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Financial crisis in Asia and the Pacific Region: Its genesis, severity and impact on poverty and hunger

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Financial Crisis in Asia and the Pacific Region-its Genesis, Severity and Impact on Poverty and Hunger[1]

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Abstract

Building on a vast recent literature on finance, growth and hunger, we have examined the experience of 9 Asian countries over the period 1960-2006, using a state-of art-econometric methodology. Although the results are mixed depending on the specification and variables used, there is some evidence favouring a positive role of finance on GDP and agricultural value added growth. But there is also evidence of a reverse causality between GDP and agricultural growth on financial development. In fact, there are a few cases in which the causality runs both ways. In light of this complexity, the results of finance on inequality and hunger require cautious interpretation. Financial development reduces the Gini coefficient of income distribution. However, when this measure of inequality is replaced with the share of the poorest quintile in GDP, financial development ceases to have any effect, pointing presumably to the exclusion of the poorest in the sample of Asian countries considered. Although there is support for the view that financial development reduces hunger, the results are not-so-robust. Specifically, when the endogeneity of trade and finance is taken into account, the negative effect of financial development on hunger disappears. Whether these results are driven by some outliers needs further examination.

Some recent evidence on microfinance suggests that higher interest rates and lower maturity periods are likely to affect women and low income households more than others. The quality of loan portfolio of MFIs may also deteriorate with higher interest rates and drying up of funding sources. While microfinance has the potential to ameliorate some of the worst forms of deprivation, the contraction of credit in general and risk aversion of investors, together with a looming global recession underlie gloomy prospects for the poor in this region

Whether the constraints on funding MFIs would weaken with large-scale injection of capital into the financial sector and whether the design of microfinance programmes would be suitably altered (e.g., larger loan amounts, longer maturities, and appropriate pricing of loans) may determine whether the poor would be shielded from a marked deceleration in growth rates in this region. As these issues have not figured prominently in the discourse on global financial crisis (including the just concluded G20 summit in Washington DC), there is a real apprehension that in trying to save the existing financial architecture the poor and vulnerable may not get the attention they deserve.

Key Words: Finance, Economic Development, Agriculture, Inequality, Poverty, Asia
JEL Code: C33, E44, G01, I32, O15

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Introduction

There has been a surge of studies focusing on the recent financial crisis that erupted in USA and has rapidly spread to the rest of the world (e.g., IMF, 2008, World Bank, 2008, ADB, 2008, Arrow, 2008, Krugman, 2008, Phelps, 2008). Indeed, this crisis has turned into a crisis of confidence. Despite extensive interventions by governments and monetary authorities, the supply of credit has shrunk, stock markets have recorded dramatic losses, and a major downturn in the global economy is likely. Commodity prices have eased from recent peaks and large exchange rate realignments have occurred (ADB, 2008, IMF, 2008).

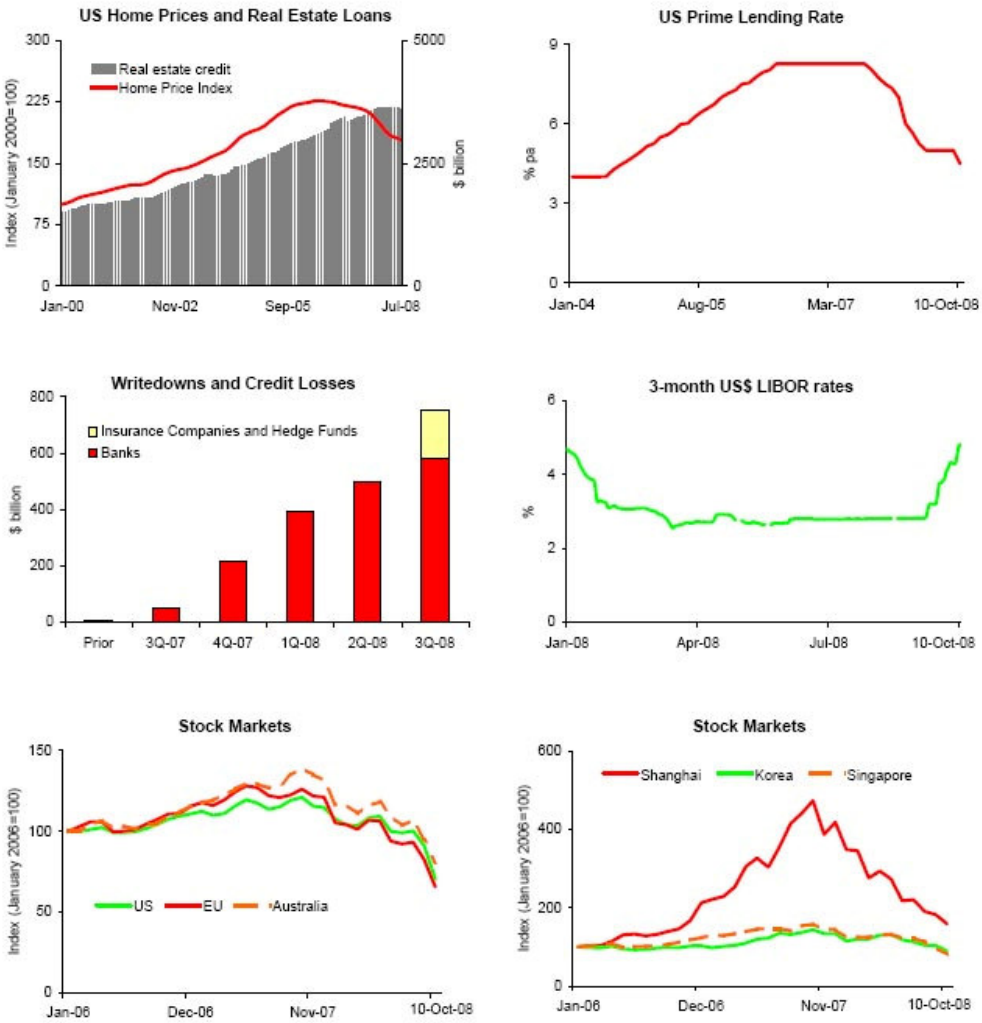
A broad brush account of how the crisis originated and spread is given below, drawing upon ADB (2008). Graphical illustrations from this study are reproduced in Fig: 1-3.

The roots of this crisis lay in the subprime mortgage market in USA. Expansionary monetary policy kept the interest rate low for some years and encouraged borrowing for real estate. Financial institutions offered loans to people who were not capable of repaying them-the subprime borrowers. Such loans were bundled up and turned into investments through securitization. These mortgage securities were also combined with other securities designed to reduce the risk-as collateralized debt obligations or CDOs-and used to entice more investors. Financial institutions also entered into intricate financial contracts known as credit derivatives or credit default swaps in order to protect against default. An oversupply of homes and rising interest rates caused a decline in housing prices and home loans. Rising defaults, and declining house prices and lending resulted in losses to those institutions that held and sold mortgage-backed securities and credit derivatives. Subsequently, the crisis spread to non-housing businesses and larger financial institutions not directly connected with mortgage lending. Many had invested in assets derived from mortgage-based securities. Interbank lending rates rose to reflect higher risk in the financial sector. As interbank lending contracted and trust eroded, the credit market failure unravelled. Overseas financial institutions linked to these markets were sucked into the financial turmoil of USA, UK and the rest of Europe. Investors started withdrawing from stock markets resulting in huge falls in valuation. These falls were recorded in both high-income and emerging markets, given trade and asset linkages. As the contagion spreads further, predictions of a global recession gained plausibility.

The objective of the present study is to deepen our understanding of the severity of the financial crisis and its implications for growth and poverty reduction in selected Asian countries. The scheme is as follows: first, an attempt is made to link finance and the real economy, followed by a brief exposition of the dynamics of the financial crisis. In the next section, macro-economic indicators are reviewed, in order to illustrate the downturn in economic activities. The third section is devoted to a review of the literature and empirical evidence on how credit influences growth and poverty reduction. An extension is carried out to throw further light on various mechanisms

that link contraction of credit to lowering of crop yields and aggravation of poverty in a sample of Asian countries. Another extension relates to how contraction of credit is likely to affect micro-finance and the poor in rural areas. In the absence of firm empirical evidence, a distillation of a survey of MFIs is given. In the concluding section, some observations are made from a broad policy perspective.

Figure 1: Key developments in world financial markets



%=percent, $=United States dollar, pa=per annum; EU=European Union, LIBOR=London Interbank Offered Rate

Note: Stock market indices used are: US= Standard and Poor's 500; EU=Dow Jones Euro Stoxx; Australia=Australian Securities Exchange (ASX) all ordinaries; Shanghai=composite index; Korea=Korea Composite Stock Price Index (KOSPI) 200; and Singapore=Singapore Exchange (SGX) Strait Times.

Source: CEIC Database, Standard and Poor's website; British Bankers' Association website, "Shockwaves from the North: Latin America and the External Deterioration", presentation for the Annual Meetings of IMF and World Bank, Washington DC, October 2008.

Source: ADB (2008).

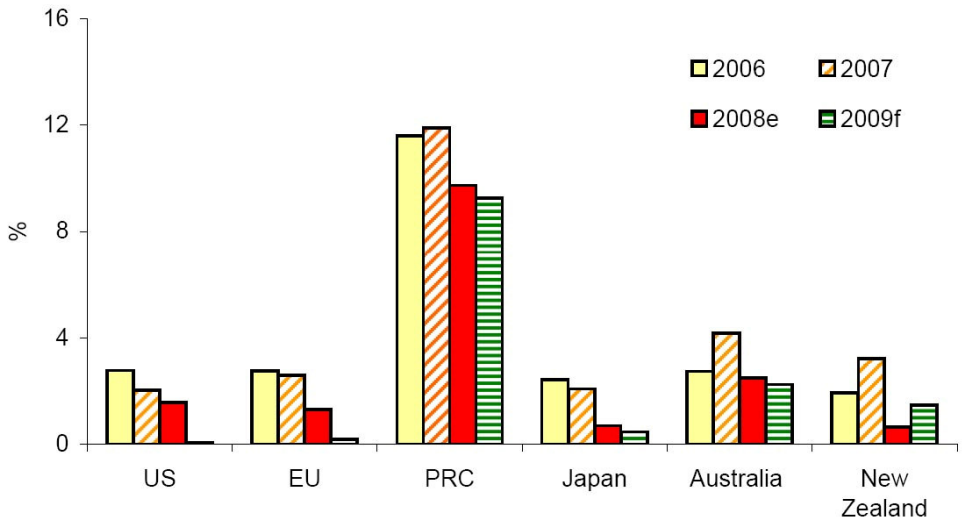
Finance and Real Economy

While these linkages remain contentious, various studies have focused on the following.

The first is through a financial accelerator that amplifies the effects of financial cycles on the real economy through its effects on the value of collateral and thereby

expansion of credit. Another is through lenders' balance sheets and the relationship between bank capital and aggregate credit. When bank capital is eroded, banks become reluctant to lend and are forced to deleverage. A third but overlapping with the first linkage is the variation in the role of the financial accelerator with the financial system (arm's length financing as opposed to relationship banking). In other words, households and producers can substitute away from banks to markets (IMF, 2008).

Figure 2: Growth in key economies



%=percent, e=estimate, f=forecast, EU=European Union, PRC=People's Republic of China, US=United States
Source: International Monetary Fund, World Economic Outlook Database, October 2008.

Source: ADB (2008).

The dynamics of the financial crisis could be delineated as follows: the procyclical behaviour of bank leverage – changes during upturns and downturns-is crucial to understanding how banking stress translates into a reduced credit supply, a higher cost of capital, and a flattening of economic activity. More specifically, the key issue is: when banks overextend their balance sheets during booms, on the back of higher asset values and lower perceived risks, financial imbalances build up, economic activity is further boosted that in turn also further boosts asset values, reduces perceived risk, fostering further lending and economic expansion. Under such conditions, a financial shock that either increases risks or reduces yields prompts a cycle of deleveraging, with a sharp reduction in bank lending as bank capital falls, leading to an economic slowdown that feeds into a further reduction in credit supply. The procyclicality of bank leverage is greater when banks are more exposed to fluctuations in the market value of assets-for example, through their holdings of securities and their repurchase. IMF (2008) confirms that commercial banks tend to be more procyclical when operating in more arm's length financial systems, where a greater share of intermediation occurs through financial markets rather than through traditional relationship-based (and bank dominated) activities. Thus, more arm's length financial systems are more prone to financial crises. In fact, lack of information about the value

and risk of many securitised products, and about the losses subsequently associated with these products, amplified the present crisis.

How is the Crisis Unfolding in Asia?

The crisis manifested in emerging Asia in early 2008, and is likely to worsen in response to slackening demand from advanced economies and growing tensions in regional financial markets. A selective review of the evidence is given below.

- Growth in China eased to $10^{1/2}$ per cent in the first half of 2008, from 12 per cent in 2007, partly because of slowing exports. Investment and consumption, however, maintained their momentum.
- In India, growth in the second quarter slowed to 8 per cent, on the back of weakening investment, while private consumption and exports have held up better than feared, with signs of the latter registering a sharp drop in October, 2008[3]. In fact, exports have fallen sharply in other Asian countries too, including South Korea, China, Japan and Taiwan.[4]
- In the so-called NIEs and ASEAN economies, activity has decelerated. Domestic demand has softened as a result of surge in food and fuel prices, and investment plans have been scaled down. Vietnam, for example, is undergoing a sharp correction as the demand boom caused by large capital inflows unwinds.
- Financial markets have weakened due to a pessimistic global outlook and investor risk appetite has declined following the September turbulence. Equity markets that had a bull run during 2005-07-prices more than quadrupled in China and tripled in India-plummeted. In some countries, borrowing spreads shot up for banks relying on wholesale funding.
- Current accounts are beginning to show strains as well, largely due to rising import bills for commodities and slowing export growth, while capital account and exchange rate developments have varied. Capital inflows to China have remained strong, as reflected in the continuing surge of foreign reserves; capital flows to other countries in the region have become more volatile, particularly to those running large external deficits. Consequently, their currencies have come under pressure, prompting central banks to intervene (India, Pakistan and Vietnam). Differing nominal exchange rate developments underlie differing real exchange rates, with the Chinese renmimbi and the ASEAN currencies continuing to appreciate, and the South Asian and NIE's currencies weakening.

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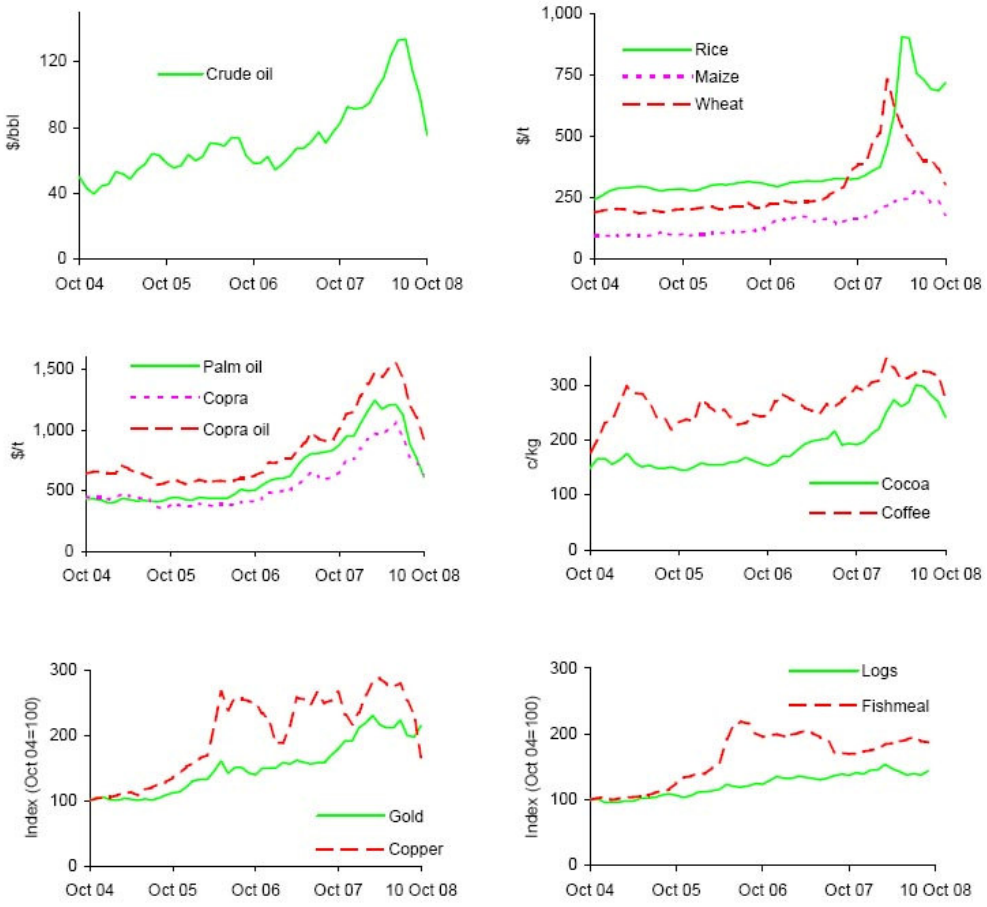
[3] Preliminary estimates suggest that India's exports shrank by about 15 per cent in October, 2008. Non-oil exports dipped 20 per cent in October against a small rise of 3 per cent in September. These exports account for 80 per cent of India's exports, and industries like gems and jewellery and handicrafts have been the worst hit. October's performance is likely to drag the country's overall export performance. Exports grew by 31 per cent in from April to September, 2008, and from April to October, 2008, by 21.5 per cent, relative to 23.3 per cent in the same period last year *(Business Standard*, November 11, 2008).

[4] *Financial Times* (11 November, 2008) cites evidence of precipitous falls in exports in these countries. China, for example, reported the slowest export growth in four months. South Korea's exports in the first 10 days of November fell 26 per cent from the same period a year earlier. A slowing of the Chinese economy also had a knock-on effect on Taiwan. An exporter of electronic goods, its overall exports fell 8.3 per cent from a year ago. Sales to China and Hong Kong fell about 20 per cent.

- Growth prospects appear somewhat unspectacular, as the overall regional growth rate is likely to moderate to $7^{3/4}$ per cent in 2008, and 7 per cent in 2009. Weakening external demand will restrict export growth but in some cases the impact on imports may be mitigated by still-loose monetary policies and currency depreciation. Investment will moderate, largely due to deteriorating export prospects. Consumption will ease because of the continuing surge in food prices, but protected to some extent by consumer subsidies. In the aggregate, demand may remain resilient, with moderate reduction in food prices.
- Headline CPI inflation soared in many countries in the first half of 2008, with slight reductions in a few. In China, headline CPI inflation has declined from its peak of $8^{1/2}$ per cent in April, 2008, as food supply has improved. In India, CPI inflation jumped to 9 per cent in August. Underlying inflationary pressures have increased, as robust credit growth could cause second round effects. It is therefore likely that inflation will remain at elevated rates over the near term. For the region as a whole, headline inflation is projected to rise to $7^{1/4}$ per cent in 2008, up from 5 per cent in 2007. In 2009, it is projected to be about 6 per cent[5].

[5] For a detailed exposition, see Thapa et al. (2008).

Figure 3: World commodity prices



$=United States dollar, bbl=barrel, t=metric ton, c=cents, kg=kilogram.
Note: Prices shown are crude oil Brent spot price, Thai rice (5%), US maize (no. 2 yellow), Canadian wheat, Malaysian palm oil, Philippine/Indonesian copra and copra oil, International Cocoa Organization price of cocoa, International Coffee Organization price of Arabica coffee, United Kingdom gold, Copper London Metal Exchange (grade A), logs from Malaysia and fishmeal (any origin).
Source: World Bank Commodity Price Data (Pink Sheet), various months, Thompson Datastream, *Wall Street Journal*, and *Financial Times*.

Source: ADB (2008).

Policy Dilemma

A major policy dilemma is how to respond to weakening growth outlook and global financial turbulence without overlooking the inflation risks. While country circumstances differ, downside risks in emerging Asia have risen, as inflation risks have moderated due to fall in food and fuel prices from their recent peaks.

- In most countries domestic demand is weakening and some policy tightening has already begun. Discretionary fiscal policies could be used judiciously in countries with a strong fiscal position.
- By contrast, in a few countries where growth is expected to remain strong, risks of second round inflation are high, and monetary policy lacks credibility, macroeconomic policies need tightening (for example, Indonesia and Vietnam). Monetary policy tightening is a necessary first step but may need to be combined with exchange rate flexibility.
- Fiscal restraint could help reduce inflation in countries in countries which have recorded rising food and fuel subsidies as well as higher wages and consequently weakened the fiscal position.

Finance, Growth and Poverty

There is a vast literature on this theme with valuable insights from cross-country data. We will concentrate largely on two (Beck et al. 2007, and Claessens and Feijen, 2006), with brief comments on a few other important contributions.

