.003)	-0.012*** (0.003)	-0.013*** (0.003)	-0.074*** (0.014)	-0.078*** (0.005)	-0.076*** (0.005)
Urban Location	0.014** (0.005)	0.014** (0.005)	0.014** (0.005)	0.020*** (0.004)	0.020*** (0.004)	0.020*** (0.004)	0.052*** (0.009)	0.052*** (0.009)	0.052*** (0.009)
Household Size	0.008*** (0.002)	0.008*** (0.002)	0.008*** (0.002)	0.005*** (0.001)	0.005*** (0.002)	0.005*** (0.002)	0.025*** (0.003)	0.026*** (0.003)	0.025*** (0.003)
Education Level	-0.030*** (0.007)	-0.031*** (0.007)	-0.032*** (0.007)	-0.029*** (0.006)	-0.030*** (0.006)	-0.030*** (0.006)	-0.072*** (0.010)	-0.075*** (0.010)	-0.073*** (0.010)
Phone Access	-0.018*** (0.006)	-0.018*** (0.006)	-0.019*** (0.006)	0.005 (0.005)	0.005 (0.005)	0.004 (0.005)	-0.014 (0.010)	-0.015 (0.009)	-0.016* (0.009)
Internet Access	-0.021*** (0.006)	-0.024*** (0.006)	-0.024*** (0.006)	-0.029*** (0.005)	-0.032*** (0.005)	-0.033*** (0.005)	-0.112*** (0.010)	-0.120*** (0.010)	-0.113*** (0.010)
Muslim Dummy	-0.012 (0.011)	-0.010 (0.010)	-0.008 (0.011)	0.025** (0.010)	0.028*** (0.011)	0.030*** (0.011)	-0.011 (0.017)	-0.004 (0.017)	-0.005 (0.017)
Countries	28	28	28	28	28	28	28	28	28
Obs.	17057	17057	170057	17057	17057	170057	17057	17057	170057

Notes: Country dummies and the constant are included in the regression. Robust standard errors reported.
 (*) (**) (***) Denotes (10)(5)(1)% significance.

columns of Table 3.6. This is in contrast to the macro section of the study. This may reaffirm our prior, that an increase in income and its effect on health is best examined at the household level, rather than the global macro level. Examining the magnitude of this coefficient, evaluated at the mean, from the corresponding Table 3.7, a 1% increase in household income decreases the probability of omitting a doctor's appointment by approximately 1%.

Household size is positively associated with the choice of skipping a doctor's visit, whereas owning more household amenities are negatively related to skipping a doctor's visit. In addition, being educated at the secondary school level or greater is negatively associated with missing a doctor's appointment. The corresponding marginal effects evaluated at the mean suggest that being educated at a secondary school level or greater reduces the probability of missing medical appointments by 3%.

The following three columns examine the relationship between the selected variables and whether households cease the use of regular medication when a crisis occurs. The use of regular medication may be expensive and may amount to a significant share of a household budget. Stopping the use of such medication may reduce short term health levels, although pursuing this course of action may not be life threatening to the individual. When a negative shock occurs, it may be common to find that an individual may sacrifice their individual health, to try and raise the welfare of their household by cutting expenditure on medication, so it may be directed to other consumption decisions. With the presence of financial services, if credit is available or accumulated savings are in liquid forms and not in bulky assets this may be avoided. The results show that ownership of all three financial measures in Table 3.6, a bank account, debit card, and credit card are negatively associated with ceasing the use of regular medication in times of an economic crisis. The magnitude of the coefficients follow the pattern exhibited in the first three columns of Table 3.6, where ownership of a bank account has the largest coefficient, followed

by a debit card and finally a credit card. The corresponding marginal effects from Table 3.7 suggest that, the use of a bank account may reduce the probability of stopping the use of regular medicine in times of a crisis by 4%. This figure falls to 2% for ownership of a debit card, and 1% for the use of a credit card. The results seem to suggest that the savings channel, with its greater magnitudes than the credit channel is more important to maintaining health outcomes when a negative economic shock occurs.

Several covariates enter this specification significantly. As in the macro section of the study, education remains important in the prevention of ceasing the use of regular medication. An educated household may be more suited to identify the negative consequences of ceasing the use of medication, therefore may encourage that this doesn't occur. Income remains negative and significant, and household wealth remains insignificant. Living in an urban area increases the probability of ceasing the use of regular medication. This may be explained if one assumes that medical facilities are more abundant in urban areas. If an individual's health status deteriorates once the use of regular medication is stopped, living in an urban area may allow for treatment to be administered far quicker than in a rural area.

The final three columns of Table 3.6 examine the relationship between finance and cutting staple food consumption in times of crisis. This builds upon the hypothesis of Claessens & Feijen (2006) that finance may quell hunger. The results show a strong negative correlation between all three financial variables and cutting staple food consumption during a negative economic shock. The coefficients on finance in the final three columns of Table 3.6 are not fully consistent with the coefficients in columns 1–6. The largest coefficient on finance is when the finance measure is the ownership of a bank account. This is consistent with the findings in the earlier columns. It would be expected that this coefficient is the largest as it would have both the savings and credit channel embodied within it. It may also include further facilities available from the financial system, for example, payment services and the

ability to process any other financial transactions. The coefficient on ownership of a debit card, which may represent the McKinnon conduit effect, has a coefficient smaller than that of the credit channel which differs to the earlier results. This suggests that when an economic crisis hits, borrowing decreases the probability of reducing staple food consumption by 6.3%, an effect almost double than using savings (3%) according to the marginal effects in Table 3.7. A plausible explanation may be that savings in grain or alternate food reserves may be reducing the magnitude of the financial savings channel. This is because grain reserves or excess food may be kept as opposed to sold and then stored as non-monetary savings. However, the use of monetary savings is still important to prevent the reduction in staple food consumption as shown in Table 3.6.

Wealth effects are negative yet remain insignificant and income retains its significance. Living in an urban area increases the probability of cutting back staple food consumption. This may be attributable to the fact that in rural areas, the primary occupation is often agriculture. Hence, in times of a negative shock the household may exploit grain/food reserves and consume these excess produces, as opposed to selling their produce or trading it for alternate food. Education remains negative and significant, and an increase in household size is positively associated with cutting down on staple food consumption.

Overall the results from the micro section support the findings from the macro portion of the study. Together the novel approach of using both a macroeconomic and a microeconomic dataset to investigate the relationship between finance and health has led to interesting findings. The results show that finance plays a role in improving health outcomes.

3.5 Conclusion

This paper examines whether finance does play a role in improving health outcomes. Utilising both a macro and a micro dataset, the results show that finance may be conducive at increasing health levels. The macro data suggests that deeper financial sectors are negatively associated with infant and child mortality. Deeper financial sectors may provide credit to firms that engage in health promoting activities. Additionally, the financial system can offer households a means to utilise savings and deposits in times of a negative economic shock. This allows them to consumption smooth during this turbulent period. I test this hypothesis more directly using data from a household survey during the recent economic crisis. I find that financial usage reduced the probability that households skipped scheduled doctor's visits, ceased the use of regular medicine, and decreased their staple food consumption. Furthermore, the availability and use of finance can prevent a household from jeopardising its asset base through the sale of grain reserves, livestock and homes, which leaves the household more vulnerable should an illness be encountered in the future.

This paper suggests that studying the health component between finance and human capital is as important as examining the relationship between finance and education and should not be ignored. Moreover, this study suggests that future survey design should not neglect questions regarding financial usage, and the role the financial system may play in aiding health promotion.

Chapter 4

Financial breadth and poverty reduction

4.1 Introduction

Financial development consists of more than just financial deepening. Recent attention has been focused towards the inclusiveness of the financial sector and in particular its breadth or outreach. Financial deepening has been shown to be positively associated with economic growth and negatively related to various poverty measures. However, a deep financial sector may not be broad. Therefore its benefits may not be felt by the most impoverished if it is inaccessible.

In this paper I study whether financial breadth, measured by the number of physical financial terminals may reduce both absolute and relative poverty rates. I find that a 10% increase in financial breadth reduces the \$1 and \$2 a day headcount rate on average by 0.2% but does not increase the income of the poor.

To address the research question, I examine a panel of developing countries over the period 2004–2010. Finance is measured using new measures of financial access, notably the number of automated teller machines (ATMs) and bank branches per 100,000 people, and per 1,000km². I use a fixed effects estimator to control for endogeneity bias that may arise from country specific effects, where unobserved country characteristics may be driving reductions in poverty and not financial access. Furthermore, I control for reverse causality, a second form of endogeneity as reductions in poverty may stimulate a demand for financial services. I use the error correction two stage least squares (EC2SLS) instrumental variable estimator. The selected instruments are dummy variables that measure varying levels of media freedom. The validity of these instruments is subject to further scrutiny where their exogeneity is tested using two approaches. The first is by their direct inclusion in the regression specification and second, by a new novel approach suggested by Conley et al. (2012). The results indicate that the instruments are plausibly exogenous.

