**UNITED NATIONS
UNIVERSITY**

UNU-WIDER

World Institute for Development
Economics Research

Research Paper No. 2006/51

Finance and Poverty in Ethiopia

A Household Level Analysis

Alemayehu Geda,[1] Abebe Shimeles[2]
and Daniel Zerfu[3]

May 2006

Abstract

In this paper, using the rich household panel data of urban and rural Ethiopia that covers the period from 1994 to 2000, we attempted to establish the link between finance and poverty in Ethiopia. Our results show that access to finance is an important factor in consumption smoothing and hence poverty reduction. We also found evidence for a poverty trap due to liquidity constraints that limits the ability of the rural households from consumption smoothing. The empirical findings from this study could inform finance policies aimed at addressing issues of poverty reduction.

[1] Alemayehu Geda, Associate Professor, Department of Economics, Addis Ababa University;
[2] Abebe Shimeles, Gothenborg University and Economic Commission for Africa, Principal Expert on Poverty;
[3] Daniel Zerfu, Gothenborg University and Lecturers at the Department of Economics, Addis Ababa University.

1   Introduction

The year 1992 marked a policy watershed in the Ethiopian financial sector, as well as the country's economic policy at large. This was the period where a shift from a controlled to market friendly policy regime was made. The new government continued with the policy of state ownership of major financial institutions, with major reforms such as operational autonomy and streamlining of some activities, expansion of credit and savings facilities, and adherence to prudent monetary and banking policy. In addition, the sector was, for the first time, opened to the private sector. The World Bank and IMF supported the financial liberalization programme through their Structural Adjustment Program (SAP), which started in late 1992.

The major development in the financial sector during the post-reform period is the reorientation of the sector away from its bias to the socialized sectors. Unlike the pre-1991 military-cum-socialist regime—called the *Derg*, which simply set the financial sector to the service of public enterprises and cooperatives, the post-reform period shows a market-based allocation of credits and financial services. Following this reform, the private sector is claiming the lion's share of total credits disbursed by the banking system. In contrast, public enterprises have seen their share declining through the years. Apart from the effect of the market based credit allocation, the considerable decline in the share of credits to public enterprises may be attributed to the privatization process, which, in effect, reduced the number of clients deemed as public entities. The result is that the financial system has evolved into an ownership structure which is mixed (public and private) and largely guided by market forces.

There are various studies that attempted to evaluate the effect of these reforms on the efficiency and growth of the financial sector (see Alemayehu 2005 and Addison and Alemayehu 2003, for instance). However, one area that is neglected is the relationship between the liberalization of the financial sectors and the pervasive poverty that is haunting the country. With an absolute poverty level of about 42 per cent, it is imperative that one needs to examine the link between finance and poverty. Thus, this paper tries to fill this gap by looking at this relationship in the rural households of Ethiopia who make over 80 per cent of the Ethiopian population.

Access to and efficiency of the financial sector are important elements in reducing poverty through lessening the financial constraints of the poor and enabling them to invest in a risky but profitable environment. Some empirical evidence shows that the inefficiency of the financial sector could lead to a high transaction cost for the poor who lead them to switch the form of saving and investment into physical assets. In Ghana 80 per cent of savings are in terms of physical assets while the figure for India is 50 per cent (see Srinivasan and Wallack 2004). This incapacitates the poor from earning interest income and engaging in high return but risky ventures. Moreover, it would also make hedging against inflation more difficult as part of their saving contain liquid cash.

Lack of financial access coupled with low endowment may lead to self perpetuating poverty. Households with low endowment and no/limited financial access tend to invest in low risk and low return areas and hence earn low return. This constraints the poor to investment on long term high return areas such as education. Moreover, households will also be faced with borrowing constrains which makes consumption smoothing very

difficult. The combined effect of these forces is to significantly reduce the welfare of the poor resulting in possible perpetuation of poverty, sometimes even across generations.

As we noted above, while there is a wide literature on financial sector performance and its impact on growth (both globally and in Ethiopia), empirical work on its impact on the poor using micro data is still scanty. This paper would document some evidence using the panel data from Ethiopia that covers the period from 1994 to 2000. Specifically, we attempted to: (i) test the impact of access to credit on poverty; (ii) investigate the importance of access to credit for consumption smoothing and hence the welfare of the population; and (iii) test for the possibility of a poverty trap due to financial markets imperfections.

The rest of the paper is organized as follows. The next section briefly summarizes the theoretical and empirical evidence on the relationship between poverty and finance. Section 3 describes the poverty profile of Ethiopia, as well as the nature of saving and access to credit. Section 4 presents the theoretical framework and the estimation results of a model that attempts to depict the relationship between poverty and access to credit. Sub-sections 4.1 and 4.2 examine in detail this link between poverty and finance by identifying the channels through which finance could impact on poverty. Thus, it offers empirical evidence on the link between consumption smoothing and access to credit as well as the result about the possibility of a poverty trap due to liquidity constraint. Section 5 concludes the paper.