Beck et al. (2007) examine the effects of financial development on poverty through two channels: aggregate growth, and changes in the distribution of income. Theory provides conflicting predictions. One proposition is that financial development enhances growth and reduces inequality. Financial imperfections, such as information and transaction costs, may affect the poor more as they lack collateral and credit histories. So relaxation of credit constraints would benefit the poor more. Moreover, credit constraints hamper efficiency of capital allocation and aggravate income inequality by restricting the flow of capital to the poor with high expected returns. A contrary proposition is that financial development mainly benefits the rich. As the poor rely on informal and family networks for capital, improvements in the formal financial sector are of little consequence to them. A special case is the model developed by Greenwood and Jovanovic (1990). It predicts a non-linear relationship between financial development, inequality and economic development. At all stages of economic development, financial development improves capital allocation, boosts aggregate growth and in turn benefits the poor. However, the distributional effect of financial development, and thus the net impact on the poor, depends on the level of economic development. At early stages of development, only the rich enjoy access to and benefit directly from better financial markets. At later stages, as access becomes more extensive, a higher section of society benefits directly from financial development. To resolve these conflicting propositions, Beck et al. (2007) carry out a detailed empirical investigation.

Instead of examining the finance-growth link, Beck et al. (2007) offer an assessment of the impact of financial development on changes in the distribution of income and changes in both relative and absolute poverty. Specifically, the variables considered are (i) the Gini coefficient of income distribution; (ii) income share of the poor, measured as the income share of the poorest quintile relative total national income; and (iii) the share of the population living on less than $1 per day.

(a) Data

Financial development is measured as credit by financial intermediaries to the private sector divided by GDP (or private credit to GDP). This excludes credit given by the central bank and development banks. Moreover, it excludes credit to the public sector, and cross claims of one group of intermediaries on another. Thus private credit captures the amount of credit channeled from savers, through financial intermediaries, to private firms/entities.[6] These data were obtained from the Financial Structure Database (Beck et al. 2001). Estimates of the Gini coefficient of income distribution were obtained from Dollar and Kray (2002) and UNU-WIDER (2006). The shares of the lowest income quintile and the head-count ratios were taken from the World Bank (including WDI). The period covered varies with the exercise but in some cases it is 1960-2005 or 1980-2005.

(b) Model Specification

Several different specifications were used. The basic specification is

$$Y_{i,t} = \alpha Y_{i,t-1} + \beta FD_{i,t} + \gamma X_{i,t} + \varepsilon_{i,t} \quad (1)$$

or

$$Y_{i,t} - Y_{i,t-1} = (\alpha-1) Y_{i,t-1} + \beta FD_{i,t} + \gamma X_{i,t} + \varepsilon_{i,t} \quad (2)$$

In this regression, $Y_{i,t}$ is either the log of (i) share of lowest income quintile, (ii) the Gini coefficient, or (iii) head-count ratio for country i in period t. $FD_{i,t}$ is the measure of private credit or financial development, and $X_{i,t}$ is a set of conditioning variables for country i in period t. These variables include log of average years of schooling, the growth rate of GDP deflator (as a measure of inflation), sum of exports and imports as a share of GDP (as a measure of trade openness)[7].

The estimation of equation (2) by OLS is problematic for several reasons. One is the possibility of reverse causation (for example, reductions in poverty may stimulate demand for financial services). Another is that cross-country regressions do not fully control for unobserved country-specific effects. A third is that even when 2SLS is used with instruments for financial development, there is no control for endogeneity of other variables that could bias the coefficients of financial development. A fourth difficulty is that the use of a lagged dependent variable could bias the coefficient estimates. Finally, the use of pure cross-country regression does not exploit the time series dimension of the data. Accordingly, a GMM panel estimator for dynamic models is used.[8] This estimation is based on data averaged over 5 years. Specifically, a system of the panel version of regression (2) is estimated in levels and differences. The difference and level regressions are then combined in a system.

[6] Beck et al. (2007) reject the alternative measure of M2 (broad money) as a share of GDP on the ground that it does not reflect a key function of financial intermediaries (i.e., channelling of society's savings to private sector projects).
[7] For further details, see Beck et al. (2007).
[8] For details, see Beck et al. (2007).

(c) Results

A summary of the results is given below.

- There is a robust negative relationship between the growth of Gini and private credit. Even after eliminating the outliers, the negative relationship is preserved. The dynamic panel estimator further corroborates this relationship.
- Financial intermediary development exerts a disproportionately positive effect on the poor and reduces income inequality. This result is robust to different estimation procedure. Private credit explains about 40 per cent of the overall effect of financial intermediary development on income growth of the poor using OLS and more with the dynamic panel estimator.
- Constrained by fewer estimates of poverty, the growth rates of poverty are occasionally computed for less than five years and frequently for less than 10 years. The results of different methods of estimation and specifications confirm that financial development leads to faster poverty reduction. More specifically, financial development helps poverty reduction not just by fostering economic growth but also by lowering income inequality. However, data limitations precluded the use of dynamic panel estimation to control for endogeneity.

In sum, greater financial development is associated with poverty reduction. In fact, 60 per cent of the impact of financial development on the poorest quintile works through aggregate growth and 40 per cent through reduction in income inequality[9]. However, more can be said about the mechanisms linking finance and poverty on the basis of Claessens and Feijen (2006).

(d) Extensions

The focus of Claessens and Feijen (2006) is on specific channels through which financial development impacts on undernourishment[10]. The analysis covers the period 1980-2003.

In theory, some specific channels can be identified through which financial sector development impacts undernourishment. First, savings and credit help consumption smoothing when there are income or other shocks. Second, access to financial services eases the financing of productive investment in, say, agricultural equipment, thereby raising yields and incomes of smallholders, and reducing undernourishment. Third, there may be an additional benefit to low income households, without access to financial services, as higher yields translate into higher food output and lower prices. For a diagrammatic illustration, see Fig. 4.

[9] Honohan (2003) shows that a 10 per cent increase in private credit to GDP reduces poverty by 2.5-3 per cent.

[10] Undernourishment is defined as "the condition of people whose dietary energy consumption is continuously below a minimum dietary energy requirement for maintaining a healthy life and carrying out a light physical activity", (FAOSTA, 2006).

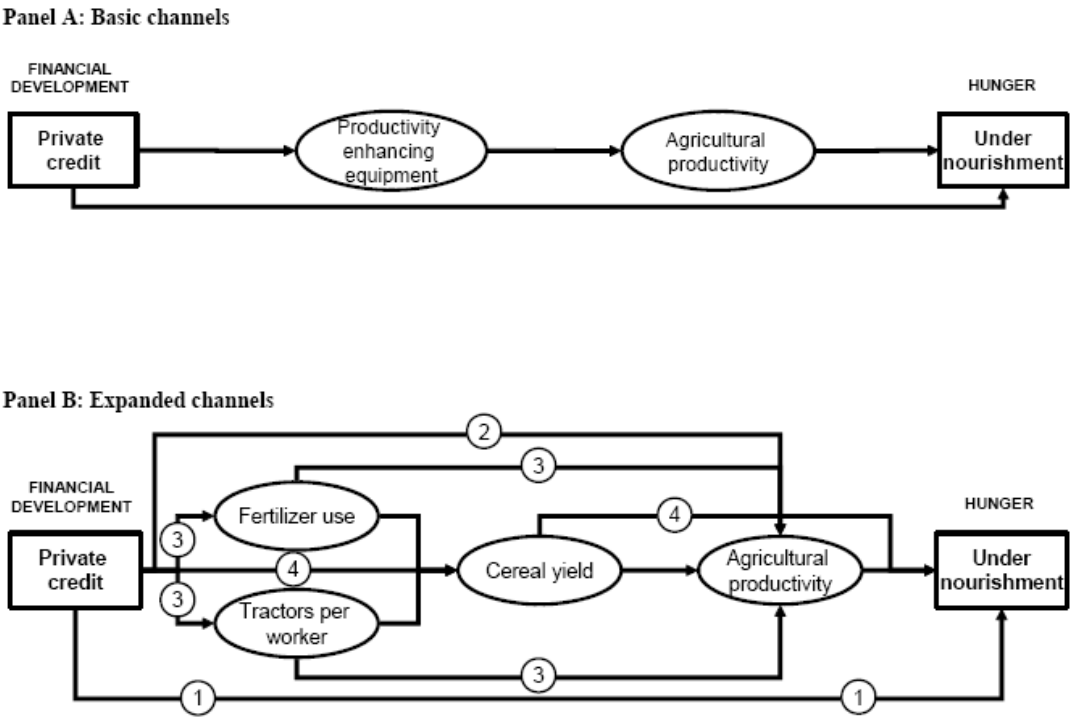


Fig: 4 Links between Finance and Undernourishment.
Source: Claessens and Feijen (2006)

Except for the data on undernourishment and agricultural productivity obtained from FAOSTA, all other variables were constructed from the data sets employed by Beck et al. (2007). One important extension is that private credit to GDP as a measure of access is supplemented by number of bank branches per 1000 square kilometre. This is of some significance as large and developing countries tend to have a lower density.

(d.1) Model Specifications

The basic specification is

$$\text{Undernourish}_i = \alpha + \beta_1 FD_i + \mathbf{BX}_i + \varepsilon_i \qquad (3)$$

where Undernourish_i is the average prevalence of undernourishment for country i over the period 1980-2000, FD is private credit to GDP, and $\mathbf{X}_i$ is the vector of control variables.

This is supplemented by another relationship

$$\text{Undernourish}_i = \alpha + \beta_1 \text{Productivity}_i + \mathbf{BX}_i + \varepsilon_i \qquad (4)$$

where Productivity_i is the average productivity per agricultural worker. The next step is to assess the factors driving agricultural productivity. This leads to the next specification

$$\text{Productivity}_i = \alpha + \beta_0 (\text{Ini\_Productivity}_i) + \beta_1 FD_i + \mathbf{BX}_i + \varepsilon_i \quad (5)$$

where $\text{Ini\_Productivity}_i$ is the first non-missing value of agricultural productivity in the period 1980-2003 to account for initial conditions. To further identify the channels between financial development and productivity enhancing inputs, the following relation is specified

$$\text{Productivityenhancing}_i = \alpha + \beta_0 (\text{Ini\_Productivityenhancing}_i) + \beta_1 FD_i + \mathbf{BX}_i + \varepsilon \quad (6)$$

where $\text{Ini\_Productivityenhancing}_i$ is the first non-missing value of agricultural productivity enhancing inputs in the period 1980-2003. So the hypothesis is that financial sector development relates to the use of productivity enhancing inputs (e.g. fertilizer and tractor use).

As noted earlier, a straightforward application of OLS is problematic. The reasons are reverse causality (e.g. a reduction in undernourishment either directly or as a proxy for, say, a reduction in poverty may stimulate demand for financial services and/or less undernourishment could translate into healthier, more productive workers, raising agricultural productivity). So an IV estimation strategy is employed. Two sets of instruments are used: one for private credit to GDP, and another for agricultural productivity. Following the finance literature, the legal origin is used as an exogenous source of variation which is correlated with financial development but not necessarily with undernourishment. An important finding is that property rights are better established British common law countries and less so in Civil law countries (La Porta et al. 1998). Superior property rights facilitate financial contracting and thus result in improved financial development. Agricultural productivity is instrumented by fertilizer per ha of arable land and number of tractors per agricultural worker. The presumption here is that these two instruments are correlated with agricultural productivity but not with undernourishment. To deal with other concerns of endogeneity and omitted variable bias, a fixed effect panel estimation is also carried out. Given the data constraints, averages for the following periods are used: 1979-81, 1990-92, 1993-95, 1995-97 and 2001-2003.

(d.2) Results

A selection of the results obtained by Claessens and Feijen (2006) is given below.

- In various specifications and using different methods of estimation, there is a significant negative effect of financial sector development on undernourishment. Using an IV estimation, the coefficient of private credit is -2.44 implying a very substantial reduction in undernourishment. In fact, even after controlling for the level of development, private credit has an independent effect in lowering undernourishment.
- Regression results confirm that agricultural productivity decreases undernourishment, even after controlling for the initial levels of poverty and GDP per capita. With additional controls to ameliorate omitted variable bias, it turns out that a 1 per cent increase in agricultural productivity reduces undernourishment 0.407 per cent. Even in a regression on the poorest countries (i.e., with GDP per capita < $4671), this relationship is corroborated.

When agricultural productivity is instrumented by fertilizer and tractor use, the coefficient of agricultural productivity is about -0.8. In a panel estimation with fixed effects, the strong effect of agricultural productivity in reducing undernourishment is confirmed.

- Cereal yields also reduce undernourishment. The elasticity of undernourishment to cereal yield is -0.27 or larger (in absolute value) (i.e., a 1 per cent higher cereal yield reduces undernourishment by 0.27 per cent or more). When cereal yields are instrumented by fertilizer and tractor use, the coefficient for cereal yield has the hypothesized negative effect and the elasticity is larger in absolute value (-0.45). In a panel estimation that allows for unobservable country fixed effects, the negative effect of cereal yield is significant.
- There is a highly significant effect of private credit on agricultural productivity, after controlling for initial productivity, GDP per capita and poverty. The elasticity is 0.128, implying a positive effect of credit on productivity. Using the IV approach in which private credit is instrumented by legal origin, the coefficient rises to 1.68, implying a very substantial increase in agricultural productivity. Even in a fixed effect panel estimation, the effect of credit on productivity is substantially high.
- Not only the level of agricultural productivity but also its growth is enhanced by credit. With an IV estimation, the coefficient of credit is 0.5 implying that a 1 per cent increase in credit leads to a 0.5 per cent higher growth rate of agricultural productivity[11].
- An analysis of cereal yields (per ha) , cereal yields growth, growth in livestock production and crop production further reveals that financial development drives agricultural productivity largely due to higher cereal yields. Although the effect is small (0.11) it is statistically significant. With IV estimation, the effect is larger (1.682) but weakly significant. Further, the effect of private credit on cereal yield growth is significant, its magnitude is small (0.003). The effects of private credit on livestock production and crop production are highly significant too.
- The link between agricultural productivity and finance through greater use of fertilizer and tractors is corroborated. Private credit is significantly associated with fertilizer use, after controlling for initial fertilizer use, GDP per capita and poverty (the coefficient is 0.44). To overcome the potential endogeneity problem, private credit is instrumented by legal origin. Although the coefficient of private credit is substantially higher (1.6), it ceases to be significant. However, without initial fertilizer use, the coefficient is substantially higher (4.58) and also statistically significant.
- Also, there is a significant positive relationship between finance and tractor use per worker. The coefficient of the former is 0.244, after controlling for the effects of initial levels of tractor use, GDP per capita and poverty. With an IV estimation, the effect of credit rises to 5.5. However, the panel result is significant but markedly lower (0.140).
- In an important departure from the current literature, Claessens and Feijen (2006) investigate whether the number of bank branches also matter. Using the

[11] Note that the F-tests cast doubts about the validity of the instruments for private credit in both level and growth regressions of agricultural productivity. For details, see Claessens and Feijen (2006).

number of bank branches and ATMs for the year 2003-04, scaled by the size of the country in square km, as proxies for access to financial services, an attempt is made to examine the combined effect of financial development and access to financial services on undernourishment, productivity, productivity enhancing inputs and prices. There are controls for the degree of country openness, the size of government, inflation, food production per capita and food next exports in different regressions. The effect of the reach of the financial system turns out to be so strong that private credit ceases to have a significant effect on undernourishment. While the effect of this measure of financial access is significant on agricultural productivity, that of credit is also highly significant. Similar results are obtained for cereal yields. But the effect of financial development on prices is positive.

- Private credit has about one quarter of the impact of GDP per capita on undernourishment. That is large, given that private credit also increases GDP per capita substantially.
- Pulling together all these results, three findings illustrate the linkages between finance and undernourishment: (i) agricultural productivity is an important channel and accounts for 26-55 per cent of the impact of private credit on undernourishment. The remainder is presumably due to consumption smoothing. (ii) Private credit contributes to productivity by enabling greater use of fertilizer and tractors-about 60-63 per cent of the impact of private credit on productivity is attributable to these two inputs. Education is likely to contribute much of the remainder. (iii) About 45-61 per cent of the impact is accounted for by higher cereal yields.

In sum, private credit has a large negative effect on undernourishment through higher agricultural productivity in general and higher livestock, crop and cereal yields in particular. To a large extent higher agricultural productivity due to financial development is mediated by greater fertilizer and tractor use. Besides, the distribution of banking outlets makes a difference.

Microfinance and Poverty

Microfinance allows poor people to protect, diversify and increase sources of their income. As Littlefield et al. (20030 emphasise, " The ability to borrow a small amount of money to take advantage of a business opportunity, to pay for school fees, or to bridge a cash-flow gap can be a first step in breaking the cycle of poverty. Similarly poor households will use a safe, convenient savings account to accumulate enough cash to buy assets such as inventory for a small business enterprise, to fix a leaky roof, to pay for health care, or to send more children to school" (p.2). Microfinance also mitigates vulnerability to extreme fluctuations that are a feature of their daily existence. Loans, savings, and insurance smooth out income fluctuations and stabilize consumption levels even during lean periods. A selective review of the evidence is given below, beginning with its targeting accuracy. The assessment of targeting is interesting as it takes into account both monetary and non-monetary indicators of deprivation, based on a small sample of households in Maharashtra (an Indian State).

- The largest proportion of SHG members (37.4 per cent) belonged to labour households- a highly poverty prone group- followed by Others (34 per cent) and cultivating households (about 28 per cent). This contrasts with the

distribution of the control group, as the share of those belonging to labour households was the lowest (20 per cent).

- However, as shown in Fig. 5, the majority of the participants were well above the poverty cut-off point of Rs 2800 per capita annually (at current prices)[12]. Well over 90 per cent of the participants had incomes higher than this cut-off point. Even if the cut off point is raised by 25 per cent (i.e. if it is taken to be Rs 3500), barely 14 per cent of the SHG members would be classified as poor. In fact, when the cut off point is doubled (i.e. if it is taken to be Rs 5600), barely 40 per cent of the SHG members would be poor. So whatever the poverty cut-off point within this large range, the majority of the participants would be considered as non-poor or relatively affluent.
- To the extent that SC/ST/OBCs are more prone to economic and other forms of deprivation- including social exclusion-the fact that over two thirds of the SHG participants belong to them suggests that deprived sections have benefited through this intervention. The fact, however, that even among the control group the share of SC/ST/OBC households is higher also suggests that a large segment of the deprived groups is also left out. Besides, since the share of upper castes among SHGs is non-negligible, it suggests that the benefits have also accrued to sections that are typically (relatively) affluent.
- Economic well-being depends on some forms of capital. Human capital is an important component of it. Educational attainment is a specific form of human capital. A large fraction of SHG members is illiterate or possesses primary education. About 40 per cent possess middle level of education and a small fraction consists of matriculates or above. A similar distribution is obtained for the control group.
- Nearly 70 per cent of SHG members were landless or nearly landless. The corresponding share of the control group is markedly lower (40 per cent). So to the extent lack of ownership limits income enhancing options, SHGs appear to cover a large subset of households with limited land endowment. The average landowned among SHG members was 0.70 acre as against 2.02 acres among the non-participants.
- Although a large majority of SHG members were permanently employed, many were seasonally or temporarily employed. In parts of Maharashtra with semi-arid or arid conditions, slack periods tend to be long. So to the extent that SHG loans help finance productive activities, the income gains would enhance welfare significantly. By contrast, a much larger majority of the control group reported that they were permanently employed.

[12] This is based on a poverty cut –off point of Rs 15 per capita per month at 1960-61 prices, adjusted for price changes using the Consumer Price Index for Agricultural Labourers in Maharashtra. For details, see Gaiha and Nandhi (2008). There have been some suggestions in the recent literature that this cut-off point is much too low. See, in particular, Sen (2005).

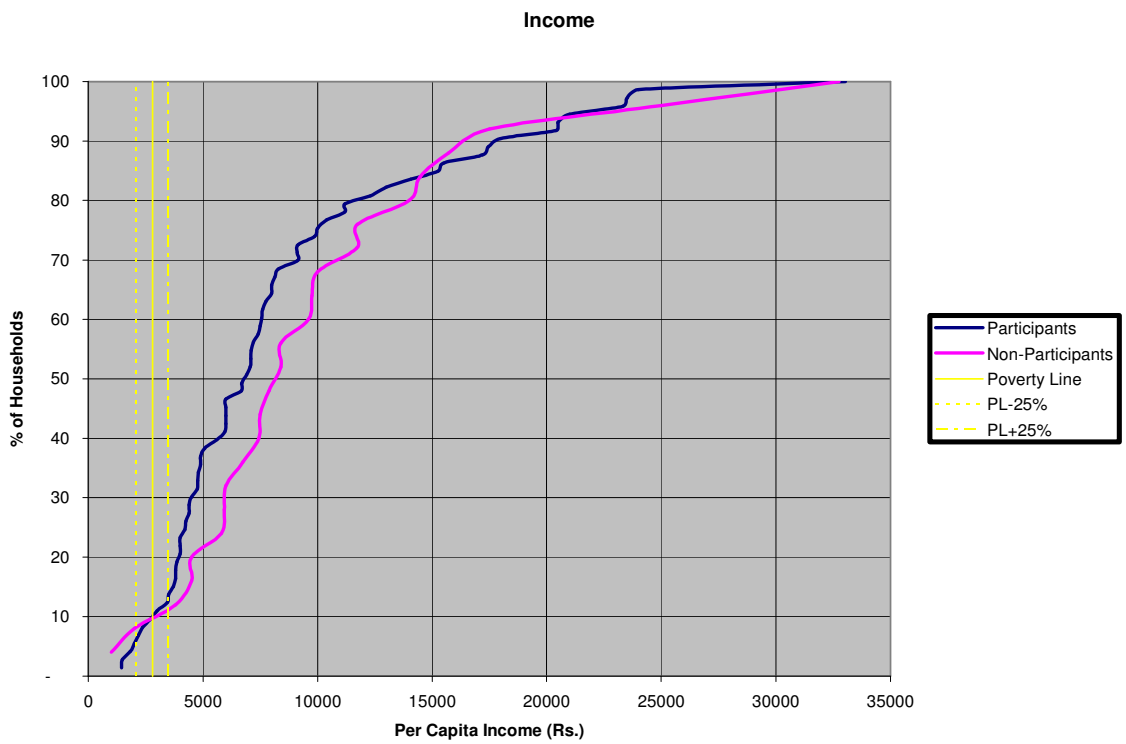


Fig: 5 Targeting of SHGs

Source: Gaiha and Nandhi (2008)

So, while in terms of an income criterion the targeting was unsatisfactory, other criteria point to better targeting of the deprived. This finding is corroborated by other studies in Asia and the Pacific region (Littlefield et al. 2003).