This paper contributes to the literature as it shows that financial access may reduce absolute poverty, but not relative poverty. Moreover, it suggests that the measures of financial breadth used in this study are heterogeneous, therefore not

considering all the measures may lead to inaccurate conclusions. The results from this study appear to confirm the increasing evidence that the poor only require the simplest functions of the financial system if they are to benefit from more finance. This complements recent studies which show that the savings channel is more relevant to poverty reduction than the credit channel. Therefore, it may be of importance to increase financial outlets that offer these services specifically.

Studies show that increased financial development, solely measured by financial depth is poverty reducing. Therefore it is interesting to find out whether the same may be said about financial breadth. When Guillaumont Jeanneney & Kpodar (2011) interact certain financial access measures with the available financial depth variables, they find that geographic coverage strengthens the positive impact an increase in M3/GDP has on poverty reduction. This provides additional motivation to research the impact of financial breadth on poverty reduction. Moreover, in Africa less than one in five households have access to finance, Beck et al (2009), proving that the study of financial inclusiveness requires much greater attention.

4.2 Existing literature and hypotheses

4.2.1 Previous research

Beck et al. (2007) examine whether various depth based indicators of financial development may reduce poverty. Using private credit as a ratio of GDP, and commercial bank assets to the sum of commercial and central bank assets they find; financial development disproportionately boosts the income of the lowest quintile, that financial development lowers income inequality, and that financial development may reduce the fraction of the population living on less than a dollar a day. Further studies that use depth measures of financial development have taken this work further, (Akhtar & Daly (2009); Guillaumont & Kpodar (2011); Perez-Moreno (2011)).

In particular, Perez-Moreno (2011) and Guillaumont Jeanneney & Kpodar (2011) find that financial development mainly contributes to poverty reduction through the conduit effect, McKinnon (1973). This is opposed to the credit channel.¹ The McKinnon conduit effect implies that even if credit is not offered by financial institutions, these institutions may still render themselves useful by offering profitable opportunities to save and easily access deposits. This may be beneficial to the poor who may only require basic financial facilities.

Due to thin and inadequate data on people's use of financial services, the outreach dimension of financial development has been largely overlooked. A small subset of literature is emerging on this topic and certain conclusions have already been reached.

Burgess and Pande (2005) examine the bank branch expansion program created by the Indian government from 1977–1990. The Indian social banking experiment set out a law that if a bank opened a branch in an area already served by banks, then they had to open four branches in currently unserved regions. The resulting impact on rural poverty was dramatic. The rural headcount rate fell by 14–17 percentage points, whereas rural savings accounts increased by over one-hundred million, and rural loan accounts by twenty-five million.

Further studies that focus on financial access and the poor include Mookerjee & Kalipioni (2010) who find that bank branch outreach may reduce income inequality. Ayyagari et al. (2013) further examine whether financial access had any impact on poverty in India. Their results contrast to those by Burgess & Pande (2005) as the authors find that it was the increased depth of the financial system, and not increased breadth that was the main driver of poverty reduction in their study. The explanation to support this claim was that the increased financial depth in India allowed small and medium enterprises to increase in size, offering further employ-

¹The variable private credit as a ratio of GDP is generally used to measure the credit channel of financial development, whereas M2/M3 ratios to GDP predominantly measure the McKinnon conduit effect.

ment opportunities that eventually reduced poverty and not by offering credit to households.

As the literature shows that the poor benefit far more from the most basic services available to them, the expansion of simple deposit accounts for transactional basis appear to be the most poverty reducing. With the growth of deposit accounts, four times greater than loan accounts in the study by Burgess & Pande (2005), this may show the importance of differentiating between the savings and credit channels offered by financial institutions. Whereas when using financial depth indicators, M2/M3 ratios to GDP have been shown to capture the McKinnon conduit effect and private credit to GDP has been used to measure credit services available to the poor. I propose similar measures may exist with financial breadth variables. The number of ATMs may proxy for the savings and deposits channel of financial intermediation, whereas the number of bank branches may capture the additional services available from financial institutions. The ability to differentiate between these two channels using financial breadth data, similar to the ways when using financial depth indicators may reaffirm any prior conclusions made about the financial system and poverty reduction.

4.2.2 Financial access and poverty reduction

Financial access may quell poverty through several channels. Access to credit may allow young talented entrepreneurs to start up businesses, or expand their human capital, potentially lifting them out of poverty, Levine (2008). Moreover, as human capital increases in the economy, aggregate productivity of the workforce increases which may lead to higher economic growth. With the creation of new competitive firms, or expansion of small and medium enterprises (SMEs) who were previously credit constrained, poverty may be reduced through two methods. First, additional growth effects may take place through the encouragement of efficiency within the

economy, and second, as firms expand they may create new formal sector jobs. These may be offered to the poor, providing them with employment and stable incomes, thus reducing poverty.

In times of crisis, in order to remain on a smoothed consumption path, a household may resort to borrowing. Chapter 3 finds evidence that the use of financial services may reduce the probability a household skips medical visits, ceases the use of regular medication and cuts down on staple food consumption in times of economic crisis. These results stress the importance of financial availability in maintaining the poor's welfare levels.

Importantly, this is not to say that it is always helpful to borrow when a shock occurs. The danger of over-borrowing and issuing loans to those who are not credit worthy, over-optimistic entrepreneurs and highly leveraged firms may be damaging, and is one way that financial crises come into existence.

Improved financial outreach does not revolve entirely around increased credit access. Greater financial breadth may offer the previously unbanked a profitable means to save and access deposits. Accumulated savings, can provide consumption smoothing opportunities in times of negative economic shocks and offer the poor opportunities to self-finance human capital or entrepreneurial investment. In periods of unanticipated inflation, deposit accounts that are indexed to inflation may prevent any accumulated savings from eroding away in value. This is important for the poor whose incomes are not indexed to inflation, such as pensions or state determined transfers.

Ownership of deposit accounts offers a safe method of receiving remittance payments from abroad. Sending large sums of money via the post is extremely risky. Furthermore, physically transporting this money from one country to another is inefficient and expensive. A financial institution that offers payment services and allows payments to be received from abroad, may mitigate such problems and quell poverty. However, there is a danger that good financial access may promote re-

mittances and create a reliance on these payments. This provides disincentives for receiving parties to move out of poverty on their own accord. Nevertheless, in times of desperation, these payments may reduce the amounts of transitory poverty.

4.2.3 Barriers to finance

There are a variety of barriers that may hinder access to financial services. The barrier studied in this paper is the lack of geographical or physical access. This implies that many of the population within a country are not within easy reach of financial facilities. These include ATM terminals, bank branches and other financial institutions that offer financial services, World Bank (2009). However, even with abundant geographic access, the poor may still voluntarily exclude themselves from the financial system. This is not a concern, as the opportunity to utilise finance still exists.

Further barriers include; price discrimination, inadequate service provision and informational barriers. Minimum balance requirements, account maintenance fees, minimum loan requirements and transaction fees for the use of ATM machines, or to transfer/receive money internationally are examples of pricing barriers. Beck et al. (2008) show that on average, minimum balance requirements are 12% of GDP per capita in their sample and minimum loan amounts are substantially higher. In their sample, on average, ATM charges were ten US cents per transaction and international transfer fees were 6% of the sum transferred. This escalated up to 20% in the Dominican Republic.

Bureaucracy and discrimination may prevent the poor from obtaining formal financial accounts. In many developing countries, to open a credit or deposit account requires four legal documents, an example of this bureaucracy. This makes financial inclusion for the often document-less poor significantly difficult.

Prejudice that prevents financial access may be due to gender, social class, race,

or religious reasons and may be exasperated by social class. Empirical evidence by Muravyev et al. (2008) shows that firms managed by females, face a five percent lower probability of receiving loans and face higher interest rates. Weller (2009) examines racial discrimination and finds that non-whites have higher loan denial rates than whites even after controlling for relevant characteristics. Furthermore, the well connected may curtail financial access. Feijen (2005) finds that established industrialists try to eliminate competition from young firms during banking crises for their own gain.

Poor informational or contractual frameworks may amplify barriers to access stressing the importance of information. The establishment of public credit bureaus is one method suggested by Beck et al. (2009) to mitigate these barriers. Moreover, the establishment of private credit registries in Ukraine has managed to increase credit volumes, Grajzl & Laptieva (2011). Therefore any methods that decrease informational asymmetries may be deemed barrier reducing and foster greater financial outreach.

4.3 Data and method

The data consists of all developing countries worldwide. The descriptive statistics are presented in Table 4.1 and a full country list is available in the appendix, Table E.