2   Finance and poverty

It can be hypothesized that there is a link between poverty and finance. In a more subtle manner, Banerjee and Newman (1993) showed that the distribution on initial wealth coupled with imperfect capital market determines the occupational choice of an individual and hence the level of one's and one's offspring's income. Due to capital market imperfection, individuals' borrowing capacity would be limited by the level of their initial wealth. This would, in effect, rule out the poor from investing in high return investment ventures (Banerjee and Newman 1993).

The credit market imperfection can also affect the poor through human capital accumulation. Galor and Zeira (1993) showed that with capital market imperfection and unequal distribution of wealth, those with higher initial endowment would invest on human capital while those with no or lower initial endowment would face a higher interest rate and hence tend to invest less on human capital. To the extent that earnings depend on human capital, the rich that invest on human capital would remain rich while the poor remain poor and stay in the unskilled labour sector showing that the liquidity constraint stems from the imperfect capital market is particularly binding on the poor. This rising level of inequality would, in turn, aggravate poverty. In the Ethiopian case, empirical evidence shows that inequality is one of the major determinants of poverty. Inequality aggravates poverty by 1 percentage point compared to a reduction of 2 percentage points that could be obtained from a growth rate of 1 percentage point (see Alemayehu et al. 2003).

2

Better financial intermediation is, thus, expected to ease the liquidity constraints faced by the poor in addition to containing the adverse impact of initial wealth distribution. The evidence in this respect is mixed. Greenwood and Jovanovic (1990) theoretically demonstrate that given that there is a lump-sum cost of accessing the financial intermediary, agents below some minimum level of savings remain outside of the formal financial market. As a result, at the early state of financial development inequality across the very rich and the very poor increases, as it is only the rich who would have access to the financial markets. Over time, with the growth in the wealth of the poor, the poor would gain access to the financial intermediary and hence stable distribution of wealth can be achieved.

In terms of the empirical evidence, the results reported in Beck et al. (2004) suggest that financial development is pro-poor. Using a sample of 52 developed and developing countries over the period 1960–99, they obtained that the income of the lowest quintile grows faster than average per capita GDP with a fall in inequality in countries with better financial intermediary. In a more focused study, Amin et al. (2003) showed, using panel data from Bangladesh, that microfinance institutions, which are targeted to directly address the poor, are effective in reaching the poor. However, they reported that microfinance institutions are less successful in reaching the vulnerable, which are the very poor among the population. As opposed to Amin et al. (2003), also using panel data from Bangladesh, Khandker (2003) showed that microfinance is important in reducing poverty and it also matters even for the very poor by increasing their consumption.

Given the empirical evidence about the positive correlation between financial development and growth (see Levine et al. 2000, for instance) and to the extent that growth is pro-poor, better financial intermediation would be pro-poor. Apart from its growth impact and enabling the poor to invest in risky but profitable environment, access to credit may enhance the welfare of the poor by reducing liquidity constraints and consumption variability. We will test these hypotheses below.

3   Poverty, savings and access to credit in Ethiopia

At a per capita income of around USD 100, Ethiopia is one of the poorest nations on earth. The state of poverty is one of appalling human suffering and persistent deprivations. The evidence of recent periods shows that 40-50 per cent of households in Ethiopia live in abject poverty and that it has been persistent over time. The measure of poverty reported in this study is based on the Foster-Greer-Thorbeke index (see Foster et al. 1984) which essentially aggregates poverty based on the income of the poor. Given the income of the population by the vector: $y_1 < y_2 <, \ldots .. z_q <, .. y_n$, (where n is the number of the total population, and q is the number of the poor population), the Foster-Greer-Throbeke measure of poverty is given by:

$$P_\alpha = \frac{1}{n} \int_0^q \left(\frac{z - y}{z} \right)^\alpha dy \qquad\qquad [1]$$

Where α is a measure of the degree of inequality aversion among the poor population. In this report, we focus on α = 0, which basically gives the proportion of the poor

Table 1(a) Evolution of urban poverty in Ethiopia

Year	Headcount ratio	Poverty gap	Poverty squared gap
1994	39.4	15.2	8.0
1995	37.6	14.0	7.2
1997	34.2	13.1	6.8
2000	47.4	19.4	10.6

Source: Shimeles (2004a).