- In Indonesia, borrowers increased their incomes by 12.9 per cent compared to an increase of 3 per cent in the control group. Another study of Bank Rakyat Indonesia borrowers in Indonesia reports that the average income of the clients rose by 112 percent and that 90 per cent of households had moved out of poverty.
- A study of SHARE clients in India shows that three-fourths of clients who participated in the programme for longer periods improved their well-being (based on sources of income, ownership of productive assets, housing conditions) and that half exited from poverty. Employment pattern changed- from irregular, low-paid daily labour to diversified sources of earnings, increased employment of family members and a greater reliance on small enterprises.
- A World Bank study (Khandker, 1998) of three of the largest microfinance programmes in Bangladesh –Grameen Bank, BRAC, and RD-12-during the 1990s reports that female clients increased household consumption by 18 takas for every 100 takas borrowed, and that 5 per cent of the clients escaped poverty each year. More importantly, households were able to sustain these gains over time. There were also spillover effects benefiting non-participants. One of these programmes, for example, led to higher wage rates as many

participants engaged in self-employment and withdrew from informal labour pools.

- The rates of return are a notional measure of profitability of SHG loan financed investments. Two caveats are necessary. (i) The adjustment for rents, interest and labour costs are based on whatever data could be extracted from household responses. So to claim precision for these estimates would be misleading.(ii) Moreover, while there is a small number of loss making investments (in fact two), in a large number of investments, the returns are quite high (over 100 per cent). The latter are not implausible, as small investments often yield high returns. However, it is unlikely that such high returns are likely to be maintained when services provided (e.g. tailoring) become more competitive. So generalisations from these rates of return are difficult. Disaggregating these results by income and caste categories, we get a pattern of returns that runs contrary to the presumption that the poor lack the skills to engage in remunerative self-employment. Regardless of the poverty cut-off point chosen, a very high share of the poor earn returns in excess of 50 per cent annually. For example, if the cut-off point chosen is Rs 5600, over 57 per cent of the poor earned returns exceeding 50 per cent. Among SC/ST respondents, 68 per cent recorded returns above 50 per cent. The main findings are summarized in Table 1.

Table 1
Rates of Return on Investment

Annual Rates of Return (%)	Relative Frequency (%)	Cumulative Frequency (%)
≤ 0	5.3	5.3
0-25	23.7	28.9
25-50	7.9	36.8
50-75	18.4	55.3
75-100	21.1	76.3
≥100	23.7	100
Total	100	

1. Source: Gaiha and Nandhi (2008). These estimates are based on a subsample of respondents who used SHG loans for production.

- An ethnographic study of a Grameen village points to the much higher levels of schooling of Grameen children compared to children of non-members. Almost all girls had some schooling compared to 60 per cent of girls in the comparison group; 81 per cent of Grameen boys went to school compared to 54 per cent in non-grameen households.
- Microfinance client households appear to have better nutrition, health practices, and health outcomes than non-client households. Larger and more stable incomes generally lead to better nutrition, living conditions and preventive health care. The World Bank study (Khandker, 1998), for example, shows that a 10 per cent increase in credit to women was associated with a 6.3 per cent increase in mid-arm circumference of daughters. Mid-arm circumference of boys also increased but by a smaller amount. There was a statistically significant positive effect on height-for-age for both boys and girls.

- The Women's Empowerment Programme in Nepal found that 68 per cent of its members were making decisions on buying and selling property, sending their daughters to school, negotiating their children's marriages, and planning their family. These decisions were traditionally made by the male spouses. TSPI in the Philippines reports that programme participation increased the share of women who were principal household-fund managers from 33 per cent to 51 per cent. By contrast, only about 31 per cent women in the control group were principal fund managers.
- Some caveats, however, must be entered, based on a study of SHGs in Maharashtra. Various indices of empowerment were used (e.g., role in household decision-making, market transactions, participation in community affairs) and in most cases the responses were overwhelmingly positive[13]. But these indices of empowerment do not reveal the 'costs'. Higher incomes and a broadening of spheres of activities entail greater responsibilities for women and extra hours of work. Out of 73 respondents, 38 (52 per cent) reported extra hours of work. Over 60 per cent of the respondents reported working over 2 hours a day in addition to their domestic chores. In fact, more than a quarter of the respondents reported working more than 5 extra hours a day. In the absence of reallocation of domestic responsibilities, some of the gains from extra incomes earned are likely to be at least partly offset by longer hours of work. Out of 73 SHG members, 48 reported greater responsibilities (65.8 per cent), 19 (26 per cent) denied, and the remaining 6 (8.2 per cent) did not respond.

(a) Trade-off between Outreach and Financial Sustainability

There is a strong presumption in the extant literature that it is not financially feasible to expand coverage of the poorest. Poorer clients tend to borrow small amounts, and, as average loan size gets smaller, costs tend to rise. Littlefield et al. (2003) offer evidence to refute this presumption. One important point is that it is largely a design issue requiring simplified, cost-effective banking approaches. ASA in Bangladesh is a pioneer in developing such systems. In fact, more than a few MFIs reach clients living on less than $1 a day without impairing their financial sustainability. 65 per cent of BRAC's clients in Bangladesh live on less than $1 a day and own no agricultural land, yet the rate of return on BRAC's assets was 4.3 per cent in 2000. Over 70 per cent of the SHARE clients (in India) and CARD (in the Philippines) own no agricultural land, and so presumably are living well below this cut-off point. In 2001 Shares's return on assets was 1.1 per cent and CARD's was 3.3 per cent. In Cambodia EMT earned 2.3 per cent on assets in 2001, even though half of its clients were living in poverty. More recent evidence from the *Micro-Banking Bulletin* shows little correlation between the profitability of successful MFIs and their average loan size (as a proxy for the poor borrowers). In fact, of the 62 institutions reporting full financial self-sufficiency, the 18 that target the poorest clients (loan size of 20 per cent of GDP per capita) showed higher average profitability than the rest. One explanation is that these MFIs have lower costs per borrower that neutralizes the effect of smaller loans. Some of the successful MFIs are expanding rapidly, relying on a strong management and efficient operations. BRAC, with over 3.6 million members, launched a new programme in Afghanistan and, after six months in operation, has 5000 clients.

[13] For cross-validation, see Gaiha and Nandhi (2008).

A more recent study by Cull et al. (2007) offers a new insight into financial performance of MFIs. This is based on a new extensive data set of 124 MFIs in 49 countries. The authors explicitly examine the trade-off between the depth of outreach and profitability. Two specific issues addressed are: whether more profitability is associated with a lower depth of outreach of the poor, and whether there is a deliberate move away from serving poor clients to wealthier clients in order to enhance profitability (mission drift). They also test whether a higher interest rate leads to a deterioration in the quality of the loan portfolio due to moral hazard and adverse selection.

A special feature of this study is the classification of MFIs into three types: group lending systems, village banking and individual-based lending. This serves as the basis for examining the relevance of institutional design for the trade-off between financial performance and outreach.

The results are striking. Individual-based MFIs seem to perform better in terms of profitability, but the fraction of poor borrowers and female borrowers in the loan portfolio is lower than that for group-based institutions. Also, a rise in interest rates, above a certain threshold, leads to a worsening of portfolio quality in case of individual-based lending, whereas this is not the case for the group-based institutions. This confirms the hypothesis that screening and monitoring by peers in group-based systems helps to overcome problems of moral hazard and adverse selection. A third important finding is that individual- based MFIs, when they grow larger, focus increasingly on wealthier clients (mission drift) but group-based MFIs are less so. So design of MFIs matters.

In sum, the trade-off is exaggerated, if not mistaken.

(b) How Sensitive is Demand for Credit to Interest Rate?

Of the many recent contributions, two are significant. Despite their use of state-of-art econometric techniques, the results differ considerably. While methodological differences may be a factor, the contextual differences ought not to be overlooked.

One of the two studies reviewed below is Dahejia et al. (2005). The analysis is based on data supplied by Safesave, a credit cooperative in the slums of Dhaka, Bangladesh. To motivate this analysis, it is argued that upscaling of microfinance programmes is contingent on the success of microfinance as a commercial phenomenon, free from subsidy. A key issue in this context is whether costs could be contained and loans could be priced at interest rates high enough to generate profits. A corollary is that the poorest borrowers are willing to pay higher interest rates. This view could be defended on the ground that poor households primarily seek access to credit and not necessarily cheap credit. In that case interest rates could be raised without losing the core clientele.

Most microfinance interest rates range between 30-60 per cent per year. Fig: 6 shows the range of costs charged by over 100 leading microlenders, averaged by countries. The figures represent real portfolio yields (calculated as the financial revenue from the loan portfolio as a fraction of the average gross loan portfolio, adjusted for

inflation). These yields are taken as the average effective interest rates charged on loans, together with any loan related service charges. The figures range from 0 per cent (for a single lender in Yugoslavia) to over 70 per cent, with a median of 30 per cent. Region-wise estimates are shown in Fig: 7. Note that South Asia is at the lower end.

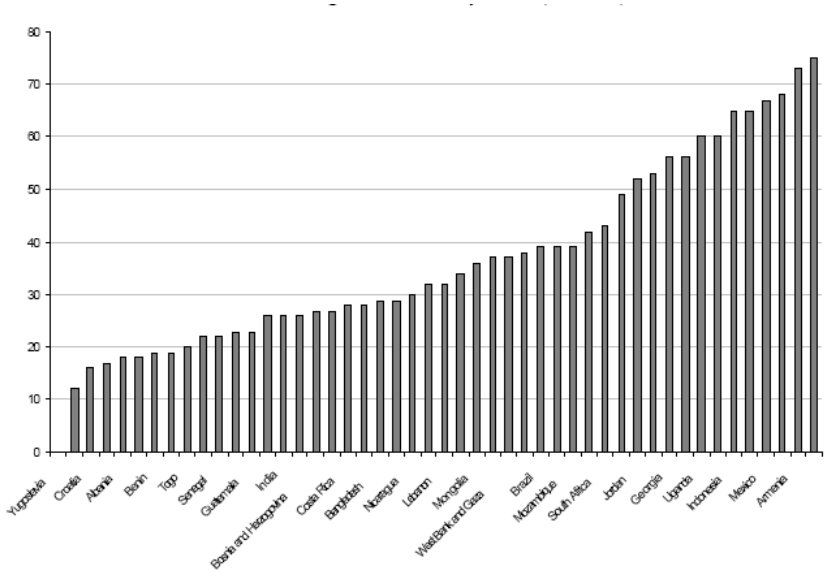


Fig: 6 Real Yields on Gross Portfolio, Country Averages, *MicroBanking Bulletin*, July 2003, (n=124). Source: Dehejia et al. (2005).

Some overzealous advocates of raising interest rates rest their claim on two ideas. One is that marginal returns to capital diminish with scale. Since the poor are starved of capital, they are likely to have higher returns and can therefore afford to pay higher interest rates. The second idea is that, since they already pay interest rates in excess of 100 per cent per annum, raising microfinance interest rates to more than 50 per cent is not likely to affect their demand. This is a contentious claim as raising interest rates can in principle exacerbate moral hazard and adverse selection, worsening loan repayment rates and screening out the most reliable borrowers.

Dehejia et al. (2005) take advantage of an unexpected price increase imposed by a lender in the slums of Dhaka to examine whether poor borrowers reduced their borrowing when faced with a higher interest rate. Identification of the February 2000 interest rate increase (from 2 per cent per month to 3 per cent per month) exploits the fact that the change occurred in Tikkaparaand Kalyanpur branches, but not in the Geneva branch. Geneva had already started with an interest rate of 3 per cent per month when it opened in March 1999.

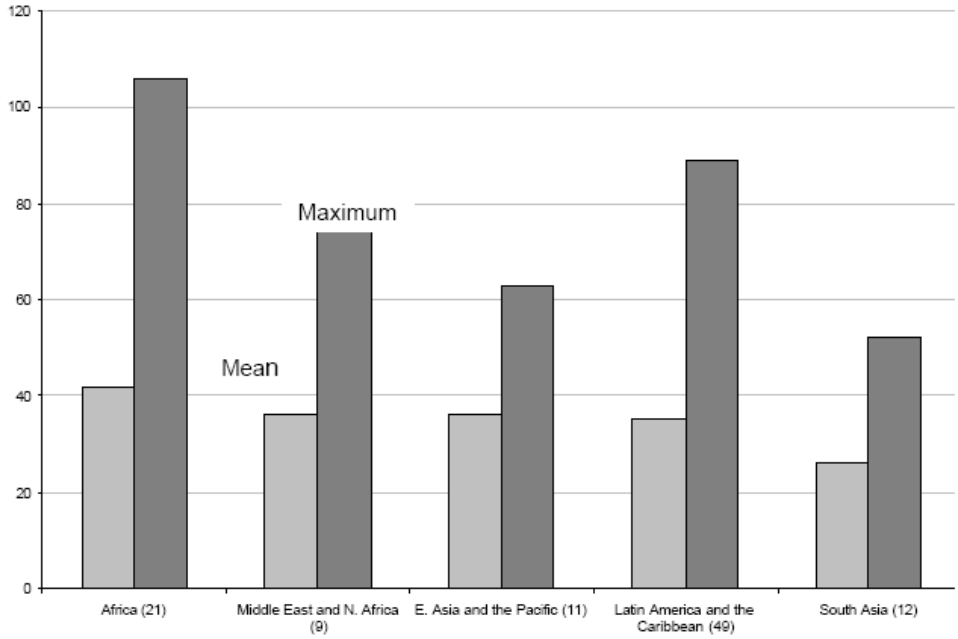


Fig: 7 Real Yields on Gross Portfolio, Region Averages and Maximum, *MicroBanking Bulletin*, July 2003 (n=124). Source: Dehejia et al. 2005.

A difference-in-difference specification is employed.

$$Y_{it} = \beta_0 + \beta_1 \text{Treated}_i + \beta_2 \text{Post}_i + \beta_3 \text{Treated}_i \text{ x } \text{Post}_i + \varepsilon_{it} \qquad (7)$$

where i indexes clients and t the month, Y_{it} is the dependent variable (typically average monthly loan balances, but also an indicator for loans, amount loaned, and repayments), Treated_i takes on a value of 1 for individuals Tikkapara and Kalyanpur and 0 for those in Geneva, and Post_i refers to time periods after the interest rate increase. Hence β_3 gives the impact of the interest rate increase: the change in borrowing before and after the interest rate increase in Tikkapara and Kalyanpur, relative to the contemporaneous change in Geneva. Some refinements include borrower characteristics, including age and length of time in the programme; a full set of monthly dummies; fixed effects; and trend differences between the treated and comparison groups.

The results vary with the specification-specifically, the controls. The important finding is that interest elasticity is large (in absolute value). A selection of the results is given below.

- Based on a balanced panel (made up of customers who are in the panel for at least 6 months prior to February, 2000, interest rate increase). The estimated interest elasticity is -0.79. (Note that this and subsequent elasticities are relative to loans in the initial period).
- Whether the elasticity varies with the estimation window is examined. In the main analysis, a period of 12 months before and after the interest increase was used. As the longer the period, the greater is the possibility that the results are driven by trends in the data. Accordingly, the window was narrowed to nine months and three months before and after the interest rate increase. For the

narrower window of nine months, the elasticity was -0.7, similar to the baseline result. For the narrowest window, however, the (absolute value of) the elasticity was lower (-0.37).

- Lacking data on wealth, average saving balances are used as a proxy. Restricting the sample to those who saved at least 100 taka during one of the months between June 1999 and August 1999, and restricting the estimation window to October 1999 to January 2001, "low saving" group is found to be more responsive to the interest rate than the "high saving" group, with an elasticity of -0.86 compared to -0.26. As a result, the inference that Safesave's portfolio shifted towards (relatively) wealthier clients with the higher interest rate seems plausible.
- The effect of the higher interest on size of loans of poor borrowers is also examined. A triple-difference estimator is employed: this requires comparison of the growth in the amount loaned to the poor relative to the rich in Tikkapara and Kalyanpur, before and after the interest rate increase, minus the same difference from Geneva to control for the time trend. There was a 250 taka decrease in the typical loan amount by poor borrowers because of the interest rate increase, a decrease of 12 per cent relative to the mean (Note that this decrease is relative to Geneva). In absolute terms, the amount loaned to the poor relative to the rich decreased in Tikkapara and Kalyanpur by 624 taka, compared to a reduction of 373 in Geneva over the same period.
- Instrumenting loan capacity by time spent in the programme, the interest elasticity turns out to be -1.04, implying greater sensitivity of borrowing to interest rate increases.
- In order to understand better the reasons for high interest rate elasticities, several mechanisms are analysed. These comprise reductions in the probability of taking loans, reductions in the size of those loans, faster repayment of loans, or some combination of these. A linear probability model (probit) is used. The results suggest that: amount borrowed decreases by about 17 per cent relative to the typical loan size; the amount repaid increases by approximately 100 taka, or 60 per cent relative to the monthly repayment; the time between loans falls by one month; and, finally, withdrawals from savings accounts rise to compensate for the reduction in borrowing.

In sum, the presumption that the demand for loans is highly inelastic to interest rate changes is refuted. In fact, the elasticities range from -0.73 to -1.04, with the latter being the preferred estimate. Although Safesave achieved financial stability as a result of higher interest rate, it "came at a cost in terms of serving the bank's poorest clients" (Dehejia et al. 2005, p. 19-20).

A second important study (Karlan and Zinman, 2007) examines interest elasticity of demand using randomised trials conducted by a consumer lender in South Africa. An important point of departure is that demand elasticities are computed with respect to price and maturity. The basic model is:

$$Y_i = f(\mathbf{C}_i, \mathbf{X}_i) \qquad (8)$$

where i indexes potential borrowers in the sample; Y_i is a measure of extensive (take-up) or intensive (loan size) demand for debt from the lender, $\mathbf{C}_i$ is a vector of loan contract terms-including the offer rate (r_i) and/or the maturity (m_i), and $\mathbf{X}_i$ comprises

variables to stratify the random assignment of (r_i). In the case of interest rate sensitivity, the identification problem is addressed by using interest variation created by the lender's random assignment. The randomly assigned interest rate is designed to capture the counterfactual: what happens to borrowing behaviour if the interest rate changes exogenously. A linear probability model (or probit) is used:

$$a_i = \alpha + \beta\, r_i + \delta\, \mathbf{X}_i + \varepsilon_{ib} \qquad (9).$$

Here a=1 if the client applied for a loan. The offer rate r is orthogonal to ε by construction and hence β is an unbiased estimate of the price sensitivity of loan take up from direct mail solicitation.[14] Allowance is made for non-linearities to capture kinks in the demand curve at prices where clients have outside options. This model is estimated separately for different gender and income groups.

The next issue is the price sensitivity of loan size demand. The intensive margin is estimated by changing a_i in (9) to a function of loan size (l_i). Here identification is somewhat complicated. Specifically, the loan size and maturity demanded may be correlated with applicant characteristics other than $\mathbf{X}_i$ if those who choose to apply at a given r_i are different (in terms of preferences or opportunities) than those who choose not to apply.

Given this caveat, loan size elasticities could be taken to hold only for the sample of borrowers. Additional controls (e.g., credit risks) are also considered and if β remains unchanged, it is concluded that the results apply to non-borrowers as well. The important results are summarised below.

- A 100 basis point increase in the monthly interest rate reduces take up by 3/10 of a percentage point. Thus a price decrease from the maximum (11.75 per cent) to the minimum (3.25 per cent) rates offered in the sample would increase the take up rate by 2.6 percentage points. Another measure of responsiveness is the take up elasticity which turns out to be -0.28. This is more than moderately high.
- Another interesting result is the asymmetric price elasticities. High rates depressed the level of take up: clients randomly assigned a higher than standard offer rate for their risk category were 3 percentage points (36 per cent) less likely to apply. In fact, the demand curve becomes steeper in the region of higher rates: the take up falls 1.7 percentage points for each 100 basis point increase in the interest rate. Thus the point estimates show that the price sensitivity of take up was 6 times greater at higher than standard rates[15].
- The price sensitivity of the amount borrowed, unconditional on borrowing, is a lot lower than in Dehejia et al. (2005). The elasticity is -0.32. Since this estimate does not change with additional controls indicated earlier, it is concluded that this result also holds for non-borrowers.
- The estimates of loan size price sensitivity conditional on borrowing is considerably lower-the elasticities range from -0.11 to -0.17.
- Combining the results on average price elasticities of demand with sensitiveness of revenues and repayment to interest rates, it is reported that

[14] For details of randomized trials through mail offers, see Karlan and Zinman (2007).
[15] For an explanation of the kink in the demand curve, see Karlan and Zinman (2007).

higher interest rates would be unprofitable for the lender. Gross revenues will decrease while loan losses will increase. However, there is no incentive for the lender to cut interest rate below the standard rate, as the revenue loss will more than offset the gain from higher repayment rates.