The estimated regression is equation 4.1. The poverty data is unequally spaced and consists of many missing observations that plague the dataset. Most studies that examine poverty reduction have data that spans decades. To smooth out any data imperfections the data is usually averaged into five year periods. As the financial access data is annual and only available from 2004–2010, there are no further solutions than to work with the data available. Attempting a King & Levine (1993)

Table 4.1: Descriptive statistics

Variable	Mean	Standard Deviation	Minimum	Maximum
Headcount \$1 a day rate	13.032	18.916	0.0000	87.720
Headcount \$2 a day rate	23.307	25.814	0.0500	95.150
Income share of poor	4.5405	1.0439	1.6285	6.8446
GDP per capita	7.4339	1.3878	4.4802	11.195
Government spending	15.005	6.1334	2.0470	47.526
Trade openness	94.900	53.951	0.3088	445.91
Inflation	0.07449	0.2029	-0.1418	5.5017
Rule of law	-0.3074	0.7873	-1.9700	1.7629
ATMs per 100,000	36.334	74.306	0.0000	1009.3
ATMs per 1,000km sq	232.73	1613.5	0.0000	23156
Banks per 100,000	17.898	46.419	0.3400	590.21
Banks per 1,000km sq	96.628	564.00	0.0100	5992.9

Notes: GDP and income of the poor reported as logs.

type regression is not possible due to a lack of data, and to maximise the sample, a panel approach is taken as opposed to studying a single cross section.

$$Y_{it} = \alpha_i + \beta X_{it} + \gamma F_{it} + \epsilon_{it} \quad (4.1)$$

The benchmark specification uses ordinary least squares (OLS) to first check whether a relationship between financial access and poverty does exist. If endogeneity is present then the OLS results will be biased and inconsistent. Therefore I estimate equation 4.1 using a fixed effects estimator. This is the preferred specification. The subscript i indexes for individual countries, whereas t indexes time. The dependent variable Y is one of the chosen poverty measures, X is a matrix of covariates found to impact poverty, and the coefficient of interest is γ . The financial breadth variables enter matrix F one at a time.

The data has a limited time dimension, and most of the variance is between countries, as opposed to within. Many of the selected variables are slowly changing through time. The use of a fixed effects estimator may absorb much of the explanatory power of these variables. This may yield these explanatory variables

statistically insignificant despite the fact that they may be economically significant.²

There may be two potential endogeneity problems that need to be accounted for. The main endogeneity problem is that nations that have strong and numerous financial institutions also tend to have other factors associated with them that may reduce poverty. Therefore, despite the data exhibiting limited time variation, the fixed effects model is selected. A second potential endogeneity problem may be simultaneity bias. As poverty falls, the demand for financial services may be stimulated. However, this problem is less severe. It would be unexpected that over the course of one year, that a fall in poverty would almost instantly increase the demand and provision of financial services. A lag of two or three years may be more appropriate to suggest that when poverty falls, the quantity of financial outlets will have increased. Therefore studies that utilise five year averages would be more likely to potentially suffer from this reverse causality bias. Moreover, Perez-Moreno (2011) in his study of causality between finance and poverty found no evidence that decreases in poverty may stimulate a demand for financial services. Nevertheless, to control for this second form of endogeneity, I use an error component two staged least squares estimator. This is a random effects estimator derived by Baltagi, which uses more moments than the standard random effects estimator therefore it is more efficient.³ I instrument for finance using two dummy variables that represent varying levels of media freedom. Media freedom is found to be a determinant of financial development because it reduces information asymmetries. As the financial system is very sensitive to information, a reduction in these asymmetries will therefore enhance financial development, Djankov et al. (2003).

The dependent variables are the two poverty headcount rates; (the \$1 and \$2 a day rate) and the income of the poorest quintile. The data sources for the dependent

²Due to the limited time dimension of the data and because of the limited within variation, I also run regressions using the random effects estimator. The random effects estimator does not control for country specific effects, therefore I include regional dummies in the specification to try account for this issue. Note that inserting regional dummies in equation 4.1 would result in them being omitted by the fixed effects transform.

³For details of this estimator and its prior applications see Baltagi (2008).

variables are the World Bank (2011), UN Wider (2012), and IEP (2012).

The X matrix of equation 4.1 contains several covariates that are found to impact poverty and are selected to follow past macro studies such as Dollar & Kraay (2002). Included in matrix X is per capita GDP, government spending, trade openness, inflation, and the rule of law. The variables are available from the World Bank (2012) and the WGI (2012).

GDP per capita would be expected to reduce poverty; hence, it is expected to be negatively signed in the specifications that contain the headcount rate of poverty. When the dependent variable is the income of the poor it would be expected that GDP per capita is positively signed. The financial breadth variables enter matrix F one at a time and would be expected to reduce poverty. The chosen variables are suitable to measure financial access/breadth as they have already been used abundantly in the literature. Further variables such as the number of deposit accounts in a country are further measures of financial access. However, data for these variables is less abundant than the selected measures used in this chapter, further validating their inclusion. Government consumption as a ratio of GDP may be positively or negatively signed, as redistributive schemes through tax and social security benefits may reduce poverty. However, if the rich use their established connections and political power to exploit the poor, then increased government consumption, may be harmful to poverty alleviation. The same applies to trade openness. If a nation becomes more open to international trade and is competitive, then it may increase production and sell in a larger market. This may create formal employment opportunities and reduce poverty. On the other hand, if the country is less competitive than others in the world market, then businesses may shut down creating greater unemployment, exasperating the poverty problem. Inflation is expected to harm the poor far more than the rich who may have access to financial instruments to hedge against inflation. A higher rule of law should be poverty reducing, as it may allow the poor to have greater protection of their assets and prevent exploitation

from the rich. Moreover, a greater rule of law would imply less corruption, which may result in the poor avoiding to have to pay expensive bribes for the use of public services. These payments may sum to significant amounts of their income. On the other hand, a greater rule of law may in fact shut down the informal economy. If the majority of the poor work in the informal sector, then eradicating this employment opportunity may be poverty increasing.

4.4 Results

4.4.1 OLS, fixed effects, and random effects results

Table 4.2 presents the benchmark results using the OLS estimator. Three dependent variables are used with the first four columns examining financial access on the \$1 a day headcount rate of poverty. The following four columns examine the \$2 a day headcount rate of poverty and the final four columns examine the income of the poor. The income of the poor is measured as the share of income of the lowest income quintile.

When the dependent variable is either the \$1 or \$2 a day poverty headcount rate, most of the variables enter significantly. From the controls only the inflation rate is insignificant throughout all eight specifications. Moreover, four of the variables enter with the negative sign suggesting that an increase in income, financial access, government spending and trade openness are all negatively associated with poverty. The final significant variable is the rule of law. This enters with a positive sign, suggesting that an increase in the rule of law may increase the poverty rate. Although it was mentioned earlier in the text that the sign of this coefficient may be ambiguous this result may be a case of endogeneity, where countries that tend to have high poverty rates, also tend to have a low rule of law.

When the dependent variable is the income of the poor, two of the five variables

Table 4.2: Benchmark regressions on the \$1, \$2 a day rate of poverty and income of the poor

Specification	\$1 a day rate				\$2 a day rate				Income of the poor				
	ATM per 100,000	ATM per 1,000km ²	Banks per 100,000	Banks per 1,000km ²	ATM per 100,000	ATM per 1,000km ²	Banks per 100,000	Banks per 1,000km ²	ATM per 100,000	ATM per 1,000km ²	Banks per 100,000	Banks per 1,000km ²	ATM per 1,000km ²
GDP per capita	-0.050*** (0.010)	-0.087*** (0.010)	-0.083*** (0.010)	-0.100*** (0.009)	-0.091*** (0.011)	-0.139*** (0.010)	-0.140*** (0.012)	-0.152*** (0.009)	0.848*** (0.036)	0.858*** (0.033)	0.836*** (0.037)	0.836*** (0.032)	0.836*** (0.032)
Financial breadth	-0.045*** (0.008)	-0.025*** (0.006)	-0.032*** (0.012)	-0.013** (0.006)	-0.054*** (0.008)	-0.032*** (0.007)	-0.021 (0.014)	-0.010 (0.007)	0.020 (0.024)	0.056** (0.024)	0.017 (0.047)	0.070*** (0.024)	0.070*** (0.024)
Government spending	-0.004 (0.017)	-0.036* (0.019)	-0.039* (0.018)	-0.054*** (0.019)	-0.066*** (0.020)	-0.106*** (0.023)	-0.113*** (0.023)	-0.124*** (0.023)	-0.023 (0.067)	-0.077 (0.069)	0.017 (0.073)	-0.059 (0.068)	-0.059 (0.068)
Trade openness	-0.058*** (0.013)	-0.056*** (0.017)	-0.078*** (0.015)	-0.082*** (0.016)	-0.077*** (0.015)	-0.070*** (0.018)	-0.102*** (0.017)	-0.104*** (0.017)	0.233*** (0.071)	0.163** (0.076)	0.137** (0.067)	0.138** (0.063)	0.138** (0.063)
Inflation	0.145 (0.102)	-0.094 (0.141)	0.002 (0.122)	-0.162 (0.142)	0.075 (0.122)	-0.287 (0.180)	-0.095 (0.156)	-0.304 (0.191)	0.638 (0.547)	0.173 (0.542)	0.718 (0.499)	0.179 (0.513)	0.179 (0.513)
Rule of law	0.041*** (0.014)	0.062*** (0.018)	0.045*** (0.014)	0.054*** (0.016)	0.050*** (0.015)	0.080*** (0.019)	0.054*** (0.016)	0.062*** (0.018)	0.157** (0.062)	0.168*** (0.064)	0.170*** (0.058)	0.175** (0.070)	0.175** (0.070)
Adjusted R ²	0.62	0.54	0.56	0.57	0.72	0.67	0.65	0.66	0.86	0.87	0.86	0.86	0.86
Observations	214	187	213	196	211	184	208	190	205	178	203	185	185

Notes: All regressions estimated using ordinary least squares with a constant. Robust standard errors reported

Income of the poor measured as the income of the lowest quintile.