Table 1(b) Evolution of rural poverty in Ethiopia

Year	Headcount ratio	Poverty gap	Poverty squared gap
1994	42	17.2	9
1995	37	17.3	9.8
1997	35	17.1	8.8
2000	50	22.0	12.8

Source: Shimeles (2004a).

population, or the headcount ratio, $\alpha = 1$ provides the poverty gap, which measures the average deprivation among the poor and $\alpha = 2$ is a measure of how sever poverty is among the population. Tables 1(a) and 1(b) report these measures for Ethiopia from 1994–2000 based on a unique panel data set collected over the last few years by the Department of Economics of Addis Ababa University and its various collaborative institutions.[1]

As Tables 1(a) and 1(b) clearly indicate the percentage of households who are unable to meet the barest minimum basic needs in both urban and rural Ethiopia are substantial. The minimum income per adult in real terms is calculated to be around Birr 2 per person per day[2] for the reference survey site. This poverty line is quite lower than the one dollar a day (a dollar is about 8.65 Birr at the nominal exchange rate) in PPP globally used to measure extreme poverty. It is therefore self evident that Ethiopia harbors one of the worst human conditions in the world. The other measures of poverty, such as poverty gap and squared poverty gap show quite a lower degree of deprivation and severity as the maximum that these values take is the headcount ratio. So, for instance, the poverty gap is in most cases less than half of the headcount ratio. In effect, a lot

---

[1] The panel data is collected by Addis Ababa University, in collaboration with Oxford University, Center for the Study of African Economies, IFPRI and Michigan State University. The panel started with approximately 1500 households in 1994 and has been active since then. The result reported in this study covers the period 1994–2000. For an extensive discussion of this data see for instance Bigsten et al. (2003).

[2] The poverty line is computed on the basis of food and non-food (non-durables) basic needs by taking into account consumption preferences of the poorest population and price differences across rural and urban areas. For further details see Bigsten et al. (2005).

more people are concentrated around the poverty line so that absolute poverty is a serious policy concern than the relative deprivation of the poor.

The trend in poverty is not encouraging either. Between 1994 and 1997, there has been some sign of hope as poverty declined and per capita income increased. The situation in 2000 however showed an increase in poverty as the country struggled through difficult periods, such as the war with Eritrea and a major drought.

Poverty is much more persistence in urban than in rural areas (see Table 2). The percentage of the persistently poor in urban areas is twice that in rural areas suggesting the limited income earning opportunities in urban areas.

We also provide the factors that are closely correlated with the persistence of poverty in Tables 3(a) and 3(b), where we can read that in both urban and rural households the persistence of poverty is positively associated with household size, that is, the higher the household size the more persistent poverty would be; and the levels of the household head's education, the value of assets owned (including the number of oxen) and the size of land are negatively correlated with the persistence of poverty. In urban areas, the persistence of poverty declines with being a civil servant, in private business or a private sector employee. On the other hand, poverty is more persistent among the unemployed, casual workers and dwellers of the capital.

The micro-evidence on the state of household savings and access to credit indicates that, particularly in rural Ethiopia, savings in the form of cash is hardly a common practice. The panel data set collected over the period of six years, from 1994 up to 2000, shows features typical of a very poor and subsistence economy. Accordingly, among nearly 1500 households in the panel, only 0.7 per cent of respondents in rural areas reported having a bank account in 1994 and 15.6 per cent said that they belonged to a traditional rotating saving club/group (*Iqub*) in that period. *Iqub* in its simplest form is a culture of group savings meant usually to raise money to finance large expenses relative to the current income of the members. This is usually meant to finance events like weddings, funerals, religious observances, purchases of household durables and some types of non-durables, like clothing and shoes; or even for investment purposes like the purchase of livestock, fertilizers, and other ventures, like house construction. What *Iqub* members do is that each contributes a certain previously agreed sum to the group every week,

Table 2 Percentage of households by poverty status: 1994–2000

Poverty status	Rural	Urban
Always poor	7.3	15.4
Once poor	28.9	20.4
Twice poor	23.0	18.3
Thrice poor	20.0	16.0
Never poor	20.8	29.9

Source: Shimeles (2004b).

Table 3(a) Household characteristics and persistent poverty, 1994–2000: rural households

Variable	Never poor	Once poor	Twice poor	Three times poor	Always poor
Household size (numbers)	4.9	5.8	6.4	6.9	8.3
Age of head of household (years)	44	46	47	47	48
Female headed household (%)	23	22	18	22	16
Household head with primary education (%)	12	10	7	7	3
Wife completed primary school (%)	4	2	2	1	1
Land size (hectare)	1.1	0.9	0.7	0.7	0.5
Crop sale (Birr)	334	247	158	83	90
Asset value (Birr)	225	173	152	87	92
Off-farm employment (%)	24	38	39	45	29
No. of oxen owned	2.0	1.7	1.4	1.1	0.78

Source: Shimeles (2004b)

Table 3(b) Household characteristics and persistent poverty, 1994-2000: urban households