- Some MFIs have more targeted objectives than expanding access generally. The target groups include females, micro-entrepreneurs, and the relatively poor. Two groups commonly targeted by MFIs have slightly stronger price elasticities than the average. The take up elasticities for female, low-income and female low income clients are -0.33, -0.32, -0.32 (the sample average being -0.28). Loan elasticities for these groups (-0.40, -0.40. -0.51) are stronger too than the sample average (-0.32). Although loan size elasticities conditional on borrowing are also larger than the sample average, their absolute magnitudes are lower than unconditional elasticities.
- These results imply that price cuts could retain more female and relatively poor borrowers. Moreover, the profitability calculations suggest that targeting objectives could be achieved with only slightly lower profitability.

Demand also increases strongly with maturities. This is particularly plausible for liquidity constrained agents. Longer maturities reduce monthly loan payments, effectively permitting more borrowing.

The model specification used is:

$$m_i = \alpha + \beta \mathbf{S}_i + \chi \mathbf{R}_i + \delta \mathbf{X}_i + \varepsilon_{ib} \qquad (10)$$

where m is the maturity chosen (parametrized linearly), S is the maturity suggestion, R is a vector of the randomly assigned offer and contract interest rates, and X includes not only risk but also the loan size in the offer letter's example loan. The analysis is restricted to a sub-sample of low and medium risk borrowers. The results are summarised below.

- Each additional month of maturity translates into an actual maturity increase of 0.11 months. Using the maturity suggestions to instrument actual maturity in two stage least squares version of (10), the maturity elasticity of demand for credit is estimated.
- Each month of additional maturity increases intensive loan demand by 15.7 per cent. More importantly, the maturity effect is large relative to price sensitivity. Specifically, a one-month maturity increase has the same effect on loan size demand as a 167 basis decrease in the monthly interest rate.
- IV estimates suggest highly significant maturity elasticities for low-income borrowers but not for high income borrowers.

In sum, there is a downward sloping but relatively flat demand with respect to price throughout a wide range of prices at and below the lender's standard rates. For the lender, the cost of reducing the interest rates slightly exceeds the benefits (increased gross revenue from marginal borrowings, and increased net revenue from higher repayment rates). Taking targeting into account, access of female and low income borrowers could be expanded at a small cost to the lender (i.e. lower profitability). The case for raising interest rates to cut subsidies may well be disastrous. Operationally feasible maturities would have large effects on aggregate credit flows in

markets where liquidity constraints bind. An issue, however, is the replicability of these results to non-borrowers.

(c) Impact of Financial Crisis on Microfinance

There is little hard evidence on the impact of the current financial turmoil on microfinance. To the extent that there is contraction of credit, and the concomitant reduction in rural credit, the implications for the rural poor are likely to be serious in light of the preceding review of evidence on how microfinance mitigates poverty. Even though interest rates have fallen to stimulate demand for credit, there is a strong reluctance to lend in an environment lacking trust. So effectively contraction of credit with lower interest rates implies effectively higher interest rates and shorter maturities. If the results summarised above have general validity, it follows that the demand for credit would be reduced-especially in the target groups of MFIs-and poverty may increase through financial constraints on raising agricultural productivity. Vulnerability of low income households may also get aggravated because of their failure to smooth consumption. On the other hand, the loan portfolio of MFIs may shift in favour of wealthier clients. Moreover, the financial viability may erode because of moral hazard and adverse selection. A major priority therefore is to inject more capital into the financial system-especially MFIs. That these concerns have emerged as major priorities is reflected in a recent survey conducted by the Microcredit Summit Campaign, reported in *Micro-credit Summit e-news*, vol. 6, issue 2: October, 2008). A summary of the responses to the questions asked is given below.

As may be noted, the concerns arise from a tightening money market, higher cost of funds, and drying up of foreign funds. Higher rates of interest are resulting in repayment difficulties and reduction in borrowing. Consumption of food is reduced in the event incomes cannot be supplemented. MFIs are being forced to be more cost-effective or else are likely to be wiped out. What is indeed most worrying is the pessimism of investors in microfinance. Few, if any, concrete strategies are identified to deal with the financial turmoil.

New Evidence on Finance, Growth and Hunger in Asia

Here the objective is to analyse the relationships between finance, growth and hunger in selected Asian countries. The analysis is based on a panel of 9 countries over the period 1960 to 2006 using a dynamic panel estimation strategy, building upon the recent literature reviewed above.

First, a description of the data used is given. This is followed by an exposition of the model estimated. In a subsequent section, the results are discussed, followed by some concluding observations from a broad policy perspective.

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Table 2
Responses to Financial Crisis

Questions	MFI /Investors[1]	Response
How has your microfinance institution (MFI) been affected by the global financial crisis, or how do you see it being affected, and if is being affected what are you doing to address it?	President, Association for Social Advancement, Dhaka, Bangladesh; Managing Director, Share Microfin Ltd., Hyderabad , India; Executive Director, Shri Kshetra Dharmasthala Rural Development Project, Dharmasthala, India;President, Kashf Foundation, Lahore, Pakistan; Director, Citigroup Global Microfinance Centre, London, England; Director, Community Development Group, Deutsche Bank, New York, USA; NABARD, India.	Lack of funds from banks and scaling down of targets; new covenants raising interest rates are being imposed and as a result the cost of funds has gone up (in one case, by 450 basis points some are being forced to cater to agri-lending targets fixed by regulators; overdue amounts are rising; rescheduling of loan instalments; larger loan amounts; cutting costs by reducing number of client meetings; option of individual lending as opposed to group lending is being seriously considered for reasons of cost-effectiveness; reduction of processing time for loan requests, and enhancement of entry loan size.
How is your MFI being affected by rising food and fuel prices? What are you or your clients doing to address those challenges?		Many clients are forced to curtail their food consumption; clients are being urged to mitigate inflation by using alternate sources of fuel and food supplements; many clients are forced to supplement their incomes by taking up another job; savings are reduced.
How do you see the global financial crisis affecting your institutions work as an investor in microfinance?		Drying up of foreign financial investment; triple A tranches that traded at 150 basis points above the LIBOR are now trading at 500 basis points above LIBOR; new microfinance collaterised debt structures are disappearing; country risk premia and local credit spreads have increased as investors are more risk averse; MFIs that are not well capitalised nor have diversified sources of funding are facing liquidity risk; many MFIs are being weeded out as money gets tighter and investors raise their credit standards; prudential requirements for MFIs are being tightened; cost-effectiveness of MFIs may improve.
If you see a negative effect what, if anything, are you doing to address it?		Expansion of refinance facilities to rural financial institutions; efforts are being made to raise money in a tight market; expansion of outreach of investors outside existing network of microfinance investors; key role of development agencies such as the World Bank.

1. MFIs from Asia are listed here. For lack of space and for reasons of consistency, the responses are summarised without specific attribution.

(a) Data

All the models are estimated with the finance and poverty and inequality data at the country level. The data sets created are based on World Bank Development Indicators (WDI) 2008 (World Bank, 2008b), FAO-STAT (FAO, 2008), World Bank's Finance Data (based on Beck et al. (2000)), The UNU-WIDER World Income Inequality Database (WIID) (UNU-WIDER, 2008), and Barro-Lee's (2000) data on education.

One of the data constraints in addressing our research questions is that while annual data on most of the key economic and financial variables are available in 1960-2006 for 9 countries (except Vietnam for which most of the variables start from 1985-1990), the data on inequality and poverty are available only for few years, the years when the national income or expenditure survey or census were carried out. Therefore, we use the annual panel data for 8 or 9 countries to examine the links between financial growth and economic or agricultural growth in the period 1960-2006, with a few missing observations. We have constructed a dynamic panel data model, drawing upon Blundell and Bond (1998) which is an extension of Arellano and Bond (1991). To investigate the relationship between finance and inequality or poverty, we use the panel data aggregated at 5 years' intervals since 1960 (e.g., Barro and Lee (2000) or the empirical macroeconomics literature to test growth theories). For all countries except Vietnam, inequality data from UNU-WIDER's WIID and undernutrition data from WDI (Classens and Feijen, 2006) are available roughly once or sometimes twice in 5 year periods. If there are more than one estimate is available in one period, the average is used.[16] These poverty and inequality data are matched with the 5 year averages of finance and economic variables. One of the advantages of applying two different time schedules is that we can use the predicted values of finance data based on annual panel data for the 5 year- panel, whereby inequality or undernourishment is estimated by the aggregated finance data based on predictions on an annual basis. This approach would at least partially address the issue of endogeneity of finance in the inequality or undernourishment equation.

Annex 1 summarises the definitions of variables, descriptive statistics and data sources. We take three different measures of finance-(i) logarithm of the share of private credit as a share of GDP; (ii) log of the share of private credit through (formal) money deposit banks as a share of GDP (the narrow definition of private credit), and (iii) log of Financial System Deposits in GDP. For inequality, we use two measures, the income Gini coefficient and the share of the income of the bottom 20% of the population. Poverty is treated as synonymous with the prevalence of undernourishment, as in Classens and Feijen (2006). Other variables used in the anal;ysis are defined in Annex 1. Graphs are presented in Annexes 2 and 3.

[16] There are a few cases where there are no inequality or undernutrition data in a 5 year interval. Because the missing observations would seriously limit the dynamic panel estimation where the lagged dependent variable is used as one of the explanatory variables, we fill these by taking the weighted average of the observations in the pre and post periods. We did not have any cases where missing observations repeat for 2 periods.

(b) Model Specifications

We estimate four dynamic models in which the dependent variable, (1) GDP per capita or agricultural value added per capita, (2) finance, (3) inequality or (4) undernourishment is separately estimated. A variable on finance is used as one of the explanatory variables for (1), (3) and (4).

(1) Model for GDP or Agricultural Value Added

Following Guariglia and Poncet (2008), we specify the following relation:

$$\Delta Y_{it} = \alpha + \beta Finance_{it} + \gamma\, Control_{it} + \eta_i + \lambda_t + \varepsilon_{it} \qquad (11)$$

where i and t denote country and year, respectively; ΔY_{it} is GDP per capita growth and Finance $_{it}$ is a proxy variable for finance, Control $_{it}$ is a vector of control variables, η_i is the country specific unobservable effect (e.g. social and cultural factors), λ_t is the time effect and ε_{it} is an error term, independent, and identically distributed (or *i.i.d.*). The log of lagged per capita GDP is included in Control $_{it}$ to control for convergence. Other controls include log of share of population with more than primary education, log of government expenditure over GDP (to measure size of government), log of CPI (consumer Price Index), log of trade as a share of GDP (measure of openness) and FDI as a share of GDP (measure of degree of openness). In a variant, the dependent variable is agricultural value added per capita.

A version of equation (11) can be written as

$$Y_{it} - Y_{it-1} = (\alpha' - 1)Y_{it-1} + \beta' X_{it} + \eta_i + \lambda_t + \varepsilon_{it}$$

by having the log of lagged per capita GDP in the right hand side and the rest of the explanatory variables are written as a vector, X_{it}. Estimating (11) (with log of lagged per capita GDP) is thus equivalent to estimating the following standard dynamic panel data model:

$$Y_{it} = \alpha' Y_{it-1} + \beta' X_{it} + \eta_i + \lambda_t + \varepsilon_{it} \qquad (12)$$

GMM panel estimator relies on first-differencing the estimating equation (and thus country fixed effects will be eliminated) and appropriate lags of the right side variables as instruments.

$$Y_{it} - Y_{it-1} = \alpha''(Y_{it-1} - Y_{it-2}) + \beta''(X_{it} - X_{it-1}) + (\lambda_t - \lambda_{t-1}) + (\varepsilon_{it} - \varepsilon_{it-1}) \qquad (13)$$[17]

Two issues have to be resolved: one is endogeneity of the regressors and the second is the correlation between $(Y_{it-1} - Y_{it-2})$ and $(\varepsilon_{it} - \varepsilon_{it-1})$ (e.g. see Baltagi, 2005,

[17] As an extension, we have carried out the case with the first and second lagged dependent variables in some cases, depending on the results of serial correlation tests and significance of coefficient estimates of the lagged dependent variables.

Chapter 8). Assuming that ε_{it} is not serially correlated and that the regressors in X_{it} are weakly exogenous, the generalized method-of-moments (GMM) first difference estimator (e.g. Arellano and Bond, 1991) can be used. Alternatively, we could use the lagged differences of all explanatory variables as instruments for the level equation and could combine difference equation (13) and the level equation (12) in a system whereby the panel estimators use instrument variables based on previous realisations of the explanatory variables as the internal instruments using the Blundell-Bond (1998) system GMM estimator based on additional moment conditions.[18] Such a system gives consistent results under the assumptions that there is no second order serial correlation and the instruments are uncorrelated with the error terms. Validity of instruments is tested by the Sargan's J test and the second order serial correlation of the residuals. The Blundell-Bond (1998) system GMM estimator is used in the present study. We use the heteroscedasticity-robust variance-covariance estimator for all cases.

The Blundell-Bond (1998) system GMM estimator is useful to address the problem of potentially endogenous regressors (e.g. Finance in equation (11)). In the system equation, endogenous variables can be treated similarly to lagged dependent variables. The second lagged levels of endogenous variables could be specified as instruments for difference equation. The first lagged differences of those variables could also be used as instruments for the level equation in the system.

We try the cases (i) where the endogeneity is not taken into account and (ii) where some endogenous variables are included. In this model, we try the cases where finance and trade share are treated as endogenous variables.

(2) Model for Financial Development

While there is a huge empirical literature to estimate the determinants of finance, we use a simple specification, following Baltagi et al.'s (2008) where finance is estimated by a dynamic panel model in which trade openness and financial openness are used as explanatory variables.

$$Finance_{it} = \gamma Finance_{it-1} + \delta Openness_{it} + \eta'_i + \lambda'_t + \varepsilon'_{it} \qquad (14)$$

This is estimated by the Blundell-Bond system GMM estimator.

(3) Model for Inequality

Likewise, inequality is estimated by a dynamic panel model using the Blundell-Bond system GMM estimator applied to 5 year panel data.

$$Inequality_{it} = \theta Inequality_{it-1} + \vartheta Finance_{it} + \mu W_{it} + \eta''_i + \lambda''_t + \varepsilon''_{it} \qquad (15)$$

The dependent variable is the Gini index of consumption or income or the share of the bottom 20 per cent of the population. $Finance_{it}$ is a log of private credit (value of credit by financial intermediaries to the private sector) divided by GDP, or log of

[18] See the application by Guariglia and Poncet (2008) to examine the relation of finance and economic growth in China.

Financial System Deposits in GDP. W_{it}, a vector of control variables including log of initial years of schooling, log of the growth rate of the GDP deflator, and log of trade share. Finance and trade share are treated as endogenous variables in some specifications.

(4) Model for Undernourishment

In the regression of prevalence of undernourishment, we use the same specification as for the inequality equation except that we include log of population growth and log of dependency burden (share of population in the age group between 15—65; in other words, active population) in W_{it}.

(5) Granger Causality Tests for Finance and GDP or Agricultural Value Added

As an extension, we carry out the Granger Causality test based on the VAR (Vector Autoregressive) model for finance and GDP per capita or agricultural value added per capita using annual time series data for each country.

$$Y_t = a_o + a_1 Y_{t-1} + a_2 Y_{t-1} + \cdots + a_k Y_{t-k} + \cdots + b_1 Finance_{t-1} + b_2 Finance_{t-1} + \cdots + b_k Finance_{t-k} + u_t \quad (16)$$

and

$$Finance_t = c_o + c_1 Finance_{t-1} + c_2 Finance_{t-1} + \cdots + c_k Finance_{t-k} + d_1 Y_{t-1} + d_2 Y_{t-1} + \cdots + d_k Y_{t-k} + e_t \quad (17)$$

where the number of lags, *k*, is determined by Toda and Yamamoto`s (1995) procedure. They show that, even if the processes are integrated or cointegrated of an arbitrary order, a lag-selection procedure by estimating (k`+ d_{max}) th-order VAR where k` is determined as a lag length determined by Akaike Information Criteria (AIC) or Schwarz Information Criteria (SIC), for example, is feasible, and d_{max} is the maximal order of integration. Then the Granger Causality Test, for example from *Finance* to *Y* can be conducted by the joint significance test for the coefficient estimates of b_1 to b_k. Likewise, the Granger Causality Test from *Y* to *Finance* involves the joint significance test for d_1 to d_k.

(c) Results

The results of the models specified above are discussed here. Table 3 reports 6 cases; Cases 1 and 2 for the broad definition of private credit, Cases 3 and 4 for the narrow definition of private credit through banks, and Cases 5 and 6 for financial system deposits. Cases 2, 4, and 6 are those in which finance and trade openness are treated as endogenous in the system. These six cases (based on three definitions of finance and whether some of the explanatory variables are endogenised in the system) will be tried for all the other models.

Table 3 Results for the Growth Equation (GDP per capita) based on Blundell and Bond (1998) GMM estimation

		Case 1	Case 2	Case 3	Case 4	Case 5	Case 6
	Whether Endogenous or Exogenous In Cases 2, 4 and 6.	Without endogenous regressors	With Endogenous Regressors	Without endogenous regressors	With endogenous regressors	Without Endogenous Regressors	With Endogenous Regressors
Dep. Variable		log(GDP pc)	log(GDP pc)	log(GDP pc)	log(GDP pc)	log(GDP pc)	log(GDP pc)
Explanatory Variables							
L.		1.238	1.287	1.289	1.308	1.254	1.275
		(23.55)**	(18.48)**	(19.01)**	(18.19)**	(17.75)**	(15.75)**
L2.		-0.266	-0.311	-0.312	-0.327	-0.279	-0.294
		(4.59)**	(4.32)**	(4.46)**	(4.45)**	(3.81)**	(3.66)**
log(private credit/GDP)	Endogenous	**-0.005**	**-0.003**				
		(2.32)*	**(1.20)**				
log(private credit by banks/GDP)	Endogenous			**-0.006**	**-0.002**		
				(1.35)	**(0.29)**		
log(financial system deposit/GDP)	Endogenous					**0.003**	**0.002**
						(5.18)**	**(2.81)****
log(share of population with primary ed. or above	Exogenous	0.018	0.008	0.026	0.014	0.022	0.01
		(1.30)	(1.12)	(2.07)*	(2.92)**	(1.85)	(1.96)
log(government expenditure/GDP)	Exogenous	0.019	0.011	0.012	0.003	0.007	0.002
		(4.18)**	(4.36)**	(2.28)*	(1.34)	(2.50)*	(1.32)
log(CPI)	Exogenous	-0.005	-0.001	0.001	0.004	0.002	0.004
		(1.56)	(0.43)	(0.58)	(3.46)**	(1.06)	(2.20)*
log(Export+Import /GDP)	Endogenous	0.029	0.024	0.019	0.014	0.015	0.013
		(4.24)**	(3.27)**	(3.36)**	(3.03)**	(3.43)**	(2.38)*
Constant		-0.23	-0.066	-0.202	0.017	-0.052	0.064
		(3.02)**	(1.49)	(1.34)	(0.28)	(0.67)	(3.75)**
Observations		294	294	258	258	270	270
Number of Country		8	8	7	7	7	7
Arellano-Bond Test for Serial Correlation (Z value)							
m 2		(-2.10)*	(-2.01)*	(-1.39)	(-1.35)	(-1.44)	(-1.39)
Sargan Test of overidentifying restrictions							
Ho: overidentifying restrictions are valid							
		$chi^2(323)$=	$chi^2(459)$=	$chi^2(288)$=	$chi^2(423)$=	$chi^2(300)$=	$chi^2(435)$=
		345.15	496.1	313.18	429.93	323.97	444.1
Prpb>Chi2		0.19	0.11	0.14	0.4	0.16	0.37
Without Malaysia							
log(private credit/GDP)	Endogenous	**-0.004**	**0.003**				
		(0.93)	**(1.79)**				
log(private credit by banks/GDP)	Endogenous			**-0.001**	**0.003**		
				(0.23)	**(0.59)**		
log(financial system deposit/GDP)	Endogenous					**0.003**	**0.003**
						(4.65)**	**(5.01)****

1. Absolute value of z statistics in parentheses
2. * significant at 5%; ** significant at 1% (based on robust estimators)
3. Blundell and Bond (1998) GMM one-step estimator is applied for all the cases.

Somewhat surprisingly, the coefficient estimate of finance is *negative* and significant in Case 1, which is contradictory to the predictions of positive role of financial development on economic growth, e.g., through financial intermediation or facilitation of industrial or agricultural investment). However, it ceases to be

significant once it is endogensised in the system. Finance, defined as financial system deposits, is positive and significant in Cases 5 and 6.

As a sensitivity test, we have run the regression with the same specification by dropping Malaysia.[19] As shown in the last panel, in Case 2 where finance is treated as an endogenous variable, it has a significant *positive* coefficient (at the 10% level), while the coefficient estimate in Case 1 ceases to be significant. The coefficient estimates are not significant in Case 3 or Case 4. However, they are highly significant in Case 5 and Case 6, as in the corresponding case *with* Malaysia. Incidentally, in Case 6, finance has a significant positive coefficient with a much higher z value. The rest of the coefficient estimates are more or less the same in the cases without Malaysia and are therefore not shown here.