(*) (**) (***) Denotes (10)(5)(1)% significance.

that entered significantly in the earlier columns now become statistically insignificant. These include government spending and to some extent financial breadth. However, the variables income per capita, trade openness and when significant, financial breadth all enter with the expected positive signs. The rule of law variable retains its positive value. If it was to complement the results from the previous eight columns it would enter the final four columns with a negative sign. This further suggests that there may be a potential endogeneity problem with the OLS specification.

Table 4.3 presents the fixed effects results. This estimator is chosen as it may be that nations that with strong financial institutions and strong governance also tend to have other factors associated with them that may reduce poverty.

The main coefficient of interest, financial breadth, exhibits interesting results. When poverty is measured by the \$1 and \$2 a day headcount rate, certain financial access coefficients are negative and significant. When the measure of poverty is the income of the poor, no financial variables are significant. Moreover, only the variables that measure the number of ATM machines are positive and significant in the first eight columns. The magnitude of the coefficient in columns 1 and 2 suggests that a 10% increase in financial breadth may reduce poverty by 0.14%. In columns 5 and 6, when poverty is measured as the \$2 a day measure, the magnitude increases to 0.25% on average. In comparison to other coefficients, this effect is less than a tenth of that associated with a similar increase in GDP per capita. This is a small effect; however, this effect may become larger if other barriers to finance, for example, price discrimination were reduced in tandem. Therefore a reduction in these barriers may consolidate the positive effect that increased financial access may have on the poor, but I leave this question for future research.

It is interesting that only the variables that measure ATM coverage are significant in Table 4.3, as opposed to all the measures of financial breadth. This may be explained by the fact that the facilities available from ATMs and bank branches may

Table 4.3: Fixed effects regressions on the \$1, \$2 a day rate of poverty and income of the poor

Specification	\$1 a day rate				\$2 a day rate				Income of the poor				
	ATM per 100,000	ATM per 1,000km ²	Banks per 100,000	Banks per 1,000km ²	ATM per 100,000	ATM per 1,000km ²	Banks per 100,000	Banks per 1,000km ²	ATM per 100,000	ATM per 1,000km ²	Banks per 100,000	Banks per 1,000km ²	ATM per 1,000km ²
GDP per capita	-0.107*** (0.031)	-0.117*** (0.037)	-0.124*** (0.033)	-0.108*** (0.034)	-0.173*** (0.038)	-0.196*** (0.044)	-0.233*** (0.053)	-0.230*** (0.061)	1.304*** (0.135)	1.172*** (0.109)	1.195*** (0.103)	1.145*** (0.109)	
Financial breadth	-0.014** (0.006)	-0.014* (0.008)	-0.002 (0.009)	-0.007 (0.010)	-0.026** (0.012)	-0.024*** (0.010)	-0.003 (0.014)	-0.006 (0.014)	-0.029 (0.024)	-0.018 (0.019)	-0.025 (0.026)	-0.020 (0.025)	
Government spending	-0.016 (0.013)	-0.021 (0.013)	-0.019 (0.016)	-0.016 (0.016)	-0.019 (0.021)	-0.020 (0.018)	-0.023 (0.026)	-0.017 (0.022)	-0.027 (0.048)	-0.030 (0.048)	-0.028 (0.037)	-0.043 (0.045)	
Trade openness	-0.019 (0.028)	-0.016 (0.033)	-0.024 (0.036)	-0.013 (0.039)	0.010 (0.026)	0.022 (0.030)	0.011 (0.041)	0.038 (0.043)	-0.043 (0.084)	-0.032 (0.073)	-0.070 (0.064)	-0.064 (0.075)	
Inflation	-0.012 (0.049)	-0.132 (0.082)	0.008 (0.044)	-0.062 (0.085)	0.035 (0.054)	-0.086 (0.099)	0.028 (0.052)	-0.003 (0.136)	-0.016 (0.201)	-0.040 (0.239)	-0.085 (0.109)	-0.064 (0.075)	
Rule of law	0.057*** (0.049)	0.062*** (0.082)	0.056*** (0.018)	0.054*** (0.018)	0.076*** (0.021)	0.091*** (0.024)	0.078*** (0.028)	0.087*** (0.031)	0.010 (0.066)	0.081 (0.085)	0.069 (0.055)	0.101** (0.047)	
Adjusted R ²	0.50	0.48	0.46	0.48	0.56	0.53	0.50	0.46	0.82	0.83	0.84	0.82	
Countries	68	63	73	73	68	63	72	71	68	63	73	72	
Observations	214	187	213	196	211	184	208	190	205	178	203	185	

Notes: All regressions estimated using fixed effects. Constant and financial crisis dummies included. Robust standard errors reported. Income of the poor measured as the income of the lowest quintile.

(*) (**) (***) Denotes (10)(5)(1)% significance.

Table 4.4: Random effects regressions on the \$1, \$2 a day rate of poverty and income of the poor

Specification	\$1 a day rate				\$2 a day rate				Income of the poor					
	ATM per 100,000	ATM per 1,000km ²	Banks per 100,000	Banks per 1,000km ²	ATM per 100,000	ATM per 1,000km ²	Banks per 100,000	Banks per 1,000km ²	ATM per 100,000	ATM per 1,000km ²	Banks per 100,000	Banks per 1,000km ²	ATM per 1,000km ²	Banks per 1,000km ²
GDP per capita	-0.082*** (0.014)	-0.088*** (0.013)	-0.093*** (0.013)	-0.096*** (0.014)	-0.111*** (0.014)	-0.130*** (0.014)	-0.141*** (0.016)	-0.146*** (0.016)	0.995*** (0.042)	0.969*** (0.046)	0.991*** (0.044)	0.978*** (0.043)		
Financial breadth	-0.015*** (0.006)	-0.012* (0.006)	-0.007 (0.007)	-0.005 (0.006)	-0.029*** (0.009)	-0.025*** (0.012)	-0.012 (0.008)	-0.008 (0.006)	0.008 (0.014)	0.022 (0.015)	-0.017 (0.020)	-0.006 (0.016)		
Government spending	-0.007 (0.013)	-0.014 (0.014)	-0.007 (0.016)	-0.020 (0.017)	-0.029 (0.018)	-0.020 (0.021)	-0.025 (0.025)	-0.032 (0.026)	-0.082 (0.034)	-0.093*** (0.036)	-0.057 (0.035)	-0.064* (0.038)		
Trade openness	-0.013 (0.021)	-0.014 (0.025)	-0.009 (0.024)	-0.009 (0.025)	-0.001 (0.018)	0.004 (0.023)	0.008 (0.022)	0.006 (0.024)	-0.063 (0.054)	-0.091 (0.056)	-0.066 (0.054)	-0.087 (0.054)		
Inflation	0.007 (0.047)	-0.037 (0.063)	0.029 (0.041)	-0.009 (0.068)	0.088* (0.048)	-0.022 (0.097)	0.034 (0.067)	-0.045 (0.103)	-0.045 (0.125)	-0.001 (0.206)	-0.026 (0.127)	0.102 (0.200)		
Rule of law	0.050*** (0.013)	0.054*** (0.018)	0.045** (0.018)	0.046** (0.018)	0.054*** (0.016)	0.065*** (0.023)	0.049** (0.022)	0.052*** (0.024)	0.020 (0.046)	0.035 (0.052)	0.050 (0.037)	0.063* (0.035)		
Adjusted R ²	0.50	0.48	0.46	0.48	0.56	0.53	0.50	0.46	0.82	0.83	0.84	0.82		
Countries	68	63	73	73	68	63	72	71	68	63	73	72		
Observations	214	187	213	196	211	184	208	190	205	178	203	185		

Notes: All regressions estimated using random effects. Constant and financial crisis and regional dummies included. Robust standard errors reported. Income of the poor measured as the income of the lowest quintile.
 (*) (**) (***) Denotes (10)(5)(1)% significance.

differ. The former, ATM coverage may purely capture the basic facilities available to an individual. This may include increased physical access to deposit accounts, where monies may be deposited and withdrawn only. The latter, the physical access to a bank branch may offer a wider variety of services such as credit and more complex transaction/payment services. The results seem to suggest that for poverty alleviation only the most basic services are required for the poor, and in particular, the savings channel appears to be more important than the credit channel. This offers some support to studies that attempt to distinguish the effects of these channels on poverty using financial depth variables. For example, Guillaumont Jeanneney & Kpodar (2011) found that the McKinnon conduit effect (the savings channel), proxied by the ratio of M2/GDP may play a greater role in poverty reduction than the credit channel, where the latter is measured by private credit as a ratio of GDP. Importantly, the results also seem to suggest that the savings channel may not increase the incomes of the poor and enters the specifications insignificantly as do the bank branch variables. This may suggest that the poor use savings as an insurance substitute, where if a negative shock occurs, households may avoid dropping below the poverty line by consumption smoothing, as opposed to accumulating savings for human capital or entrepreneurial investment. However, examining this question is left for future research, where a microeconomic study may be more suitable to examine this hypothesis.