Education, defined as the share of the population with primary education or above is positively associated with GDP per capita. Size of the government as measured by the share of government spending in GDP leads to the higher level of GDP per capita. The coefficient estimate of CPI is positive in all cases except Case 1. Trade share is positive and significant regardless of whether it is endogenised in the system. Tests for the second order serial correlation of the residuals (m2) show that there is no second order serial correlation except Case 1. The results for Sargan test validate our specification as overidentifying restrictions are valid for all the cases.

In Table 4, we estimate the determinants of agricultural value added per capita using the same specification. Private credit is negative and significant at the 5% level in Case 2 and at the 10% level in Case 1. However, the coefficient estimate of financial system deposit is positive and highly significant in Cases 5 and 6.

We have carried out again a sensitivity test without Malaysia. The coefficient estimates of finance are still negative in Case 1 to Case 4, but they are no longer significant in any of these cases, which suggests that Malaysia seems to have driven the negative and significant (at the 10% level) coefficients in Cases 1, 2 and 4 when Malaysia is included. Cases 5 and 6 with Malaysia still show a positive and significant coefficient for finance.

The evidence on the role of finance in agricultural growth is thus mixed. Other variables show more or less similar results to those in Table 3. However, it is noted that trade openness is not significant in Cases 3 to 6. Sargan tests and tests for serial correlations validate our specification.

[19] We do so because Malaysia is a special case not simply because of its size but also because of its structural characteristics.

Table 4 Results for the Growth Equation (Agricultural Value Added per capita) based on Blundell and Bond (1998) GMM estimation

		Case 1	Case 2	Case 3	Case 4	Case 5	Case 6
	Whether endogenous or exogenous in Cases 2, 4 & 6.	Without Endogenous Regressors	With Endogenous Regressors	Without endogenous regressors	With endogenous regressors	Without endogenous regressors	With endogenous regressors
Dep. Variable		log(Agri VA pc)	log(Agri VA pc)	log(Agri VA pc)	log(Agri VA pc)	log(Agri VA pc)	log(Agri VA pc)
Explanatory Variables							
L.		0.72	0.732	0.719	0.736	0.659	0.688
		(8.23)**	(8.81)**	(9.96)**	(10.91)**	(7.67)**	(8.07)**
L2.		0.244	0.248	0.255	0.25	0.29	0.288
		(3.80)**	(3.42)**	(4.27)**	(4.07)**	(3.89)**	(3.53)**
log(private credit/GDP)	Endogenous	**-0.017**	**-0.016**				
		(1.81)	**(2.00)***				
log(private credit by	Endogenous			**-0.013**	**-0.011**		
Banks /GDP)				**(1.43)**	**(1.72)**		
log(financial system	Endogenous					**0.006**	**0.003**
deposit/GDP)						**(4.57)****	**(2.46)***
log(share of population with primary ed. or above	Exogenous	0.00	0.002	0.006	0.012	0.013	0.012
		(0.02)	(0.27)	(1.04)	(3.04)**	(2.81)**	(2.76)**
log(government	Exogenous	0.007	0.005	-0.002	-0.005	-0.009	-0.008
expenditure/GDP)		(1.28)	(1.78)	(0.62)	(2.64)**	(1.79)	(2.73)**
log(CPI)	Exogenous	-0.001	0.00	0.004	0.005	0.005	0.004
		(0.24)	(0.06)	(1.85)	(3.26)**	(2.79)**	(2.42)*
log(Export+Import/GDP)	Endogenous	0.025	0.02	0.00	0.002	-0.008	-0.002
		(3.22)**	(3.39)**	(0.00)	(0.31)	(1.12)	(0.37)
Constant		0.122	0.053	0.132	0.115	0.41	0.271
		(0.71)	(0.59)	(1.10)	(1.84)	(7.19)**	(4.99)**
Observations		284	284	248	248	260	260
Number of Country		8	8	7	7	7	7
Arellano-Bond Tes for Serial Correlation (Z value)							
m 2		(-1.58)	(-1.53)	(-1.00)	(-0.93)	(-1.42)	(-1.35)
Sargan Test of overidentifying restrictions							
Ho: overidentifying restrictions are valid							
		$chi^2(314)$=	$chi^2(449)$=	$chi^2(278)$=	$chi^2(409)$=	$chi^2(290)$=	$chi^2(421)$=
		345.15	496.1	313.18	429.93	323.97	444.1
Prpb>Chi2		0.19	0.11	0.14	0.4	0.16	0.37
1. Absolute value of z statistics in parentheses							
2. * significant at 5%; ** significant at 1% (based on robust estimators)							
3. Blundell and Bond (1998) GMM one-step estimator is applied for all the cases.							
Without Malaysia							
log(private credit/GDP)	Endogenous	**-0.004**	**-0.005**				
		(1.00)	**(1.35)**				
log(private credit by banks/GDP)	Endogenous			**0.001**	**-0.004**		
				(0.24)	**(1.26)**		
log(financial system	Endogenous					**0.004**	**0.004**
deposit/GDP)						**(2.46)***	**(2.48)***

Table 5 contains the results of the finance equation. Cases 1 and 2, Cases and 3 and 4, and Cases 5 and 6 relate to three different finance measures. Two cases are tried for each definition according to whether trade openness is treated as an endogenous variable or not. Higher GDP per capita is significantly associated with (at the 10% level) financial development in all cases except Case 2. This is consistent with Baltagi et al. (2008). However, trade openness is not significant in any of the six cases. This is in sharp contrast to Baltagi et al. (2008) who found a positive and significant coefficient estimate for both trade openness and financial openness. It is noted, however that they use the data for 31 countries including advanced countries (e.g. US, UK, Japan), middle income countries (e.g. Brazil) and low income countries (e.g. Zimbabwe) for 1980-1996. The use of different data sets would partly explain the differences between the results. Sargan tests and tests for serial correlations validate our specification.

Table 5 Results for the Finance Equation based on Blundell and Bond (1998) GMM estimation (explanatory variable: log of GDP per capita)

		Case 1	Case 2	Case 3	Case 4	Case 5	Case 6
	Whether endogenous or exogenous in Cases 2, 4 & 6.	Without endogenous regressors	With endogenous regressors	Without endogenous regressors	With Endogenous Regressors	Without Endogenous Regressors	With endogenous regressors
Dep. Variable		log(private credit/GDP)	log(private credit/GDP)	log(private credit by banks/GDP)	log(private credit by Banks/GDP)	log(financial system deposit/GDP)	log(financial system deposit/GDP)
Explanatory Variables							
L.		1.096	1.114	1.502	1.498	1.017	0.999
		(14.33)**	(14.04)**	(24.03)**	(24.56)**	(44.82)**	(34.64)**
L2.		-0.189	-0.184	-0.571	-0.559	-0.092	-0.077
		(2.51)*	(2.56)*	(8.11)**	(8.11)**	(3.87)**	(2.50)*
log(GDP per capita)	**Endogenous**	**0.039**	**0.009**	**0.064**	**0.041**	**0.071**	**0.04**
		(2.63)**	**(0.65)**	**(2.99)****	**(2.80)****	**(1.80)**	**(2.37)***
log(Export+Import/GDP)	**Endogenous**	0.025	0.028	-0.008	0.001	0.009	-0.011
		(0.86)	(1.37)	(0.29)	(0.07)	(0.18)	(0.28)
Constant		0.123	0.238	-0.489	-0.324	-0.505	-0.316
		(0.88)	(2.08)*	(3.09)**	(2.91)**	(1.88)	(2.64)**
Observations		319	319	259	259	271	271
Number of Country		9	9	8	8	8	8
Arellano-Bond Tes for Serial Correlation (Z, Probb>z)							
m 2		(-0.53)	(-0.58)	(-2.04)*	(-2.04)*	(-0.95)	(-1.12)
Sargan Test of overidentifying restrictions							
Ho: overidentifying restrictions are valid							
		$chi^2(347)$=	$chi^2(441)$=	$chi^2(291)$=	$chi^2(382)$=	$chi^2(303)$=	$chi^2(394)$=
		383.16	470.4	333.31*	419.25	356.62*	456.33*
Prpb>Chi2		0.09	0.16	0.04	0.09	0.02	0.02

1. Absolute value of z statistics in parentheses

2. * significant at 5%; ** significant at 1% (based on robust estimators)

3. Blundell and Bond (1998) GMM one-step estimator is applied for all the cases.

Tables 6, 7 and 8 report the results based on a dynamic panel data model where the dependent variable is the Gini coefficient, or the share of income of the bottom 20% of the population, or the prevalence of undernourishment. Based on the regression results in Cases 2, 4 and 6 in Table 5, the predicted values of three finance indicators are derived for the entire period on an annual basis. These predicted values are aggregated at 5 year intervals and are used as alternatives to the actual values. The merit of this approach is that it addresses partially the endogeneity problem of finance. It also increases the number of observations by making out-of-sample forecast if there are some missing observations. 12 cases are tried. Cases 1, 3, ..., 11 (odd numbers) are the cases where endogeneity is not taken into account, while Cases 2, 4, ..., 12 (even numbers) are those where the endogeneity of potentially endogenous variables (e.g. trade openness) is considered. Cases 1 to 4, Cases 5 to 8 and Cases 9 to 12 are for three different measures of finance, broad and narrow definitions of private credit and financial system deposit (each of which is relative to GDP). Cases 3 and 4, Cases 7 and 8 and Cases 11 and 12 are based on predicted finance measures. Only key results are summarised below.

In Table 6, the Gini coefficient is a dependent variable in all the cases. A main finding is that the financial development measured by higher levels of deposits is significantly associated with lower inequality as implied by highly significant (at 1% level) and negative coefficient estimates of finance in Cases 9 to 12. It is noted that the coefficient estimate is lower in absolute terms when the endogeneity is taken into consideration. Signs of coefficient estimates for finance are negative for the other two definitions of finance in Cases 1 to 8 (and significant at the 10% level in Case 1 and Case 7, and non-significant in the rest).

In sum, finance tends to decrease inequality measured by the Gini coefficient. The coefficient estimates for schooling years in the initial year are negative and significant. If the country has higher levels of education in the early period, it tends to have higher Gini because only a section of the educated people capture the benefits. Trade openness is not significant, nor is the GDP deflator. Sargan tests and tests for serial correlations, which imply that there is no second order serial correlation, validate our specification in all the cases.

However, if we replace the Gini coefficient by an alternative measure of inequality in Table 7, the income share of the bottom 20% in the population, finance is not significant in any of the 12 cases. That is, the income share of the poorest quintile is not affected by the macro-level financial development. However, higher level of education is associated with lower level of income share of the poorest 20 per cent. Again, neither trade openness nor the GDP deflator significant. Sargan tests and tests for serial correlations validate our specification except in Cases 1, 3, 7 and 9 where the Sargan test shows that overidentifying restrictions are not valid.

Table 8 focuses on the determinants of undernourishment. A few additional explanatory variables are included for these cases. A main finding is that private credit broadly defined has a significant negative effect on undernourishment (at the 1% level) in Cases 1 to 4, i.e., depending on whether the endogeneity of finance is taken into account, or whether the predicted or the actual values of private credit is used. This suggests that private credit which is broadly defined to cover formal and informal banking sectors plays an important role in reducing hunger. The negative

and significant (at the 10% level) coefficient estimates of narrowly defined private credit (formal banking) in Cases 5 and 7 further strengthen the poverty or undernourishment reducing roles of finance. However, some caution is necessary as these coefficients cease to be significant once they are endogenised in Cases 6 and 8. Financial system deposit is not significant in Cases 8 to 12.

On the results of control variables, trade openness is not significant, while population growth is positive and significant in increasing the prevalence of undernourishment, as in Cases 5 to 11. Age dependence ratio has a significant negative effect in Cases 5 to 12 (i.e., as the share of the people in the working age increases, the prevalence of undernourishment tends to decrease. Sargan tests and tests for serial correlations validate our specification.

Table 6 Results for the Inequality Equation based on Blundell and Bond (1998) GMM estimation (explanatory variable: Gini coefficient)

	Whether endogenous or exogenous in Cases 2, 4, 6, 8, 10 and 12	Case 1 Without endogenous	Case 2 With endogenous	Case 3 Without endogenous	Case 4 With Endogenous	Case 5 Without endogenous	Case 6 With endogenous	Case 7 Without endogenous	Case 8 With Endogenous	Case 9 Without endogenous	Case 10 With endogenous	Case 11 Without endogenous	Case 12 With endogenous
Dep. Variable		regressors Gini	Regressors Gini	regressors Gini	Regressors Gini	regressors Gini	regressors Gini	Regressors Gini	Regressors Gini	regressors Gini	regressors Gini	regressors Gini	regressors Gini
Explanatory Variables													
L.		0.451	0.557	0.404	0.571	0.255	0.375	0.244	0.357	0.197	0.316	0.155	0.324
		(2.60)**	(4.14)**	(1.68)	(3.87)**	(1.91)	(2.46)*	(2.12)*	(2.38)*	(1.58)	(2.71)**	(1.13)	(2.19)*
log(schooling years in the initial years)	Exogenous	0.089	0.066	0.101	0.066	0.132	0.117	0.14	0.119	0.128	0.137	0.148	0.133
		(1.97)*	(2.58)**	(2.03)*	(2.62)**	(4.14)**	(5.17)**	(4.76)**	(4.80)**	(3.56)**	(5.11)**	(3.89)**	(4.39)**
log(GDP deflator)	Exogenous	0.018	0.018	0.021	0.015	-0.006	0.001	-0.006	0	-0.008	-0.011	-0.009	-0.006
		(0.74)	(0.94)	(0.85)	(0.84)	(0.37)	(0.05)	(0.40)	(0.03)	(0.64)	(1.09)	(0.63)	(0.51)
log(private credit/GDP)	**Endogenous**	**-0.033**	**-0.023**	-	-	-	-	-	-	-	-	-	-
		(1.91)	**(1.25)**	-	-	-	-	-	-	-	-	-	-
predicted log(private credit/GDP)	**Endogenous**	-	-	**-0.046**	**-0.015**	-	-	-	-	-	-	-	-
		-	-	**(1.07)**	**(0.63)**	-	-	-	-	-	-	-	-
log(private credit by banks/GDP)	**Endogenous**	-	-	-	-	**-0.034**	**-0.015**	-	-	-	-	-	-
		-	-	-	-	**(1.33)**	**(0.83)**	-	-	-	-	-	-
predicted log(private credit by banks/GDP)	**Endogenous**	-	-	-	-	-	-	**-0.044**	**-0.02**	-	-	-	-
		-	-	-	-	-	-	**(1.74)**	**(0.98)**	-	-	-	-
log(financial system deposit/GDP)	**Endogenous**	-	-	-	-	-	-	-	-	**-0.029**	**-0.016**	-	-
		-	-	-	-	-	-	-	-	**(3.42)****	**(5.17)****	-	-
predicted log(financial system deposit/GDP)	**Endogenous**	-	-	-	-	-	-	-	-	-	-	**-0.03**	**-0.02**
		-	-	-	-	-	-	-	-	-	-	**(2.58)****	**(3.64)****
log(Export+Import/GDP)	**Endogenous**	0.07	0.051	0.088	0.04	0.082	0.05	0.092	0.056	0.086	0.043	0.091	0.054
		(1.53)	(1.59)	(1.18)	(0.99)	(0.99)	(1.06)	(1.06)	(1.12)	(1.01)	(0.99)	(0.95)	(1.16)
Constant		2.082	1.658	2.295	1.573	2.67	2.229	2.699	2.292	2.891	2.447	3.046	2.417
		(2.98)**	(2.95)**	(2.19)*	(2.47)*	(5.18)**	(3.90)**	(6.01)**	(4.11)**	(5.77)**	(5.58)**	(5.63)**	(4.36)**
Observations		57	57	56	56	45	45	44	44	48	48	46	46
Number of Country		8	8	8	8	7	7	7	7	7	7	7	7
Arellano-Bond Tes for Serial Correlation (Z, Probb>z)													
m 2		(1.43)	(1.45)	(1.43)	(1.44)	(0.12)	(0.04)	(-0.32)	(-0.42)	(0.46)	(0.47)	(0.04)	(-0.09)
Sargan Test of overidentifying restrictions													
Ho: overidentifying restrictions are valid													
		$chi^2(37)$=	$chi^2(66)$=	$chi^2(37)$=	$chi^2(65)$=	$chi^2(36)$=	$chi^2(56)$=	$chi^2(35)$=	$chi^2(55)$=	$chi^2(36)$=	$chi^2(58)$=	$chi^2(35)$=	$chi^2(57)$=
		37.61	59.88	41.83	58.07	45.04	59.35	46.9	62.75	40.53	56.31	46.28	62.25
Prpb>Chi2		0.35	0.69	0.27	0.72	0.14	0.35	0.09	0.22	0.28	0.54	0.096	0.29

1. Absolute value of z statistics in parentheses. 2. * significant at 5%; ** significant at 1% (based on robust estimators) 3. Blundell and Bond (1998) GMM one-step estimator is applied for all the cases.

Table 7 Results for the Inequality Equation based on Blundell and Bond (1998) GMM estimation (explanatory variable: share of the bottom 20% of the population)

Dep. Variable	Whether Endogenous or exogenous in Cases 2, 4, 6, 8,10 and 12	Case 1 Without endogenous regressors the bottom 20%	Case 2 With endogenous regressors the bottom 20%	Case 3 Without endogenous regressors the bottom 20%	Case 4 With Endogenous Regressors the bottom 20%	Case 5 Without endogenous regressors the bottom 20%	Case 6 With endogenous Regressors the bottom 20%	Case 7 Without endogenous regressors the bottom 20%	Case 8 With endogenous regressors the bottom 20%	Case 9 Without endogenous regressors the bottom 20%	Case 10 With endogenous regressors the bottom 20%	Case 11 Without endogenous regressors the bottom 20%	Case 12 With Endogenous Regressors the bottom 20%
Explanatory Variables													
L.		0.403	0.438	0.458	0.429	0.561	0.493	0.463	0.458	0.53	0.496	0.408	0.445
		(4.58)**	(3.82)**	(5.45)**	(3.95)**	(12.27)**	(6.58)**	(4.56)**	(4.86)**	(9.50)**	(8.26)**	(3.84)**	(4.34)**
log(schooling years in	Exogenous	-0.159	-0.127	-0.142	-0.105	-0.13	-0.137	-0.182	-0.15	-0.184	-0.133	-0.249	-0.16
the initial years)		(2.15)*	(1.63)	(2.29)*	(1.31)	(2.82)**	(2.63)**	(2.13)*	(2.52)*	(5.93)**	(2.56)*	(3.50)**	(2.61)**
log(GDP deflator)	Exogenous	-0.001	-0.014	0.001	-0.013	-0.013	-0.028	0.028	-0.01	-0.002	-0.018	0.041	-0.004
		(0.03)	(0.26)	(0.03)	(0.26)	(0.27)	(0.58)	(0.53)	(0.24)	(0.04)	(0.40)	(0.75)	(0.10)
log(private credit/GDP)	**Endogenous**	**0.019**	**0.084**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
		(0.23)	**(0.87)**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
predicted log(private credit/GDP)	**Endogenous**	**-**	**-**	**0.059**	**0.109**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
		-	**-**	**(0.86)**	**(1.05)**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
log(private credit by	**Endogenous**	**-**	**-**	**-**	**-**	**0.084**	**0.001**	**-**	**-**	**-**	**-**	**-**	**-**
banks/GDP)		**-**	**-**	**-**	**-**	**(1.40)**	**(0.01)**	**-**	**-**	**-**	**-**	**-**	**-**
predicted log(private credit by	**Endogenous**	**-**	**-**	**-**	**-**	**-**	**-**	**0.051**	**-0.01**	**-**	**-**	**-**	**-**
Banks/GDP)		**-**	**-**	**-**	**-**	**-**	**-**	**(0.74)**	**(0.08)**	**-**	**-**	**-**	**-**
log(financial system	**Endogenous**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-0.019**	**-0.029**	**-**	**-**
deposit/GDP)		**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**(0.14)**	**(0.35)**	**-**	**-**
predicted log(financial system	**Endogenous**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-0.08**	**-0.09**
deposit/GDP)		**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**(0.57)**	**(0.79)**
log(Export+Import/GDP)	**Endogenous**	0.035	-0.151	-0.018	-0.201	-0.022	0.002	0.123	0.058	0.092	0.027	0.282	0.128
		(0.16)	(0.87)	(0.10)	(1.23)	(0.15)	(0.01)	(0.59)	(0.35)	(0.69)	(0.21)	(1.39)	(0.80)
Constant		1.067	0.681	0.796	0.564	0.94	1.005	1.085	1.046	0.938	0.937	1.13	1.014
		(2.11)*	(1.11)	(1.69)	(0.91)	(4.90)**	(5.18)**	(3.81)**	(4.76)**	(4.01)**	(5.77)**	(4.29)**	(4.69)**
Observations		33	33	32	32	29	29	28	28	30	30	28	28
Number of Code		8	8	8	8	6	6	6	6	7	7	6	6

Arellano-Bond Tes for Serial Correlation (Z, Probb>z)													
m 2		(-1.00)	(-0.92)	(-1.00)	(-0.88)	(-1.00)	(-0.92)	(-1.38)	(-1.03)	(-1.08)	(-0.95)	(-1.41)	(-1.07)
Sargan Test of overidentifying restrictions													
Ho: overidentifying restrictions are valid													
		chi2(24)=	chi2(38)=	chi2(24)=	chi2(38)=	chi2(23)=	chi2(36)=	chi2(22)=	chi2(35)=	chi2(23)=	chi2(36)=	chi2(22)=	chi2(35)=
		40.83*	49.69	41.02*	50.28	35	45.73	35.57*	45.16	36.42*	43.65	36.35*	45.26
Prpb>Chi2		0.02	0.1	0.02	0.09	0.052	0.13	0.03	0.12	0.041	0.18	0.03	0.11

1. Absolute value of z statistics in parentheses. 2. * significant at 5%; ** significant at 1% (based on robust estimators)3. Blundell and Bond (1998) GMM one-step estimator is applied for all the cases.

Table 8 Results for the Undernourishment Equation based on Blundell and Bond (1998) GMM estimation (explanatory variable: share of the undernourished population in the total)

	Whether endogenous or exogenous in Cases 2, 4, 6, 8, 10 & 12.	Case 1 Without Endogenous	Case 2 With endogenous	Case 3 Without endogenous	Case 4 With Endogenous	Case 5 Without endogenous	Case 6 With endogenous	Case 7 Without endogenous	Case 8 With endogenous	Case 9 Without endogenous	Case 10 With endogenous	Case 11 Without endogenous	Case 12 With endogenous
Dep. Variable		Regressors Undernourishment	regressors Undernourishment	regressors Undernourishment	Regressors Undernourishment	regressors Undernourishment	regressors Undernourishment	regressors Undernourishment	regressors Undernourishment	regressors Undernourishment	regressors Undernourishment	regressors Undernourishment	Regressors Undernourishment
Explanatory Variables													
L.		0.661	0.93	0.672	0.935	1.016	0.976	1.006	0.969	0.93	0.996	0.925	0.992
		(5.43)**	(22.02)**	(5.27)**	(22.99)**	(7.57)**	(40.15)**	(7.29)**	(40.66)**	(6.48)**	(32.06)**	(6.16)**	(29.70)**
log(schooling years in the initial years)	Exogenous	-0.475	0.027	-0.463	0.015	0.248	0.022	0.256	0.013	0.218	0.02	0.23	0.017
		(0.88)	(0.35)	(0.83)	(0.19)	(1.11)	(0.34)	(1.08)	(0.18)	(1.04)	(0.31)	(1.09)	(0.24)
log(GDP deflator)	Exogenous	-0.094	-0.104	-0.086	-0.099	-0.075	-0.05	-0.076	-0.053	-0.072	-0.048	-0.073	-0.044
		(1.84)	(2.83)**	(2.12)*	(2.91)**	(3.54)**	(1.77)	(3.13)**	(1.67)	(2.30)*	(1.81)	(2.53)*	(1.48)
log(private credit/GDP)	Endogenous	**-0.397**	**-0.276**	-	-	-	-	-	-	-	-	-	-
		(4.88)**	**(8.79)****	-	-	-	-	-	-	-	-	-	-
predicted log(private credit/GDP)	Endogenous	-	-	**-0.415**	**-0.287**	-	-	-	-	-	-	-	-
		-	-	**(5.05)****	**(6.48)****	-	-	-	-	-	-	-	-
log(private credit by banks/GDP)	Endogenous	-	-	-	-	**-0.186**	**-0.078**	-	-	-	-	-	-
		-	-	-	-	**(2.44)***	**(1.01)**	-	-	-	-	-	-
predicted log(private credit	Endogenous	-	-	-	-	-	-	**-0.193**	**-0.08**	-	-	-	-

by banks/GDP)		-	-	-	-	-	-	**(2.57)***	**(1.03)**	-	-	-	-
log(financial system deposit/GDP) predicted	Endogenous	-	-	-	-	-	-	-	-	**-0.034**	**-0.012**	-	-
		-	-	-	-	-	-	-	-	**(1.02)**	**(1.08)**	-	-
log(financial system deposit/GDP)	Endogenous	-	-	-	-	-	-	-	-	-	-	**-0.05**	**-0.01**
		-	-	-	-	-	-	-	-	-	-	**(1.25)**	**(0.37)**
log(Export+Import /GDP)	Endogenous	0.471	-0.009	0.479	0.008	-0.106	-0.074	-0.105	-0.077	-0.179	-0.063	-0.171	-0.055
		(1.19)	(0.13)	(1.18)	(0.11)	(1.37)	(1.19)	(1.35)	(1.20)	(1.92)	(1.04)	(1.61)	(0.79)
log(Population Growth)	Exogenous	0.702	0.325	0.631	0.302	0.778	0.552	0.746	0.551	0.591	0.446	0.54	0.424
		(0.96)	(1.14)	(0.91)	(1.07)	(4.11)**	(3.10)**	(3.98)**	(2.86)**	(2.07)*	(1.74)	(2.03)*	(1.56)
log (Dependency Burden)	Exogenous	-0.623	-0.937	-0.593	-0.917	-1.935	-1.065	-1.887	-1.061	-1.417	-0.789	-1.372	-0.737
		(1.40)	(1.89)	(1.31)	(1.82)	(3.71)**	(4.68)**	(3.57)**	(4.28)**	(2.34)*	(2.31)*	(2.20)*	(2.07)*
Constant		5.748	2.198	5.489	2.151	1.9	1.678	1.804	1.706	1.738	1.377	1.544	1.323
		(1.49)	(2.34)*	(1.48)	(2.31)*	(2.06)*	(2.68)**	(2.07)*	(2.51)*	(1.35)	(1.63)	(1.26)	(1.47)
Observations		47	47	47	47	38	38	37	37	39	39	38	38
Number of Code		8	8	8	8	7	7	7	7	7	7	7	7
Arellano-Bond Tes for Serial Correlation (Z, Probb>z)													
m 2		(0.37)	(-0.16)	(0.55)	(0.07)	(-1.11)	(-1.23)	(-1.12)	(-1.21)	(-0.99)	(-1.39)	(-1.00)	(-1.44)
Sargan Test of overidentifying restrictions													
Ho: overidentifying restrictions are valid													
		chi2(18)=	chi2(61)=	chi2(18)=	chi2(61)=	chi2(18)=	chi2(53)=	chi2(18)=	chi2(52)=	chi2(18)=	chi2(54)=	chi2(18)=	chi2(53)=
		39.10**	83.6*	37.83**	82.65*	25.29	52.02	25.87	52.31	25.06	53.47	25.36	53.98
Prpb>Chi2		0.003	0.03	0.004	0.03	0.12	0.51	0.103	0.46	0.12	0.49	0.12	0.44

1. Absolute value of z statistics in parentheses. 2. * significant at 5%; ** significant at 1% (based on robust estimators)3. Blundell and Bond (1998) GMM one-step estimator is applied for all the cases.

Table 9 summarises the results of Granger causality tests to examine the links between finance and economic or agricultural growth based on country-level time series data. The detailed results of VAR models are shown in Annex 3. It is not easy to offer a single conclusion as the results are different in different countries.

First, the causality from economic growth to financial development is generally stronger than that from finance to growth (typically in India or the Philippines). That is, in these countries economic growth occurs first and then influences the financial development, and not the other way around. Second, if we look at the causality between finance and agricultural growth, we observe a few cases (e.g., the Philippines, Malaysia and Indonesia) where finance appears to cause agricultural growth. Agricultural growth Granger causes financial development in India or Thailand. Both directions of causality are highly significant in Bangladesh or Vietnam, while the causality from agriculture to finance is strong in China.[20]

Table 9 Summary of Granger Causality Tests for Finance and Economic or Agricultural Income at Country Level

		Finance Granger causes GDP per capita	GDP per capita Granger causes Finance	No. Of Obs.	Finance Granger causes Agricultural Value Added pc	Agricultural VA per capita Granger causes Finance	No. Of Obs.
Bangladesh	log(private credit/GDP)	**	**	30	**	**	30
	log(private credit by banks/GDP)	**	**	8	**	**	8
	log(financial system deposit/GDP)	**	+	8	**	**	8
China	log(private credit/GDP)			27		**	27
	log(private credit by banks/GDP)	NA	NA	-	NA	NA	-
	log(financial system	NA	NA	-	NA	NA	-
India	log(private credit/GDP)		+	44		*	44
	log(private credit by banks/GDP)			23			23
	log(financial system deposit/GDP)		**	35	+	**	35
Indonesia	log(private credit/GDP)		**	24		**	24

[20] Graphical representations are given in Annexes 3 and 4.

	log(private credit by banks/GDP)	*		44	*		44
	log(financial system deposit/GDP)	**		44	**		44
Malaysia							
	log(private credit/GDP)			44	**	**	34
	log(private credit by banks/GDP)		**	44	*		34
	log(financial system deposit/GDP)			44			34
Pakistan	log(private credit/GDP)	+		44			44
	log(private credit by banks/GDP)		+	44			44
	log(financial system deposit/GDP)			44		+	44
The Philippines							
	log(private credit/GDP)		**	44			44
	log(private credit by banks/GDP)		**	44	**		44
	log(financial system deposit/GDP)	*		44	+		44
Thailand							
	log(private credit/GDP)		**	44		**	44
	log(private credit by banks/GDP)		**	38			38
	log(financial system deposit/GDP)	**	*	38			38
Vietnam	log(private credit/GDP)	**	**	9	**	**	9
	log(private credit by banks/GDP)	**	**	8	**	+	8
	log(financial system deposit/GDP)	**	**	8	*	**	8

** significant at 1%; ** significant at 1%; + significant at 10%; no mark not significant.
The results of VAR models based on which we carried the Granger causality tests are shown in the Appendix 2.

Conclusion

Building on a vast recent literature on finance, growth and hunger, we have examined the experience of 9 Asian countries over the period 1960-2006, using a state-of art-econometric methodology. Although the results are mixed depending on the specification and variables used, there is some evidence favouring a positive role of finance on GDP and agricultural value added growth. But there is also evidence of a reverse causality between GDP and agricultural growth on financial development. In fact, there are a few cases in which the causality runs both ways. In light of this complexity, the results of finance on inequality and hunger require cautious interpretation. Financial development reduces the Gini coefficient of income distribution. However, when this measure of inequality is replaced with the share of the poorest quintile in GDP, financial development ceases to have any effect, pointing presumably to the exclusion of the poorest in the sample of Asian countries considered. Although there is support for the view that financial development reduces hunger, the results are not-so-robust. Specifically, when the endogeneity of trade and finance is taken into account, the negative effect of financial development on hunger disappears. Whether these results are driven by some outliers or by a complex two-way dynamics between finance and growth needs further examination.

Some recent evidence on microfinance suggests that higher interest rates and lower maturity periods are likely to affect women and low income households more than others. The quality of loan portfolio of MFIs may also deteriorate with higher interest rates and drying up of funding sources. While microfinance has the potential to ameliorate some of the worst forms of deprivation, the contraction of credit in general and risk aversion of investors, together with a looming global recession underlie gloomy prospects for the poor in this region.

In conclusion, whether the constraints on funding MFIs would weaken with large-scale injection of capital into the financial sector and whether the design of microfinance programmes would be suitably altered (e.g., larger loan amounts, longer maturities, and appropriate pricing of loans) may determine whether the poor would be shielded from a marked deceleration in growth rates in this region. As these issues have not figured prominently in the discourse on global financial crisis (including the just concluded G20 summit in Washington DC), there is a real apprehension that in trying to save the existing financial architecture the poor and vulnerable may not get the attention they deserve.

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Annex 1 Definitions and Descriptive Statistics of the Variables

Annual Panel Data (1960-2006) for 9 countries

Variable	Definition	Source	Obs	Mean	Std. Dev.	Min	Max
log(GDP pc)	log of GDP per capita	WDI	399	6.219	0.850	4.281	8.420
log(Agri VA pc)	log of Agricultureal Value Added per capita	FAO-STAT.	388	4.772	0.478	3.779	6.044
log(private credit/GDP)	log of share of domestic credit provided by banking sector in GDP*1.	WDI	339	3.446	0.839	0.651	5.349
log(private credit by banks/GDP)	log of private credit by Deposit Money Banks and Other Financial Institutions in GDP*2.	Beck et al. (2000).	283	-1.225	0.693	-2.645	0.507
log(financial system deposit/GDP)	log of Financial System Deposits in GDP.	Beck et al. (2000).	295	-1.382	1.479	-9.596	0.235
log(share of population with primary ed. or above	log of share of the population with education level of primary or above.	Barro-Lee (2000).	359	3.475	0.529	2.230	4.251
log(government expenditure/GDP)	log of share of government espenditure in GDP.	WDI	384	22.479	1.362	19.196	26.497
Population below minimum level of diet	log of Consumer Price Index.	WDI	336	3.334	1.694	-7.370	5.173
log(Ecport+Import/GDP)	log of the share of Export and Import in GDP.			-0.708	0.729	-2.540	0.894

*1 Domestic credit provided by the banking sector includes all credit to various sectors on a gross basis, with the exception of credit to the central government, which is net. The banking sector includes monetary authorities and deposit money banks, as well as other banking institutions where data are available (including institutions that do not accept transferable deposits but do incur such liabilities as time and savings deposits). Examples of other banking institutions are savings and mortgage loan institutions and building and loan associations.

*2 This is similar to the first definition, but the first definition covers a broader category of banking sector, including monetary authorities, formal and informal banking institutions, while the second mainly covers private credit through deposit money banks.

Annex 1 Definitions and Descriptive Statistics of the Variables (Cont.)

5 Year Panel Data (1960-2004) for 9 countries

Variable	Definition	Source	Obs	Mean	Std. Dev.	Min	Max
GINI	log of GINI coefficient of income or consumption at naional level.	UNU-WIDER.	74	3.650	0.181	3.316	4.036
the bottom 20%	Percentage share of income or consumption is the share that accrues to the bottom 20% of the population.	WDI	50	1.677	0.320	1.099	2.322
Undernourishment	The share of population below minimum level of dietary energy consumption (also referred to as prevalence of undernourishment) which shows the percentage of the population whose food intake is insufficient to meet dietary energy requirements continuously.	WDI	63	3.015	0.778	0.916	3.932
log(private credit/GDP)	log of share of domestic credit provided by banking sector in GDP.	Beck et al. (2000).	75	3.451	0.872	0.960	5.257
predicted log(private credit/GDP)	log of share of domestic credit provided by banking sector in GDP, predicted by annual panel.	Beck et al. (2000).	74	3.499	0.785	1.390	5.186
log(private credit by banks/GDP)	log of private credit by Deposit Money Banks and Other Financial Institutions in GDP.	Beck et al. (2000).	62	-1.213	0.685	-2.437	0.374
predicted log(private credit by banks/GDP)	log of private credit by Deposit Money Banks and Other Financial Institutions in GDP, predicted by annual panel.	Beck et al. (2000).	61	-1.194	0.666	-2.347	0.345
log(financial system deposit/GDP)	log of Financial System Deposits in GDP.	Beck et al. (2000).	65	-1.443	1.695	-9.596	0.186
predicetd log(financial system deposit/GDP)	log of Financial System Deposits in GDP, predicted by annual panel.	Beck et al. (2000).	63	-1.308	1.302	-7.809	0.175
log(schooling years in the initial year)	log of average schooling years of people above 15 years old in the initial year.	Barro-Lee (2000).	77	0.671	0.743	-0.491	1.478
log(GDP deflator)	Inflation as measured by the annual growth rate of the GDP implicit deflator.	WDI	82	1.936	1.053	-0.697	5.847
log(Ecport+Import/GDP)	log of the share of Export and Import in GDP.	WDI	82	-0.671	0.730	-2.385	0.885
log(Population Growth)	log of annual popuoation growth		90	-3.920	0.358	-5.117	-3.461
log (Dependency Burden)	the ratio of dependents--people younger than 15 or older than 64--to the working-age population--those ages 15-64.	WDI	90	-0.319	0.219	-0.892	-0.035

Annex 2 Results of VAR Models for GDP per capita (or Agricultural Value Added per capita) and Finance

Bangladesh

	GDP per capita	Coef.	Z			Agricultural VA per capita	Coef.	z	
Model1	log(private credit/GDP)				Model1	log(private credit/GDP)			
	log(private credit/GDP)					log(private credit/GDP)			
	L1.	0.748	(5.20)	**		L1.	0.992	(7.36)	**
	L2.	-0.091	(-0.59)			L2.	-0.358	(-2.59)	*
	L3.	0.157	(1.56)			L3.	0.281	(3.14)	**
	log(GDP pc)					log(Agricultural Value Added pc)			
	L1.	-0.600	(-0.50)			L1.	0.695	(1.35)	
	L2.	-1.710	(-1.28)			L2.	-1.645	(-2.84)	**
	L3.	2.926	(3.16)	**		L3.	1.648	(3.28)	**
	constant	-2.789	(-2.50)	*		constant	-2.701	(-1.95)	
	log(GDP pc)					log(Agricultural Value Added pc)			
	log(private credit/GDP)					log(private credit/GDP)			
	L1.	0.017	(0.98)			L1.	0.069	(1.70)	
	L2.	0.032	(1.69)			L2.	0.023	(0.54)	
	L3.	-0.049	(-4.00)	**		L3.	-0.066	(-2.44)	*
	log(GDP pc)					log(Agricultural Value Added pc)			
	L1.	0.901	(6.06)	**		L1.	0.811	(5.20)	**
	L2.	0.031	(0.19)			L2.	0.139	(0.79)	
	L3.	0.156	(1.37)			L3.	-0.058	(-0.38)	
	constant	-0.465	(-3.40)	**		constant	0.397	(0.95)	
Model2	logprivate credit by deposite money/GDP)				Model2	logprivate credit by deposite money/GDP)			
	logprivate credit by deposite money/GDP)					logprivate credit by deposite money/GDP)			
	L1.	0.887	(2.63)	*		L1.	0.961	(2.63)	
	L2.	-0.685	(-2.73)	**		L2.	-0.248	(-0.83)	*
	log(GDP pc)					log(Agricultural Value Added pc)			
	L1.	0.767	(0.53)			L1.	1.155	(3.38)	
	L2.	0.610	(0.37)			L2.	0.076	(0.13)	**
	constant	-9.114	(-2.83)	**		constant	-5.779	(-2.86)	
	log(GDP pc)					log(Agricultural Value Added pc)			**
	logprivate credit by deposite money/GDP)					logprivate credit by deposite money/GDP)			
	L1.	-0.160	(-5.41)	**		L1.	-0.655	(-3.99)	
	L2.	0.186	(8.44)	**		L2.	0.672	(4.99)	**
	log(GDP pc)					log(Agricultural Value Added pc)			**
	L1.	0.733	(5.73)	**		L1.	0.514	(3.34)	
	L2.	0.331	(2.28)	*		L2.	0.486	(1.89)	**
	constant	-0.283	(-1.00)			constant	0.077	(0.08)	
Model3	log(financial system deposit/GDP)				Model3	log(financial system deposit/GDP)			
	log(financial system deposit/GDP)					log(financial system deposit/GDP)			
	L1.	1.374	(4.84)	**		L1.	1.247	(4.04)	
	L2.	-0.863	(-4.12)	**		L2.	-0.533	(-2.74)	**
	log(GDP pc)					log(Agricultural Value Added pc)			**
	L1.	4.133	(1.20)			L1.	2.672	(4.58)	
	L2.	-3.068	(-0.75)			L2.	-1.112	(-0.95)	**
	constant	-6.855	(-1.13)			constant	-7.158	(-1.60)	
	log(GDP pc)					log(Agricultural Value Added pc)			
	log(financial system deposit/GDP)					log(financial system deposit/GDP)			
	L1.	-0.078	(-4.90)	**		L1.	-0.267	(-2.29)	

L2.	0.062	(5.34)	**	L2.	0.228	(3.11)	*
log(GDP pc)				log(Agricultural Value Added pc)			**
L1.	0.616	(3.21)	**	L1.	0.669	(3.03)	
L2.	0.524	(2.31)	*	L2.	0.471	(1.06)	**
constant	-0.778	(-2.29)	*	constant	-0.611	(-0.36)	

China

GDP per capita				Agricultural VA per capita			
	Coef.	Z			Coef.	z	
log(private credit/GDP)				log(private credit/GDP)			
log(private credit/GDP)				log(private credit/GDP)			
L1.	0.933	(4.90)	**	L1.	0.591	(3.10)	**
L2.	-0.431	(-1.64)		L2.	-0.432	(-2.13)	*
L3.	0.171	(0.84)		L3.	0.045	(0.28)	
log(GDP pc)				log(Agricultural Value Added pc)			
L1.	-0.070	(-0.15)		L1.	-0.280	(-0.92)	
L2.	0.235	(0.29)		L2.	0.590	(1.33)	
L3.	-0.053	(-0.11)		L3.	0.461	(1.20)	
constant	0.790	(2.18)	*	constant	-0.034	(-0.19)	
log(GDP pc)				log(Agricultural Value Added pc)			
log(private credit/GDP)				log(private credit/GDP)			
L1.	0.078	(1.10)		L1.	0.024	(0.20)	
L2.	-0.057	(-0.58)		L2.	0.028	(0.22)	
L3.	0.016	(0.20)		L3.	0.063	(0.62)	
log(GDP pc)				log(Agricultural Value Added pc)			
L1.	1.795	(10.37)	**	L1.	1.053	(5.48)	**
L2.	-1.259	(-4.21)	**	L2.	-0.046	(-0.16)	
L3.	0.451	(2.61)	*	L3.	-0.148	(-0.61)	
constant	-0.031	(-0.23)		constant	0.176	(1.56)	