However, there may be many other potential explanations for the finding that ATMs are statistically significant in the regressions as opposed to the bank branch variables. One reason may be that the cost of delivery of an ATM machine is cheaper than that of a bank branch. Therefore in rural areas where poverty is more prevalent it may be far cheaper to install an ATM machine and provide financial access than installing a bank branch and requiring it to be staffed. Whereas in urban areas both ATM machines and bank branches may be abundant, the relative cost of provision is far lower due to the market size; hence, favouring one facility to the other may be

negligible. A further explanation is that the services required for a household or a firm differ. Whereas a firm may prefer a bank branch so it may open a credit line, or have further financing opportunities, at the household level the different types of service required may be far lower. Therefore measuring poverty, where the dollar a day rate may be more heavily influenced by household's access of finance, the ATM channel may pick up the direct effect much more cleanly. This is opposed to the variables measuring the quantity of bank branches that may pick up an indirect channel. The bank branch channel may influence poverty by offering firm's credit and expanding jobs in the future, but this may occur with a time lag. Therefore bank branches may be important to reduce poverty but over a longer time horizon of which the short sample studied in this Chapter does not cover.

The results show that GDP per capita is significant in all the specifications and enters with the correct sign. GDP is negative and significant in columns 1–8 and positive and significant in columns 9–12. This suggests that an increase in economic growth is poverty reducing. When the dependent variable is the \$1 a day headcount rate of poverty, the results suggest that a 1% increase in GDP per capita may reduce headcount poverty by approximately 0.11%. When the dependent variable is the \$2 a day headcount rate, this magnitude increases. The coefficient on GDP per capita in columns 5–8 suggests that a 1% increase in GDP per capita reduces poverty between 0.17–0.23% depending on the specification. In the final four columns, the results suggest a 1% increase in GDP per capita may increase the income of the poor by approximately 1.3%. This magnitude is somewhat larger than the results suggested by Dollar & Kraay (2002). However, this sample does not include developed nations, which may account for the large coefficients.

The results from columns 1–8 in Table 4.3 suggest that an increase in the rule of law, may increase headcount poverty. This result may be explained as follows. A higher rule of law may shut down both the informal and underground economy. If the majority of the impoverished work in these sectors, then eradicating this em-

ployment opportunity may be poverty increasing. In the final four columns when the dependent variable is the income of the poor, this coefficient remains positive and is only significant in one specification. A possible explanation for this finding is that a higher rule of law may promote secure investment opportunities for the poor and prevent their exploitation. For example, eradicating non-official payments for the unconnected may be inequality reducing vis-a-vis the rich and increase the incomes of the poorest quintile. Therefore, an increase in the rule of law may harm the poorest that rely on the informal and illegal sectors for employment, but in turn provides a platform for their future income growth, a plausible explanation for the results found in Table 4.3.

The remaining covariates remain insignificant throughout all twelve specifications. The overall fit of the regressions is typically high with overall R-squared figures ranging from 0.46–0.84 depending on the specification. The latter four columns, that measure poverty as the income of the poor, have the highest fit. This is in line with previous studies that examine the role of growth on the income of the poor conditional on various covariates.

Table 4.4 estimates the research equation using a random effects estimator. As the data used for this study has a limited time component, most of the variation is between countries rather than within. This may result in certain variables in the specification appearing statistically insignificant in Table 4.3 although in reality they may be economically significant.

Whilst the random effects estimator controls for serial correlation, it does not control for country specific effects. As a result, I introduce regional dummies into the estimated equation to attempt to mitigate any bias that may arise when not controlling for these individual specific effects. The results from Table 4.4 are relatively consistent with the findings in Table 4.3. This offers confidence that the findings are accurate. The variables GDP per capita enters columns 1–8 negatively and significantly and columns 9–12 positively and significantly. When the depen-

dent variable is the headcount rate, a 10% increase in GDP per capita may reduce poverty between 0.8–1.5%. The magnitudes are not largely dissimilar to the results in Table 4.3. When the measure of poverty is the income of the poor, GDP per capita is positive and significant with a coefficient approximately 0.98. This is somewhat smaller than the results in Table 4.3 but more in line with the results of Dollar & Kraay (2002), who suggest that the poor’s income growth is proportional to average income growth.

When financial breadth is examined, the coefficients are only significant in columns 1, 2, 5 and 6. This is similar to Table 4.3 and is when finance breadth is measured as the number of ATMs as opposed to bank branches. The dependent variable in these specifications is the \$1 and \$2 a day headcount rate of poverty. As in Table 4.3 the magnitudes of the coefficients are extremely similar. The coefficient on financial breadth is insignificant in the final four columns as in Table 4.3.

The rule of law variable enters the specification positively in all twelve columns. In the first eight columns this indicates that a higher rule of law is poverty increasing, whilst in the last four columns poverty decreasing. However, in the final four columns it is only significant in one specification. In terms of the magnitude of the coefficient, it is very similar in columns 1–4 to the size of the corresponding coefficients in Table 4.3. However, when the dependent variable is the \$2 a day rate of poverty, the magnitude of the rule of law increases. This increase is almost double in size to the corresponding estimates of Table 4.3. The remaining covariates remain insignificant in Table 4.4 and the overall fit of the specification is high.

4.4.2 Instrumental variable regressions

Whereas Table 4.3 controlled for the main endogeneity problem, Table 4.5 controls for a second potential form of endogeneity, simultaneity bias. As argued already, this may be far of a less serious problem. Nevertheless, to control for the second

endogeneity problem, I run instrumental variable regressions on the significant coefficients from Table 4.3. Table 4.5 presents the results of the determinants of financial breadth and the lower panel shows the first stage coefficients of the media freedom instruments.

The traditional instrumental variables used in the financial development literature such as legal origin and endowment have recently been questioned by Bazzi & Clemens (2013). Ayyagari et al. (2013) use media freedom to identify the effects of financial development in poverty reduction on a country study of India. They revisit the ideas proposed by Djankov et al. (2003) on how the financial system is extremely sensitive to information. A greater amount of press freedom may reduce information asymmetries and with greater information, depositors are more likely to deposit money knowing that it is secure, investors are happy to exchange funds for securities. Moreover, if information may be published freely which exposes firm malpractice, it may be easier for financial institutions to perform their monitoring function fostering financial development. If the media is free then it may also report interest rate spreads and stock information which may further enhance financial development. This is as it may outline which firms or banks are in strong positions relative to their competitors.

The results seem to confirm the findings of Table 4.3. The coefficients that are significant are GDP per capita, financial breadth and the rule of law. This is the case for all four columns in Table 4.5. When the dependent variable is the \$1 a day rate, the measure of trade openness enters negatively and significantly, and in columns 2 and 3 inflation enters positively and significantly.

The magnitude of the financial breadth variables increases slightly, and ranges from 0.03–0.06 depending on the specification. The values for the \$1 a day rate are smaller than those for the \$2 a day rate, consistent with the findings in Table 4.3. The values of GDP per capita fall in Table 4.5. However, the magnitude of these coefficients is still far greater than those associated with financial breadth. The

Table 4.5: Instrumental variable regressions on headcount poverty

Specification	\$1 a day rate		\$2 a day rate	
	ATM per 100,000	ATM per 1,000km ²	ATM per 100,000	ATM per 1,000km ²
GDP per capita	-0.060*** (0.020)	-0.089*** (0.016)	-0.093*** (0.023)	-0.142*** (0.020)
Financial breadth	-0.040*** (0.011)	-0.034*** (0.013)	-0.060*** (0.013)	-0.054*** (0.017)
Government spending	-0.014 (0.011)	-0.018 (0.013)	-0.024 (0.015)	-0.030* (0.017)
Trade openness	-0.033** (0.016)	-0.031* (0.018)	-0.028 (0.020)	-0.017 (0.023)
Inflation	0.042 (0.052)	0.064*** (0.016)	0.119* (0.067)	-0.087 (0.102)
Rule of law	0.047*** (0.014)	0.064*** (0.016)	0.058*** (0.018)	0.088*** (0.021)
First stage regression coefficients on media freedom				
Fully free Media (D)	3.836*** (0.892)	2.913*** (0.869)	3.122*** (0.787)	2.703*** (0.797)
Partly Free Media (D)	0.602** (0.279)	0.594** (0.203)	0.602** (0.254)	0.594*** (0.190)
Fully Free Media (M)	0.005 (0.104)	0.026 (0.088)	-0.002 (0.095)	-0.087 (0.102)
Partly Free Media (M)	0.117 (0.086)	0.076 (0.066)	-0.087 (0.079)	0.064 (0.021)
First stage F-stat	18.5	14.6	18.0	14.4
Sargan p-value	0.22	0.27	0.27	0.30
Adjusted R ²	0.60	0.52	0.68	0.62
Observations	212	185	209	182
Notes: All regressions estimated using EC2SLS. Constant and financial crisis dummies included. (* (** (***)) Denotes (10)(5)(1)% significance.				

rule of law coefficients remain positive and significant in Table 4.5 and increase in magnitude when the measure of poverty is the \$2 a day headcount rate.