India

GDP per capita				Agricultural VA per capita			
	Coef.	Z			Coef.	z	
log(private credit/GDP)				log(private credit/GDP)			
log(private credit/GDP)				log(private credit/GDP)			
L1.	1.141	(7.52)	**	L1.	1.173	(7.82)	**
L2.	-0.030	(-0.13)		L2.	0.002	(0.01)	
L3.	-0.172	(-1.15)		L3.	-0.225	(-1.47)	
log(GDP pc)				log(Agricultural Value Added pc)			
L1.	0.758	(2.26)	*	L1.	0.536	(3.08)	**
L2.	-0.567	(-1.23)		L2.	-0.124	(-0.64)	
L3.	-0.158	(-0.43)		L3.	-0.232	(-1.25)	
constant	0.000	(0.00)		constant	-0.633	(-1.22)	
log(GDP pc)				log(Agricultural Value Added pc)			
log(private credit/GDP)				log(private credit/GDP)			
L1.	-0.047	(-0.71)		L1.	-0.151	(-1.20)	
L2.	0.178	(1.78)		L2.	0.336	(1.72)	
L3.	-0.123	(-1.89)		L3.	-0.148	(-1.15)	
log(GDP pc)				log(Agricultural Value Added pc)			
L1.	0.857	(5.85)	**	L1.	0.335	(2.29)	*
L2.	0.089	(0.44)		L2.	0.372	(2.29)	*
L3.	0.104	(0.65)		L3.	0.206	(1.31)	
constant	-0.274	(-2.96)	**	constant	0.284	(0.65)	

logprivate credit by deposite money/GDP)				logprivate credit by deposite money/GDP)			
logprivate credit by deposite money/GDP)				logprivate credit by deposite money/GDP)			
L1.	1.601	(8.86)	**	L1.	1.584	(8.63)	**
L2.	-1.040	(-3.45)	**	L2.	-1.030	(-3.40)	**
L3.	0.316	(1.74)		L3.	0.342	(1.86)	
log(GDP pc)				log(Agricultural Value Added pc)			
L1.	-0.166	(-0.12)		L1.	-0.252	(-0.37)	
L2.	2.023	(1.02)		L2.	0.032	(0.05)	
L3.	-2.091	(-1.43)		L3.	-0.555	(-0.83)	
constant	1.163	(1.33)		constant	3.366	(1.66)	
log(GDP pc)				log(Agricultural Value Added pc)			
logprivate credit by deposite money/GDP)				logprivate credit by deposite money/GDP)			
L1.	0.005	(0.22)		L1.	-0.050	(-0.94)	
L2.	0.022	(0.52)		L2.	0.140	(1.60)	
L3.	-0.034	(-1.33)		L3.	-0.084	(-1.58)	
log(GDP pc)				log(Agricultural Value Added pc)			
L1.	0.980	(4.95)	**	L1.	0.409	(2.07)	*
L2.	0.058	(0.21)		L2.	0.493	(2.76)	**
L3.	0.027	(0.13)		L3.	0.106	(0.55)	
constant	-0.347	(-2.87)	**	constant	-0.012	(-0.02)	
log(financial system deposit/GDP)				log(financial system deposit/GDP)			
log(financial system deposit/GDP)				log(financial system deposit/GDP)			
L1.	1.155	(6.73)	**	L1.	1.026	(6.32)	**
L2.	-0.220	(-0.90)		L2.	-0.022	(-0.09)	
L3.	0.045	(0.30)		L3.	-0.010	(-0.06)	
log(GDP pc)				log(Agricultural Value Added pc)			
L1.	-15.457	(-3.77)	**	L1.	-8.088	(-3.53)	**
L2.	16.587	(2.78)	**	L2.	2.343	(0.98)	
L3.	-0.776	(-0.15)		L3.	4.219	(1.69)	
constant	-1.476	(-0.41)		constant	7.045	(0.85)	
log(GDP pc)				log(Agricultural Value Added pc)			
log(financial system deposit/GDP)				log(financial system deposit/GDP)			
L1.	0.005	(0.74)		L1.	0.011	(0.92)	
L2.	-0.006	(-0.55)		L2.	-0.010	(-0.58)	
L3.	0.003	(0.53)		L3.	0.008	(0.73)	
log(GDP pc)				log(Agricultural Value Added pc)			
L1.	0.763	(4.44)	**	L1.	0.193	(1.18)	
L2.	0.211	(0.84)		L2.	0.399	(2.33)	*
L3.	0.069	(0.32)		L3.	0.217	(1.22)	
constant	-0.192	(-1.27)		constant	0.894	(1.51)	

Indonesia

GDP per capita				Agricultural VA per capita			
	Coef.	Z			Coef.	z	
log(private credit/GDP)				log(private credit/GDP)			
log(private credit/GDP)				log(private credit/GDP)			
L1.	0.787	(3.65)	**	L1.	0.844	(4.25)	**
L2.	0.020	(0.10)		L2.	0.044	(0.17)	
L3.	0.029	(0.34)		L3.	0.010	(0.07)	
log(GDP pc)				log(Agricultural Value Added pc)			
L1.	4.196	(10.14)	**	L1.	7.276	(4.37)	**

L2.	-4.161	(-3.97)	**	L2.	-4.836	(-1.86)	
L3.	-0.145	(-0.14)		L3.	-3.068	(-1.37)	
constant	1.154	(2.19)	*	constant	3.244	(1.65)	
log(GDP pc)				log(Agricultural Value Added pc)			
log(private credit/GDP)				log(private credit/GDP)			
L1.	-0.042	(-0.41)		L1.	0.021	(1.05)	
L2.	0.044	(0.48)		L2.	-0.030	(-1.17)	
L3.	-0.015	(-0.38)		L3.	-0.001	(-0.09)	
log(GDP pc)				log(Agricultural Value Added pc)			
L1.	1.240	(6.34)	**	L1.	0.981	(5.80)	**
L2.	-0.218	(-0.44)		L2.	-0.591	(-2.24)	*
L3.	-0.064	(-0.13)		L3.	0.621	(2.73)	**
constant	0.339	(1.36)		constant	0.003	(0.02)	
logprivate credit by deposite money/GDP)				logprivate credit by deposite money/GDP)			
logprivate credit by deposite money/GDP)				logprivate credit by deposite money/GDP)			
L1.	1.376	(9.38)	**	L1.	1.382	(9.08)	**
L2.	-0.246	(-0.98)		L2.	-0.268	(-1.03)	
L3.	-0.151	(-0.95)		L3.	-0.151	(-0.91)	
log(GDP pc)				log(Agricultural Value Added pc)			
L1.	0.126	(0.72)		L1.	0.166	(0.60)	
L2.	-0.410	(-1.56)		L2.	-0.179	(-0.58)	
L3.	0.302	(1.89)		L3.	0.091	(0.37)	
constant	-0.129	(-0.49)		constant	-0.407	(-0.77)	
log(GDP pc)				log(Agricultural Value Added pc)			
logprivate credit by deposite money/GDP)				logprivate credit by deposite money/GDP)			
L1.	-0.108	(-0.85)		L1.	-0.058	(-0.69)	
L2.	0.241	(1.12)		L2.	0.121	(0.85)	
L3.	-0.042	(-0.30)		L3.	0.019	(0.21)	
log(GDP pc)				log(Agricultural Value Added pc)			
L1.	1.196	(7.86)	**	L1.	0.626	(4.12)	**
L2.	-0.310	(-1.37)		L2.	0.192	(1.12)	
L3.	0.047	(0.34)		L3.	0.024	(0.18)	
constant	0.595	(2.59)	*	constant	0.889	(3.07)	**
log(financial system deposit/GDP)				log(financial system deposit/GDP)			
log(financial system deposit/GDP)				log(financial system deposit/GDP)			
L1.	1.377	(9.47)	**	L1.	1.381	(9.30)	**
L2.	-0.277	(-1.13)		L2.	-0.284	(-1.12)	
L3.	-0.188	(-1.24)		L3.	-0.191	(-1.18)	
log(GDP pc)				log(Agricultural Value Added pc)			
L1.	0.249	(1.60)		L1.	0.165	(0.66)	
L2.	-0.385	(-1.63)		L2.	-0.005	(-0.02)	
L3.	0.211	(1.45)		L3.	0.055	(0.25)	
constant	-0.569	(-1.68)		constant	-1.114	(-1.47)	
log(GDP pc)				log(Agricultural Value Added pc)			
log(financial system deposit/GDP)				log(financial system deposit/GDP)			
L1.	-0.198	(-1.51)		L1.	-0.020	(-0.23)	
L2.	0.574	(2.59)	*	L2.	0.233	(1.55)	
L3.	-0.310	(-2.26)	*	L3.	-0.137	(-1.43)	

log(GDP pc)				log(Agricultural Value Added pc)			
L1.	1.248	(8.86)	**	L1.	0.627	(4.25)	**
L2.	-0.294	(-1.38)		L2.	0.203	(1.20)	
L3.	-0.019	(-0.14)		L3.	-0.019	(-0.15)	
constant	0.511	(1.67)		constant	0.997	(2.22)	*

Malaysia

GDP per capita				Agricultural VA per capita			
	Coef.	z			Coef.	z	
log(private credit/GDP)				log(private credit/GDP)			
log(private credit/GDP)				log(private credit/GDP)			
L1.	0.989	(6.75)	**	L1.	0.867	(5.52)	**
L2.	-0.242	(-1.20)		L2.	-0.288	(-1.36)	
L3.	0.252	(1.67)		L3.	0.241	(1.65)	
log(GDP pc)				log(Agricultural Value Added pc)			
L1.	0.661	(0.98)		L1.	-1.271	(-1.54)	
L2.	-0.014	(-0.01)		L2.	0.229	(0.23)	
L3.	-0.753	(-1.08)		L3.	1.272	(1.69)	
constant	0.819	(0.78)		constant	-0.487	(-0.24)	
log(GDP pc)				log(Agricultural Value Added pc)			
log(private credit/GDP)				log(private credit/GDP)			
L1.	-0.002	(-0.07)		L1.	-0.031	(-1.02)	
L2.	-0.012	(-0.26)		L2.	-0.054	(-1.32)	
L3.	0.022	(0.65)		L3.	0.053	(1.85)	
log(GDP pc)				log(Agricultural Value Added pc)			
L1.	1.134	(7.60)	**	L1.	0.662	(4.14)	**
L2.	-0.280	(-1.24)		L2.	-0.002	(-0.01)	
L3.	0.122	(0.79)		L3.	0.161	(1.10)	
constant	0.186	(0.81)		constant	1.215	(3.03)	**
logprivate credit by deposite money/GDP)				logprivate credit by deposite money/GDP)			
logprivate credit by deposite money/GDP)				logprivate credit by deposite money/GDP)			
L1.	1.283	(8.28)	**	L1.	1.246	(7.59)	**
L2.	-0.378	(-1.58)		L2.	-0.614	(-2.47)	*
L3.	0.066	(0.48)		L3.	0.289	(1.86)	
log(GDP pc)				log(Agricultural Value Added pc)			
L1.	0.976	(2.74)	**	L1.	0.255	(0.55)	
L2.	-0.298	(-0.51)		L2.	-0.737	(-1.34)	
L3.	-0.667	(-1.67)		L3.	0.734	(1.74)	
constant	-0.123	(-0.16)		constant	-1.474	(-1.32)	
log(GDP pc)				log(Agricultural Value Added pc)			
logprivate credit by deposite money/GDP)				logprivate credit by deposite money/GDP)			
L1.	-0.050	(-0.71)		L1.	-0.081	(-1.31)	
L2.	0.057	(0.52)		L2.	0.036	(0.38)	
L3.	0.007	(0.11)		L3.	0.011	(0.19)	
log(GDP pc)				log(Agricultural Value Added pc)			
L1.	1.079	(6.63)	**	L1.	0.632	(3.63)	**
L2.	-0.172	(-0.64)		L2.	0.015	(0.07)	
L3.	0.059	(0.32)		L3.	0.169	(1.06)	
constant	0.308	(0.87)		constant	1.092	(2.59)	*

log(financial system deposit/GDP)				log(financial system deposit/GDP)			
log(financial system deposit/GDP)				log(financial system deposit/GDP)			
L1.	1.272	(8.34)	**	L1.	1.176	(7.29)	**
L2.	-0.638	(-2.77)	**	L2.	-0.627	(-2.69)	**
L3.	0.262	(1.76)		L3.	0.324	(2.19)	*
log(GDP pc)				log(Agricultural Value Added pc)			
L1.	0.550	(1.03)		L1.	0.320	(0.52)	
L2.	-0.410	(-0.50)		L2.	-0.882	(-1.15)	
L3.	-0.051	(-0.09)		L3.	0.458	(0.81)	
constant	-0.710	(-1.01)		constant	0.627	(0.40)	
log(GDP pc)				log(Agricultural Value Added pc)			
log(financial system deposit/GDP)				log(financial system deposit/GDP)			
L1.	-0.013	(-0.29)		L1.	-0.069	(-1.51)	
L2.	0.025	(0.36)		L2.	0.075	(1.12)	
L3.	0.000	(0.00)		L3.	-0.032	(-0.77)	
log(GDP pc)				log(Agricultural Value Added pc)			
L1.	1.115	(7.03)	**	L1.	0.782	(4.50)	**
L2.	-0.246	(-1.02)		L2.	0.021	(0.10)	
L3.	0.109	(0.68)		L3.	0.022	(0.14)	
constant	0.212	(1.02)		constant	1.030	(2.30)	*

Pakistan

GDP per capita				Agricultural VA per capita			
	Coef.	z			Coef.	z	
log(private credit/GDP)				log(private credit/GDP)			
log(private credit/GDP)				log(private credit/GDP)			
L1.	0.808	(5.57)	**	L1.	0.864	(5.66)	**
L2.	-0.281	(-1.51)		L2.	-0.241	(-1.25)	
L3.	0.035	(0.28)		L3.	-0.002	(-0.02)	
log(GDP pc)				log(Agricultural Value Added pc)			
L1.	0.591	(1.26)		L1.	-0.083	(-0.27)	
L2.	0.252	(0.37)		L2.	0.040	(0.11)	
L3.	-0.794	(-1.76)		L3.	0.070	(0.23)	
constant	1.086	(3.91)	**	constant	1.092	(2.53)	*
log(GDP pc)				log(Agricultural Value Added pc)			
log(private credit/GDP)				log(private credit/GDP)			
L1.	0.068	(1.49)		L1.	0.072	(0.94)	
L2.	-0.024	(-0.41)		L2.	-0.013	(-0.14)	
L3.	-0.048	(-1.24)		L3.	-0.015	(-0.24)	
log(GDP pc)				log(Agricultural Value Added pc)			
L1.	1.038	(6.97)	**	L1.	0.701	(4.64)	**
L2.	0.027	(0.13)		L2.	0.220	(1.21)	
L3.	-0.072	(-0.50)		L3.	0.043	(0.28)	
constant	0.071	(0.81)		constant	0.039	(0.18)	
logprivate credit by deposite money/GDP)				logprivate credit by deposite money/GDP)			
logprivate credit by deposite money/GDP)				logprivate credit by deposite money/GDP)			
L1.	1.134	(8.02)	**	L1.	1.193	(8.07)	**
L2.	-0.514	(-2.50)	*	L2.	-0.544	(-2.51)	*

L3.	0.111	(0.92)		L3.	0.109	(0.87)	
log(GDP pc)				log(Agricultural Value Added pc)			
L1.	0.286	(0.81)		L1.	0.133	(0.56)	
L2.	0.487	(0.93)		L2.	-0.034	(-0.12)	
L3.	-0.712	(-2.00)	*	L3.	-0.021	(-0.09)	
constant	-0.789	(-3.00)	**	constant	-0.724	(-1.69)	
log(GDP pc)				log(Agricultural Value Added pc)			
logprivate credit by deposite money/GDP)				logprivate credit by deposite money/GDP)			
L1.	0.010	(0.16)		L1.	0.035	(0.37)	
L2.	0.010	(0.12)		L2.	0.046	(0.34)	
L3.	-0.046	(-0.92)		L3.	-0.056	(-0.71)	
log(GDP pc)				log(Agricultural Value Added pc)			
L1.	1.058	(7.18)	**	L1.	0.716	(4.78)	**
L2.	0.003	(0.01)		L2.	0.209	(1.15)	
L3.	-0.060	(-0.41)		L3.	0.040	(0.27)	
constant	-0.023	(-0.21)		constant	0.215	(0.79)	
log(financial system deposit/GDP)				log(financial system deposit/GDP)			
log(financial system deposit/GDP)				log(financial system deposit/GDP)			
L1.	1.292	(9.33)	**	L1.	1.261	(9.21)	**
L2.	-0.865	(-4.41)	**	L2.	-0.842	(-4.37)	**
L3.	0.311	(2.43)	*	L3.	0.290	(2.36)	*
log(GDP pc)				log(Agricultural Value Added pc)			
L1.	0.078	(0.21)		L1.	0.314	(1.39)	
L2.	0.438	(0.81)		L2.	0.055	(0.19)	
L3.	-0.423	(-1.14)		L3.	-0.111	(-0.49)	
constant	-0.893	(-2.52)	*	constant	-1.563	(-2.66)	*
log(GDP pc)				log(Agricultural Value Added pc)			
log(financial system deposit/GDP)				log(financial system deposit/GDP)			
L1.	-0.038	(-0.67)		L1.	-0.088	(-0.98)	
L2.	0.052	(0.65)		L2.	0.189	(1.50)	
L3.	-0.060	(-1.15)		L3.	-0.113	(-1.41)	
log(GDP pc)				log(Agricultural Value Added pc)			
L1.	1.052	(6.92)	**	L1.	0.739	(5.01)	**
L2.	0.004	(0.02)		L2.	0.252	(1.38)	
L3.	-0.050	(-0.33)		L3.	-0.009	(-0.06)	
constant	-0.076	(-0.52)		constant	0.078	(0.20)	

Philippines

GDP per capita				Agricultural VA per capita			
	Coef.	z			Coef.	z	
log(private credit/GDP)				log(private credit/GDP)			
log(private credit/GDP)				log(private credit/GDP)			
L1.	1.114	(7.86)	**	L1.	1.225	(8.71)	**
L2.	0.083	(0.39)		L2.	-0.104	(-0.47)	
L3.	-0.402	(-3.07)	**	L3.	-0.277	(-2.19)	*
log(GDP pc)				log(Agricultural Value Added pc)			
L1.	1.924	(3.49)	**	L1.	1.210	(2.27)	*
L2.	-2.923	(-3.11)	**	L2.	-1.210	(-1.69)	
L3.	1.170	(1.97)	*	L3.	0.032	(0.06)	
constant	-0.461	(-0.63)		constant	0.375	(0.26)	

log(GDP pc)				log(Agricultural Value Added pc)			
log(private credit/GDP)				log(private credit/GDP)			
L1.	0.019	(0.47)		L1.	0.013	(0.32)	
L2.	-0.083	(-1.42)		L2.	-0.061	(-0.97)	
L3.	0.064	(1.79)		L3.	0.042	(1.19)	
log(GDP pc)				log(Agricultural Value Added pc)			
L1.	1.517	(9.99)	**	L1.	0.877	(5.85)	**
L2.	-0.634	(-2.45)	*	L2.	-0.070	(-0.35)	
L3.	0.076	(0.47)		L3.	0.035	(0.23)	
constant	0.279	(1.38)		constant	0.829	(2.08)	*

logprivate credit by deposite money/GDP)				logprivate credit by deposite money/GDP)			
logprivate credit by deposite money/GDP)				logprivate credit by deposite money/GDP)			
L1.	1.651	(11.00)	**	L1.	1.821	(12.33)	**
L2.	-0.796	(-3.20)	**	L2.	-1.079	(-4.17)	**
L3.	0.009	(0.07)		L3.	0.173	(1.27)	
log(GDP pc)				log(Agricultural Value Added pc)			
L1.	1.335	(4.36)	**	L1.	0.774	(2.39)	*
L2.	-1.708	(-3.17)	**	L2.	-0.849	(-1.91)	
L3.	0.522	(1.52)		L3.	0.122	(0.37)	
constant	-1.186	(-2.07)	*	constant	-0.345	(-0.39)	

log(GDP pc)				log(Agricultural Value Added pc)			
logprivate credit by deposite money/GDP)				logprivate credit by deposite money/GDP)			
L1.	0.125	(1.79)		L1.	0.111	(1.71)	
L2.	-0.250	(-2.16)	*	L2.	-0.251	(-2.21)	*
L3.	0.142	(2.33)	*	L3.	0.143	(2.39)	*
log(GDP pc)				log(Agricultural Value Added pc)			
L1.	1.505	(10.59)	**	L1.	0.868	(6.09)	**
L2.	-0.804	(-3.22)	**	L2.	-0.153	(-0.78)	
L3.	0.239	(1.50)		L3.	0.117	(0.80)	
constant	0.436	(1.64)		constant	0.867	(2.23)	*

log(financial system deposit/GDP)				log(financial system deposit/GDP)			
log(financial system deposit/GDP)				log(financial system deposit/GDP)			
L1.	1.623	(11.30)	**	L1.	1.682	(11.78)	**
L2.	-0.809	(-3.22)	**	L2.	-0.899	(-3.58)	**
L3.	0.165	(1.15)		L3.	0.215	(1.52)	
log(GDP pc)				log(Agricultural Value Added pc)			
L1.	0.315	(1.22)		L1.	0.171	(0.71)	
L2.	-0.304	(-0.71)		L2.	-0.425	(-1.33)	
L3.	0.070	(0.27)		L3.	0.289	(1.26)	
constant	-0.561	(-1.13)		constant	-0.169	(-0.25)	

log(GDP pc)				log(Agricultural Value Added pc)			
log(financial system deposit/GDP)				log(financial system deposit/GDP)			
L1.	0.088	(1.12)		L1.	0.099	(1.18)	
L2.	-0.256	(-1.87)		L2.	-0.319	(-2.16)	*
L3.	0.191	(2.45)	*	L3.	0.213	(2.56)	*
log(GDP pc)				log(Agricultural Value Added pc)			
L1.	1.485	(10.60)	**	L1.	0.872	(6.15)	**
L2.	-0.715	(-3.05)	**	L2.	-0.113	(-0.60)	

	L3.	0.143	(1.04)		L3.	0.047	(0.35)	
	constant	0.631	(2.35)	*	constant	0.993	(2.52)	*
	log(financial system deposit/GDP)				log(financial system deposit/GDP)			
	log(financial system deposit/GDP)				log(financial system deposit/GDP)			
	L1.	1.623	(11.30)	**	L1.	1.682	11.78	
	L2.	-0.809	(-3.22)	**	L2.	-0.899	-3.58	
	L3.	0.165	(1.15)		L3.	0.215	1.52	
	log(GDP pc)				logagrigdppc			
	L1.	0.315	(1.22)		L1.	0.171	0.71	
	L2.	-0.304	(-0.71)		L2.	-0.425	-1.33	
	L3.	0.070	(0.27)		L3.	0.289	1.26	
	constant	-0.561	(-1.13)		_cons	-0.169	-0.25	
	log(GDP pc)				logagrigdppc			
	log(financial system deposit/GDP)				logfd			
	L1.	0.088	(1.12)		L1.	0.099	1.18	
	L2.	-0.256	(-1.87)		L2.	-0.319	-2.16	
	L3.	0.191	(2.45)	*	L3.	0.213	2.56	
	log(GDP pc)				logagrigdppc			
	L1.	1.485	(10.60)	**	L1.	0.872	6.15	
	L2.	-0.715	(-3.05)	**	L2.	-0.113	-0.6	
	L3.	0.143	(1.04)		L3.	0.047	0.35	
	constant	0.631	(2.35)	*	_cons	0.993	2.52	

	Thaiand							
	GDP per capita				Agricultural VA per capita			
		Coef.	z			Coef.	z	
8	log(private credit/GDP)				log(private credit/GDP)			
	log(private credit/GDP)				log(private credit/GDP)			
	L1.	1.318	(8.97)	**	L1.	1.486	(9.64)	**
	L2.	-0.364	(-1.52)		L2.	-0.523	(-2.01)	*
	L3.	0.062	(0.42)		L3.	-0.049	(-0.32)	
	log(GDP pc)				log(Agricultural Value Added pc)			
	L1.	0.487	(1.72)		L1.	0.440	(2.10)	*
	L2.	0.207	(0.43)		L2.	-0.123	(-0.48)	
	L3.	-0.747	(-2.35)	*	L3.	-0.046	(-0.20)	
	constant	0.271	(0.84)		constant	-1.014	(-1.60)	
	log(GDP pc)				log(Agricultural Value Added pc)			
	log(private credit/GDP)				log(private credit/GDP)			
	L1.	-0.045	(-0.57)		L1.	0.024	(0.24)	
	L2.	0.085	(0.66)		L2.	-0.129	(-0.75)	
	L3.	-0.050	(-0.63)		L3.	0.109	(1.10)	
	log(GDP pc)				log(Agricultural Value Added pc)			
	L1.	1.528	(10.01)	**	L1.	0.522	(3.74)	**
	L2.	-0.663	(-2.54)	*	L2.	-0.015	(-0.09)	
	L3.	0.141	(0.83)		L3.	0.423	(2.83)	**
	constant	0.019	(0.11)		constant	0.368	(0.87)	
	logprivate credit by deposite money/GDP)				logprivate credit by deposite money/GDP)			
	logprivate credit by deposite money/GDP)				logprivate credit by deposite money/GDP)			

L1.	1.892	(11.86)	**	L1.	1.847	(11.52)	**
L2.	-1.235	(-4.59)	**	L2.	-1.165	(-4.09)	**
L3.	0.344	(2.45)	*	L3.	0.258	(1.63)	
log(GDP pc)				log(Agricultural Value Added pc)			
L1.	0.937	(4.57)	**	L1.	0.293	(1.54)	
L2.	-0.987	(-2.42)	*	L2.	-0.141	(-0.64)	
L3.	0.025	(0.09)		L3.	0.011	(0.06)	
constant	0.150	(0.32)		constant	-0.848	(-1.15)	
log(GDP pc)				log(Agricultural Value Added pc)			
logprivate credit by deposite money/GDP)				logprivate credit by deposite money/GDP)			
L1.	0.052	(0.40)		L1.	0.018	(0.14)	
L2.	-0.097	(-0.44)		L2.	-0.186	(-0.84)	
L3.	0.042	(0.37)		L3.	0.182	(1.47)	
log(GDP pc)				log(Agricultural Value Added pc)			
L1.	1.527	(9.10)	**	L1.	0.541	(3.64)	**
L2.	-0.727	(-2.19)	*	L2.	-0.060	(-0.35)	
L3.	0.196	(0.90)		L3.	0.389	(2.59)	*
constant	0.055	(0.14)		constant	0.699	(1.22)	
log(financial system deposit/GDP)				log(financial system deposit/GDP)			
log(financial system deposit/GDP)				log(financial system deposit/GDP)			
L1.	1.708	(8.22)	**	L1.	1.559	(9.87)	**
L2.	-1.232	(-3.40)	**	L2.	-0.873	(-3.33)	**
L3.	0.333	(1.66)		L3.	0.242	(1.51)	
log(GDP pc)				log(Agricultural Value Added pc)			
L1.	0.618	(2.17)	*	L1.	0.312	(1.97)	*
L2.	-0.819	(-1.62)		L2.	-0.082	(-0.45)	
L3.	0.377	(1.32)		L3.	-0.057	(-0.37)	
constant	-1.351	(-2.57)	*	constant	-0.898	(-1.13)	
log(GDP pc)				log(Agricultural Value Added pc)			
log(financial system deposit/GDP)				log(financial system deposit/GDP)			
L1.	0.178	(1.13)		L1.	-0.093	(-0.60)	
L2.	-0.066	(-0.24)		L2.	0.174	(0.67)	
L3.	0.060	(0.40)		L3.	-0.004	(-0.03)	
log(GDP pc)				log(Agricultural Value Added pc)			
L1.	1.403	(6.51)	**	L1.	0.496	(3.16)	**
L2.	-0.511	(-1.34)		L2.	-0.045	(-0.25)	
L3.	-0.066	(-0.31)		L3.	0.263	(1.70)	
constant	1.360	(3.42)	**	constant	1.527	(1.94)	

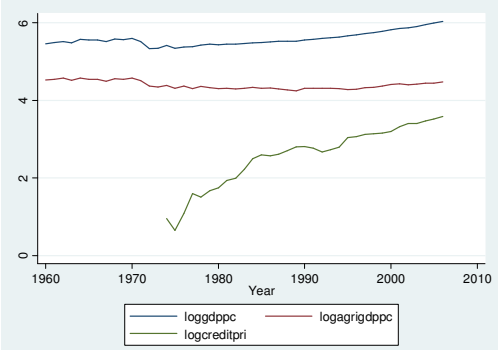
Vietnam

GDP per capita				Agricultural VA per capita			
	Coef.	z			Coef.	z	
L1.	-0.161	(-9.07)	**	L1.	3.242	(6.69)	**
L2.	0.959	(51.00)	**	L2.	1.311	(4.03)	**
L3.	-0.668	(-26.77)	**	L3.	-6.117	(-6.50)	**
log(GDP pc)				log(Agricultural Value Added pc)			
L1.	-34.993	(-68.00)	**	L1.	-200.924	(-6.23)	**
L2.	37.711	(33.90)	**	L2.	111.722	(6.47)	**
L3.	1.621	(2.33)	*	L3.	110.596	(5.95)	**
constant	-20.884	(-50.04)	**	constant	-82.627	(-6.10)	**

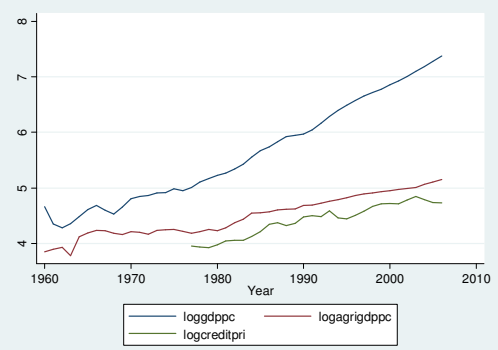
log(GDP pc)				log(Agricultural Value Added pc)			
log(private credit/GDP)				log(private credit/GDP)			
L1.	0.029	(12.62)	**	L1.	0.065	(7.79)	**
L2.	-0.025	(-10.08)	**	L2.	-0.005	(-0.82)	
L3.	0.006	(1.73)		L3.	-0.104	(-6.49)	**
log(GDP pc)				log(Agricultural Value Added pc)			
L1.	1.276	(19.11)	**	L1.	-2.980	(-5.40)	**
L2.	-0.249	(-1.73)		L2.	2.437	(8.25)	**
L3.	-0.012	(-0.14)		L3.	1.918	(6.03)	**
constant	-0.088	(-1.62)		constant	-1.418	(-6.12)	**
logprivate credit by deposite money/GDP)				logprivate credit by deposite money/GDP)			
logprivate credit by deposite money/GDP)				logprivate credit by deposite money/GDP)			
L1.	0.800	(4.34)	**	L1.	1.000	(2.40)	*
L2.	-0.144	(-0.57)		L2.	-1.041	(-2.23)	*
log(GDP pc)				log(Agricultural Value Added pc)			
L1.	-13.656	(-2.89)	**	L1.	-5.125	(-0.53)	
L2.	15.075	(3.48)	**	L2.	13.991	(1.40)	
constant	-8.022	(-1.12)		constant	-41.755	(-2.08)	*
log(GDP pc)				log(Agricultural Value Added pc)			
logprivate credit by deposite money/GDP)				logprivate credit by deposite money/GDP)			
L1.	0.029	(4.69)	**	L1.	0.025	(2.99)	**
L2.	-0.032	(-3.67)	**	L2.	-0.071	(-7.58)	**
log(GDP pc)				log(Agricultural Value Added pc)			
L1.	1.076	(6.69)	**	L1.	0.128	(0.66)	
L2.	0.016	(0.11)		L2.	1.302	(6.48)	**
constant	-0.507	(-2.08)	*	constant	-1.992	(-4.93)	**
log(financial system deposit/GDP)				log(financial system deposit/GDP)			
log(financial system deposit/GDP)				log(financial system deposit/GDP)			
L1.	0.871	(4.53)	**	L1.	-0.968	(-1.74)	
L2.	-0.304	(-1.22)		L2.	-2.192	(-4.05)	**
log(GDP pc)				log(Agricultural Value Added pc)			
L1.	-3.263	(-2.09)	*	L1.	14.625	(3.64)	**
L2.	4.868	(3.73)	**	L2.	13.783	(3.66)	**
constant	-10.045	(-1.90)		constant	-137.582	(-4.32)	**
log(GDP pc)				log(Agricultural Value Added pc)			
log(financial system deposit/GDP)				log(financial system deposit/GDP)			
L1.	0.088	(3.61)	**	L1.	-0.013	(-0.13)	
L2.	-0.066	(-2.11)	*	L2.	-0.232	(-2.47)	*
log(GDP pc)				log(Agricultural Value Added pc)			
L1.	0.841	(4.26)	**	L1.	1.031	(1.48)	
L2.	0.148	(0.90)		L2.	1.604	(2.46)	*
constant	0.154	(0.23)		constant	-7.910	(-1.43)	

Annex 3 Trends of Finance (the share of private credit in GDP) and Economic and Agricultural Growth (GDP per capita and Agricultural Value Added per capita)- based on annual data

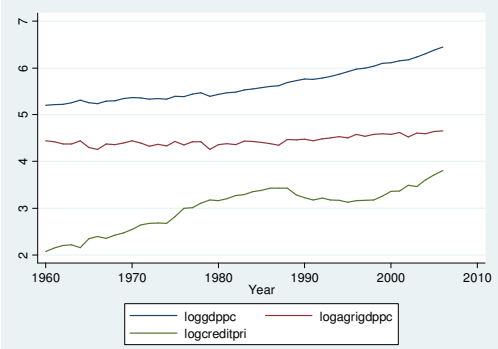
Bangladesh



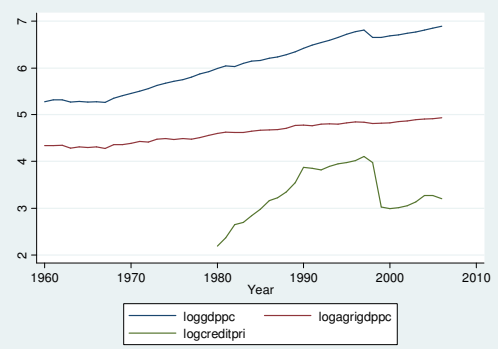
China



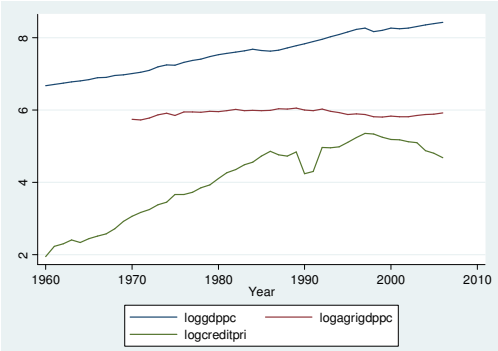
India



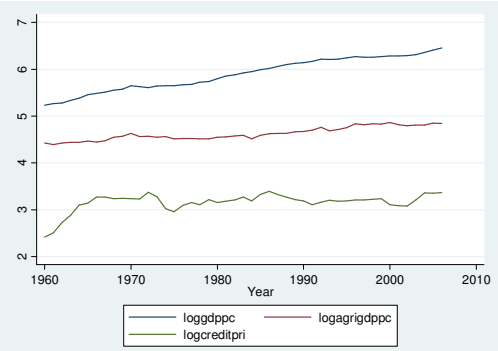
Indonesia



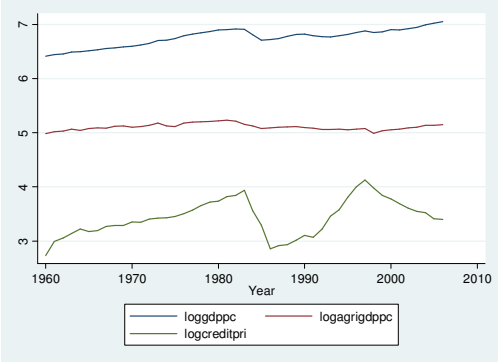
Malaysia



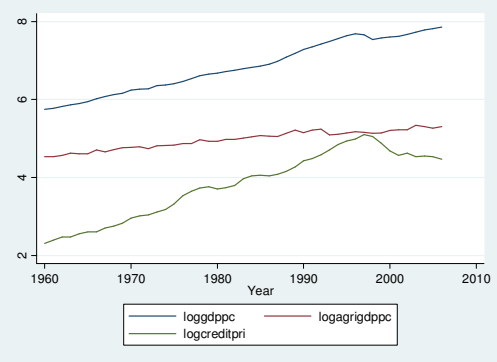
Pakistan



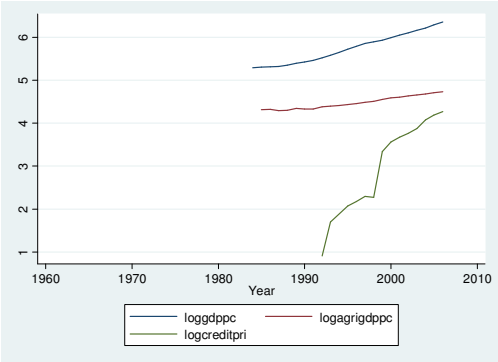
Philippines



Thailand

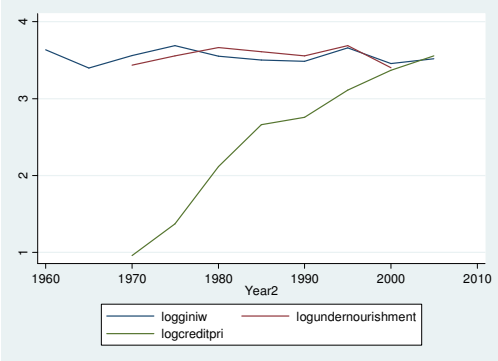


Vietnam

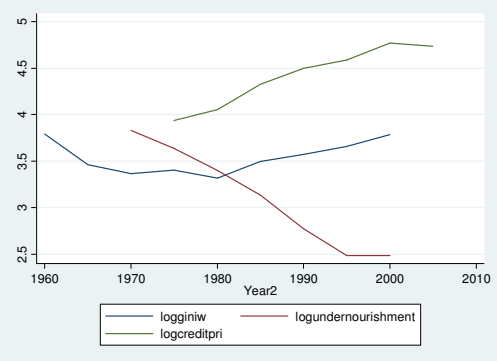


Annex 4 Trends of Finance (the share of private credit in GDP) and Economic, Inequality and Undernourishment

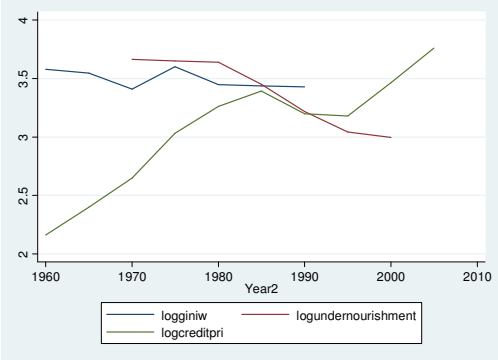
Bangladesh



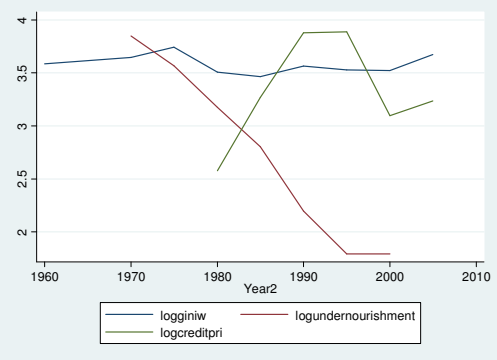
China



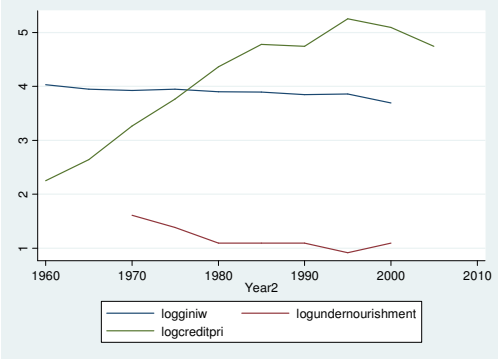
India



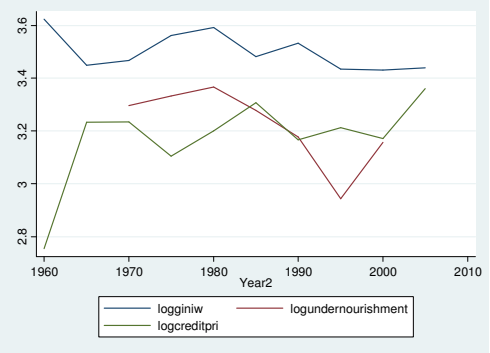
Indonesia



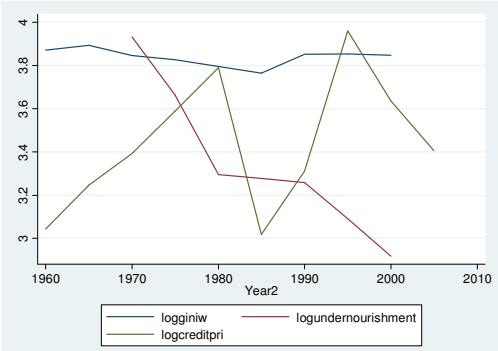
Malaysia



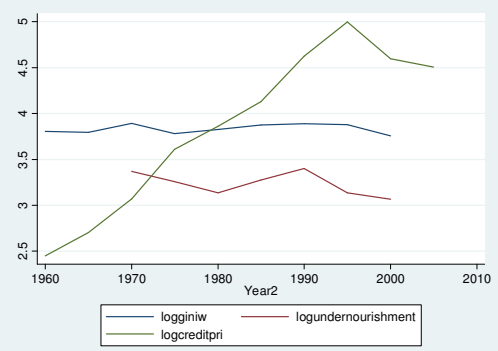
Pakistan



Philippines



Thailand



Vietnam