The lower panel shows the first stage of the selected media freedom instrumental variables.⁴ The EC2SLS estimator uses two instruments for each selected instrumental variable, therefore there are four coefficients reported in the lower panel. The top two show the within transformed instruments, whilst the lower two show the between transformed instruments. The within transformed instruments are positive and significant for both variables relative to having an a censored media. Therefore the coefficients are correctly signed as expected and the magnitude of the free media is greater than the partly free media. The diagnostic tests for the specifications are shown in the bottom four rows of Table 4.5. Running the first stage regressions to check for weak instruments, the F-statistics perform well with values far greater than the researchers target figure of 10. Testing the exogeneity of the instruments, the Sargan p-values are all greater than 0.2 and the null hypothesis that the instruments are valid is not rejected. The adjusted R-squared values show the regressions have a high fit with values ranging between 0.52–0.68

4.4.3 Robustness checks

A potential problem with the instruments used for financial breadth are that they may not be exogenous. This section attempts to address this concern. Table 4.6 uses a random effects specification and examines whether the chosen instruments have any significant direct effect on the dependent variable, poverty.

Towards the bottom of Table 4.6 are the two variables of concern. The first of the two is the dummy variable that takes the value one if the media is free in a country, and the second variable is a dummy that takes the value of one if the media in a country is partly free. The reference category is a fully censored media. The

⁴The remaining covariates are excluded from the table for brevity.

Table 4.6: Testing the exogeneity of the instruments

Specification	\$1 a day rate		\$2 a day rate	
	ATM per 100,000	ATM per 1,000km ²	ATM per 100,000	ATM per 1,000km ²
GDP per capita	-0.102*** (0.015)	-0.111*** (0.014)	-0.139*** (0.033)	-0.166*** (0.034)
Financial breadth	-0.016*** (0.006)	-0.015* (0.008)	-0.034*** (0.012)	-0.033** (0.015)
Government spending	-0.016 (0.013)	-0.021 (0.014)	-0.024 (0.021)	-0.030 (0.020)
Trade openness	-0.031 (0.021)	-0.026 (0.023)	-0.019 (0.019)	-0.010 (0.022)
Inflation	0.001 (0.050)	-0.133 (0.082)	0.072 (0.057)	-0.088 (0.118)
Rule of law	0.050*** (0.014)	0.055*** (0.018)	0.062*** (0.018)	0.079*** (0.026)
Full free media	-0.154 (0.032)	-0.006 (0.034)	0.011 (0.043)	0.021 (0.045)
Partly free media	-0.145 (0.011)	-0.014 (0.013)	0.007 (0.016)	0.010 (0.018)
Adjusted R ²	0.50	0.48	0.46	0.48
Observations	214	187	213	196

Notes: All regressions estimated using random effects.
Constant and financial crisis dummies included.
(*) (**) (***) Denotes (10)(5)(1)% significance.

instruments validity depends on the fact that they do not influence the outcome variable poverty directly. In Table 4.6 we can see that these dummy variables enter the four specifications insignificantly. This offers some justification for their use as instruments for financial breadth in Table 4.5.

Conley et al. (2012) provide a second method to test the exogeneity assumption of the instruments. The method used by Conley et al. (2012) involves assigning a predetermined value θ that corresponds to a direct effect on the dependent variable.

Once the value of θ is assigned, then the second stage of the regression is re-run to examine any changing effect on the coefficient of interest. If media freedom has a large role to play in poverty alleviation then the estimated coefficient of financial access will be sensitive to small changes in θ . If the estimated coefficient on the instrumented variable remains constant then this alleviates any concerns about the validity of the instrument. Whereas the Sargan test has been criticised for being weak Murray (2006), the method proposed by Conley et al. (2012) may offer additional support for the chosen instruments.⁵

Figure 4.1 and 4.3 corresponds to the regression when the financial breadth

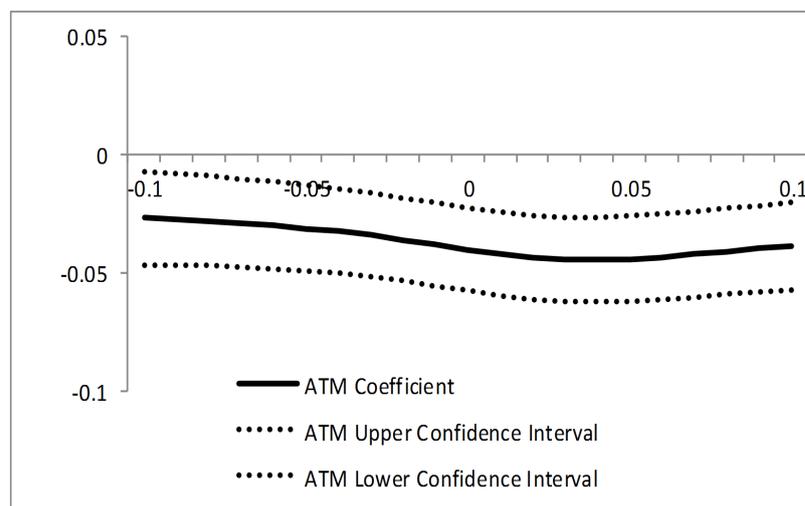


Figure 4.1: ATMs per 100,000 individuals and the \$1 a day rate

measure is the number of ATMs per 100,000 individuals. Figure 4.1 tests the instruments exogeneity when the dependent variable is the dollar a day rate of poverty. Figure 4.3 tests the instruments exogeneity when the dependent variable is the two dollar a day rate of poverty. Both figures show that the slope of the coefficients is relatively flat and the confidence intervals do not cross zero. This is even when θ takes a value of -0.10 which in comparison to the finance coefficients in Table 4.3 is over twice their size.

⁵Specifically, the Sargan test asks whether any of the instruments is invalid, but based upon a conjecture that one is valid to just identify the equation. Therefore if too few instruments are valid, the Sargan test is biased and inconsistent.

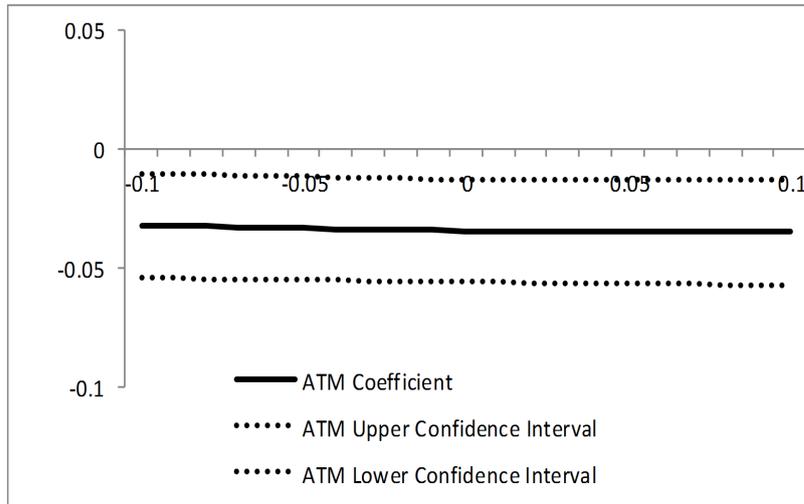


Figure 4.2: ATMs per 1,000 km² individuals and the \$1 a day rate

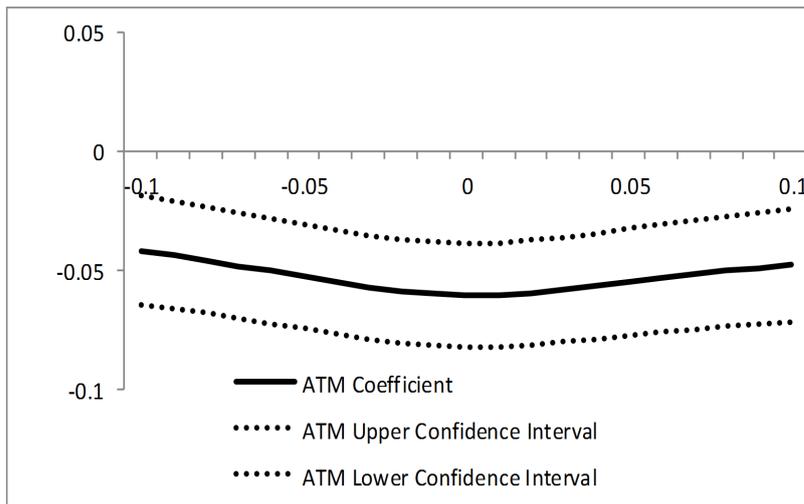


Figure 4.3: ATMs per 100,000 individuals and the \$2 a day rate

Figures 4.2 and 4.4 suggests that the when the instruments are used for the second measure of financial breadth, the number of ATMs per 1,000km² they are plausibly exogenous. The evidence shows that for the chosen intervals, Figures 4.2 and 4.4 are flat. As the direct effect of θ increases, the coefficient remains very similar to when the direct effect is zero. Even when θ is close to twice the size of the finance coefficients, the confidence intervals associated with the ATM per 1,000km² coefficient do not cross the zero boundary.

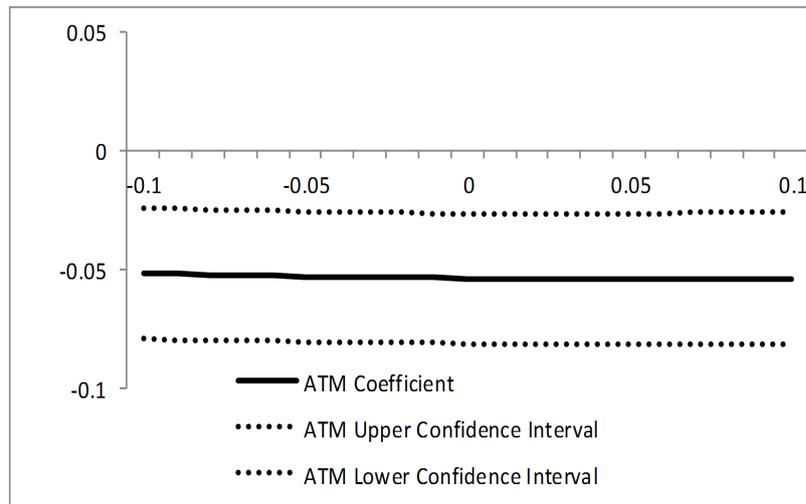


Figure 4.4: ATMs per 1,000 km² individuals and the \$2 a day rate

4.5 Conclusion

When studying the effects of financial development on poverty alleviation, most existing cross country studies measure financial development using depth based indicators. This study examines the breadth of the financial sector and whether it may reduce poverty. Specifically, the chosen financial breadth measures include physical access to financial terminals. These outlets include; the number of ATMs per 100,000 of the population, or 1,000km² and likewise, the number of bank branches per 100,000 individuals or 1,000km². It is important to realise that this is just one barrier to financial access and despite these services being available, it doesn't imply financial usage, as other financial barriers may still restrict access.

The results suggest that increasing the number of physical outlets may reduce absolute poverty. When the dependent variable is the \$1 and \$2 a day headcount rate of poverty, the evidence suggests poverty may be reduced by an average of 0.02 percent. When the dependent variable is the income of the poor, the finance coefficients are all insignificant.

This paper checks the robustness of the prior results to simultaneity bias. The results remain consistent when instrumenting financial breadth with media freedom. The exogeneity of the selected instruments is further tested by including them di-

rectly in the regression specification and by implementing a new technique by Conley et al. (2012). The evidence supports the claims that the instruments are exogenous, placing greater confidence in the estimates.

This paper suggests that the barrier of physical access is important and if reduced it may allow the financial system to aid in poverty alleviation. However, certain other barriers may need to be reduced simultaneously to receive the benefits of greater financial terminals. These include pricing barriers, or even discriminatory ones, which if they exist may provide negative effects of expanding the outreach of the financial system. Moreover, the results from this paper suggest that the four measures of financial breadth may be heterogeneous. The facilities offered by an ATM are to withdraw savings and some even offer a service to deposit money. These simple services are shown to be more important to the poor, than complex checking accounts, or even credit facilities that a bank branch may offer. Hence, the expansion of the former may be more useful to the poor, who may purely need access to the financial system for simple means.

Thesis conclusion

Scholars have researched the finance-growth nexus extensively and concluded that financial development increases economic growth. A second branch of literature also shows that the poor have benefited from this increased growth, suggesting that finance may indirectly reduce poverty. This thesis examines the role that financial development has on poverty directly.

Chapter 2 examines the role that financial deepening has on relative poverty. Drawing on an influential study that specifically examines the role of growth on the poorest income quintile, I take this study further by examining the financial sectors role on poverty more rigorously. The main finding and contribution from this Chapter is that; the direct role of financial development on poverty reduction varies by region. The importance of this finding goes against the “one-size fits all” financial reform packages which were advocated by various multilateral organisations. In particular increasing financial development in some parts of the world may have adverse effects on its poorest citizens, the exact opposite of what these reform packages were aiming to achieve.

Chapter 3 adds to the scarce literature on financial development and non-monetary welfare. Investigating how finance impacts health outcomes shows that financial development may reduce infant mortality, a question previously not addressed. Chapter 3 also examines how financial inclusion may prevent the cancellation of medical treatment, and the reduction of staple food consumption during an economic crisis. The second part of the study further contributes to the finance and health litera-

ture by measuring finance using financial inclusion variables, as opposed to relying on inferences using large aggregated data. The findings of this Chapter show that finance may improve health outcomes and therefore may benefit the poor without necessarily raising their incomes.

The final Chapter builds upon the important issue of financial inclusion. It examines whether increasing physical financial access may help reduce poverty rates. Using new data available from the financial access survey, I find that certain financial access variables may reduce absolute poverty, whereas no financial access variables are shown to improve relative poverty rates. The Chapter attempts to identify the savings and credit channels using the financial access variables, similar to the methods employed when using financial depth data. The results seem to confirm recent findings that the savings channel (McKinnon conduit effect) is relatively more important than the credit channel for poverty reduction.

Overall, the results found from this thesis suggest that financial development is an important tool for poverty reduction and not only by increasing incomes. However, the differential channels of financial development have to be considered. The evidence from this thesis suggests that the savings channel, or the McKinnon conduit effect may be a more appropriate tool used for poverty reduction. Moreover, when attempting to implement poverty reduction schemes with a focus on finance, this thesis suggests that the heterogeneity of the country needs to be considered. To reap the benefits of finance for poverty alleviation this thesis suggests a “one-size fits all” model may not be appropriate, rather the implementation of country specific plans regarding finance may be necessary.

Chapter 5

Appendix

5.1 Remaining figures

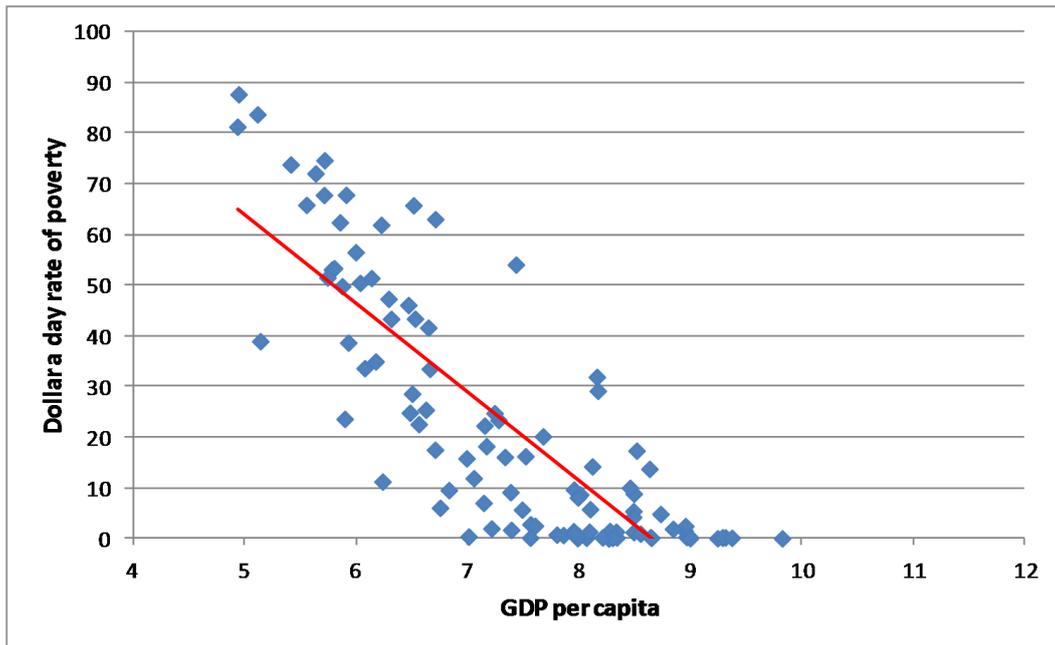


Figure A: Correlation between GDP per capita and the dollar a day rate of poverty 2005

Source: Authors own.

5.2 Remaining tables

The remaining tables are presented overleaf.

Table A: Variable Information

Variable Name	Definition	Source
Income of the poor	Measured as the share of income of the lowest quintile. Calculated by taking the share of income of the poorest fifth and then multiplying by GDP, and then taking the logarithm of this value.	Dollar & Kraay (2002) which consists of a combination of sources, Deininger & Squire (1996), UN-WIDER (2000), Ravallion and Chen (2000) and Lundberg and Squire (2000), IEP (2010). Additional waves are from UN-WIDER (2010).
GDP	This is the natural logarithm of real GDP per capita. It also appears in the body of the text as “average per capita income.”	Dollar & Kraay (2002) sample and the World Bank, World Development Indicators (2010).
Openness	Exports and Imports added together as a ratio of GDP.	Dollar & Kraay (2002) and The World Bank, World Development Indicators (2010).
Government Share	Government Consumption as a ratio of GDP.	Dollar & Kraay (2002) and The World Bank, World Development Indicators (2010).
Inflation	Calculated as one plus the inflation rate, and then the natural logarithm of this number is taken.	Dollar & Kraay (2002) and The World Bank, World Development Indicators (2010).
Rule of Law	An index composed to assign values for the quality of rule of law. Higher numbers indicate a stronger rule of law.	Dollar & Kraay (2002) and the The World Bank WGI database (2010).

Commercial Bank Assets	Calculated as Commercial Bank Assets as a ratio of Total Bank Assets.	Dollar & Kraay (2002) and the World Bank, World Development Indicators (2010) and the Financial Structure Database (2010).
Private Credit	Calculated as Private Credit as a ratio of GDP, and measures the depth of the financial system, for example the financial resources provided to the private sector.	The World Bank, World Development Indicators (2010) and the Financial Structure Database (2010).
Liquid Liabilities	This is calculated as a ratio of GDP and measures the size of the financial intermediaries.	The World Bank, World Development Indicators (2010) and the Financial Structure Database (2010).
Stock Market	Calculated as the Stock Market Capitalisation as a ratio of GDP.	The World Bank, World Development Indicators (2010) and the Financial Structure Database (2010).

Table B: Country list for Chapter 2

Algeria	Argentina	Armenia
Australia	Austria	Burundi
Belgium	Burkina Faso	Bangladesh
Bulgaria	Bahamas	Belarus
Bolivia	Brazil	Barbados
Botswana	Central African Republic	Cambodia
Canada	Chile	China
Cote D'Ivoire	Cameroon	Colombia
Costa Rica	Djibouti	Denmark
Dominican Republic	Ecuador	Egypt
El Salvador	Estonia	Ethiopia
Finland	Fiji	France
Gabon	Gambia	Georgia
Germany	Ghana	Greece
Guatemala	Guinea	Guinea-Bissau
Guyana	Honduras	Hong Kong
Hungary	Indonesia	India
Iran	Iraq	Ireland
Israel	Italy	Jamaica
Japan	Jordan	Kazakhstan
Kenya	Korea, Rep.	Kyrgyz Republic
Laos	Latvia	Lesotho
Lithuania	Luxembourg	Macedonia
Madagascar	Malawi	Malaysia
Mali	Mauritania	Mauritius
Mexico	Mongolia	Morocco
Moldova	Mozambique	Myanmar
Namibia	Netherlands	Nepal
New Zealand	Nicaragua	Niger
Nigeria	Norway	Pakistan
Panama	Papua New Guinea	Paraguay
Peru	Philippines	Poland
Portugal	Puerto Rico	Romania
Russia	Rwanda	Senegal
Seychelles	Sierra Leone	Singapore
Slovakia	Slovenia	South Africa
Spain	Sri Lanka	St. Lucia
Sudan	Suriname	Sweden
Switzerland	Taiwan	Tanzania
Thailand	Trinidad & Tobago	Tunisia
Turkey	Turkmenistan	Uganda
Ukraine	United Kingdom	United States
Uruguay	Uzbekistan	Venezuela
Vietnam	Yemen	Zambia
Zimbabwe		

Table C: Country list for Chapter 3 - Macro

Afghanistan	Albania	Algeria
Andorra	Angola	Antigua and Barbuda
Argentina	Armenia	Australia
Austria	Azerbaijan	Bahamas, The
Bahrain	Bangladesh	Barbados
Belarus	Belgium	Belize
Benin	Bhutan	Bolivia
Bosnia and Herzegovina	Botswana	Brazil
Brunei Darussalam	Bulgaria	Burkina Faso
Burundi	Cambodia	Cameroon
Canada	Cape Verde	Central African Republic
Chad	Chile	China
Colombia	Comoros	Congo, Dem. Rep.
Congo, Rep.	Costa Rica	Cote d'Ivoire
Croatia	Cuba	Cyprus
Czech Republic	Denmark	Djibouti
Dominica	Dominican Republic	Ecuador
Egypt, Arab Rep.	El Salvador	Eritrea
Estonia	Ethiopia	Fiji
Finland	France	Gabon
Gambia, The	Georgia	Germany
Ghana	Greece	Grenada
Guatemala	Guinea	Guinea-Bissau
Guyana	Haiti	Honduras
Hong Kong SAR, China	Hungary	Iceland
India	Indonesia	Iran, Islamic Rep.
Ireland	Israel	Italy
Jamaica	Japan	Jordan
Kazakhstan	Kenya	Korea, Rep.
Kuwait	Kyrgyz Republic	Lao PDR
Latvia	Lebanon	Lesotho
Liberia	Libya	Liechtenstein
Lithuania	Luxembourg	Macedonia, FYR
Madagascar	Malawi	Malaysia
Maldives	Mali	Malta
Mauritania	Mauritius	Mexico
Moldova	Mongolia	Montenegro
Morocco	Mozambique	Myanmar
Namibia	Nepal	Netherlands
New Zealand	Nicaragua	Niger
Nigeria	Norway	Oman
Pakistan	Panama	Papua New Guinea
Paraguay	Peru	Philippines
Poland	Portugal	Qatar
Romania	Russia	Rwanda
Samoa	Sao Tome and Principe	Saudi Arabia
Senegal	Serbia	Seychelles
Sierra Leone	Singapore	Slovak Republic
Slovenia	Solomon Islands	South Africa
Spain	Sri Lanka	St. Kitts and Nevis
St. Lucia	St. Vincent	Sudan
Suriname	Swaziland	Sweden
Switzerland	Syrian Arab Republic	Tajikistan
Tanzania	Thailand	Timor-Leste
Togo	Tonga	Trinidad and Tobago
Tunisia	Turkey	Turkmenistan
Uganda	Ukraine	United Arab Emirates
United Kingdom	United States	Uruguay
Uzbekistan	Vanuatu	Venezuela
Vietnam	West Bank and Gaza	Yemen
Zambia	Zimbabwe	

Table D: Country list for Chapter 3 - Micro

Albania	Armenia	Azerbaijan
Belarus	Bosnia	Bulgaria
Croatia	Czech Republic	Estonia
France	Georgia	Germany
Hungary	Italy	Kazakhstan
Kyrgyzstan	Latvia	Lithuania
Macedonia	Mongolia	Montenegro
Poland	Romania	Russia
Serbia	Slovakia	Slovenia
Sweden	Tajikistan	Turkey
Ukraine	United Kingdom	Uzbekistan

Table E: Country list for Chapters 4 and 5

Afghanistan	Albania	Algeria
Angola	Antigua and Barbuda	Argentina
Armenia	Azerbaijan	Bahamas, The
Bahrain	Bangladesh	Barbados
Belarus	Belize	Benin
Bermuda	Bhutan	Bolivia
Bosnia and Herzegovina	Botswana	Brazil
Brunei Darussalam	Bulgaria	Burkina Faso
Burundi	Cambodia	Cameroon
Cape Verde	Central African Republic	Chad
Chile	China	Colombia
Comoros	Congo, Dem. Rep.	Congo, Rep.
Costa Rica	Cote d'Ivoire	Croatia
Cuba	Czech Republic	Djibouti
Dominica	Dominican Republic	Ecuador
Egypt, Arab Rep.	El Salvador	Equatorial Guinea
Eritrea	Estonia	Ethiopia
Fiji	French Polynesia	Gabon
Gambia, The	Georgia	Ghana
Grenada	Guatemala	Guinea
Guinea-Bissau	Guyana	Haiti
Honduras	Hong Kong SAR, China	Hungary
India	Indonesia	Iran
Iraq	Israel	Jamaica
Jordan	Kazakhstan	Kenya
Kiribati	Kuwait	Kyrgyz Republic
Lao PDR	Latvia	Lebanon
Lesotho	Liberia	Libya
Lithuania	Macao SAR, China	Macedonia, FYR
Madagascar	Malawi	Malaysia
Maldives	Mali	Mauritania
Mauritius	Mexico	Moldova
Mongolia	Montenegro	Morocco
Mozambique	Myanmar	Namibia
Nepal	New Caledonia	Nicaragua
Niger	Nigeria	Oman
Pakistan	Palau	Panama
Papua New Guinea	Paraguay	Peru
Philippines	Poland	Puerto Rico
Romania	Russia	Rwanda
Samoa	Saudi Arabia	Senegal
Serbia	Seychelles	Sierra Leone
Singapore	Slovak Republic	Slovenia
Solomon Islands	South Africa	Sri Lanka
St. Kitts and Nevis	St. Lucia	St. Vincent
Sudan	Suriname	Swaziland
Syria	Tajikistan	Tanzania
Thailand	Togo	Tonga
Trinidad and Tobago	Tunisia	Turkey
Uganda	Ukraine	United Arab Emirates
Uruguay	Uzbekistan	Vanuatu
Venezuela	Vietnam	West Bank and Gaza
Yemen	Zambia	Zimbabwe

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