Variable	Never Poor	Once Poor	Twice poor	Three times poor	Always poor
Household size (numbers)	5.7	6.3	6.6	6.9	7.6
Age of head of household (years)	47	49	50	48	51
Female headed household (%)	40	44	46	39	43
Household head with primary education (%)	60	44	30	27	20
Wife with primary education (%)	33	21	16	12	8
Private business (%)	3	2	2	0	0
Own account employee (%)	19	17	15	12	16
Civil servant (%)	21	15	11	9	9
Public sector employee (%)	9	7	5	6	5
Private sector employee (%)	6	5	5	3	3
Casual worker (%)	4	6	7	14	32
Unemployed (%)	4	4	7	4	9
Resides in the capital (%)	68	71	79	78	87

Source: Shimeles (2004b).

month or quarter, depending on the prior set intervals, and the collected money is given to one person at a time. In some sense *Iqub* undertakes saving and lending activities simultaneously. Typically members wait for their turn to collect the money raised through such contributions. Customarily, the queue for getting the collected money is established by drawing lots. But, it is also common to arrange it on mutual consent, with the needy coming first. In many ways, *Iqub* is a mechanism for group insurance, frequently used to overcome idiosyncratic shocks, and also a form of medium to develop social networks with neighbours. *Iqub* is much less common in urban areas than rural areas, where people have relatively predictable flow of income over the *Iqub* period, and a number of mechanisms exist for easy enforcement, including legal remedies.

The relative size of *Iqub* reported in the data for rural households is quite interesting. The median contribution to *Iqub* was close to Birr 90 per household over a period of four months. This is close to 5 per cent of total household consumption expenditure in the period. A parallel is also discovered with our result from nationally representative data on savings. First, the percentage of households who reported positive savings from this data was around 15 per cent, which is close to the percentage of households with similar saving status in the panel data. Second, the percentage of savings from mean income was around 5 per cent, which is close to the average propensity to save that we found for the panel data (which is also consistent with the macro data of the last decade that show a gross domestic figure of about 6 per cent). In all likelihood, household cash savings are much lower in Ethiopia, mainly due to very low income level and partly also due to lack of efficient financial intermediation.

On the other hand, there is significant credit activity among households in the country. The percentage of households who took a loan at least once in the five years' preceding the survey year (1994) was 40 per cent, while the rest did not borrow money at all. The largest sources of this credit are relatives and friends, followed by village moneylenders (see Table 4). In the recent survey of 2004, the proportion of households who took a loan in the 12 months prior to the survey period increased to around 54 per cent. Half of the households who did not take a loan reported that they did not face the need for credit, while the remaining were constrained by different factors including lack of access, fear of not paying back and rejection of the loan application (see Table 5).

Table 4 Source of loan: rural households

Source of loan	Percentage
Village money lenders	19.7
Relatives/friends	77.5
Bank	0.6
Other	2.2

Source: Authors' computations.

Table 5 Reasons for not taking a loan

Reasons	Percentage
No need for a loan	50.8
Tried to get a loan but was refused	3.1
No one available to get a loan from	9.3
Expected to be rejected, so did not try to get one	1.3
No access to collateral	0.5
Afraid of losing collateral	1.1
Afraid that I cannot pay back	31.1
Interest rates too high	1.8
Other	0.8

Source: Authors' computation.

Evidence from the 2004 survey of the panel households also highlighted the importance of access to credit in raising funds for emergency purposes. The data show that only around 57 per cent of rural households can obtain 100 Birr (around USD 11.5, which is a significant amount of money for them) if the household is in an emergency. Of those who can obtain the money, credit and saving associations are the source of the fund for about 39 per cent of the households, followed by a sale of animala at 37 per cent (see Table 6). As sales of animals, particularly oxen, might have an adverse impact on farm production and income, credit would remain an important shock copping mechanism.

It is also interesting to note that access to loans is an increasing function of the level of income, except for the top rich category (see Table 7). Table 8 shows that households that have access to credit, compared to those who had not, are relatively less poor, although the distinction between these two groups is not that strong.

Table 6 Ability to raise money for emergency

If the household needed 100 Birr for an emergency, could the household obtain it within a week?		How would the household obtain 100 Birr?	
	Percentage		Percentage
Yes	57.1	Sale of animals	37.4
No	42.9	Sale of farm/ business assets	7.4
		Sale of household asset	1.7
		Own cash	7.4
		Saving association	5.7
		Loan	33.5
		Sale of crops	7.0
		Other	0.1

Source: Authors' computation.

Table 7 Access to credit by deciles distribution of 'permanent income'

Deciles	Percentage with access to credit (%)
Poorest deciles	3.61
2	4.13
3	4.21
4	4.30
5	4.64
6	4.73
7	4.82
8	5.59
9	5.93
Richest deciles	3.61
Households with access to credit (%)	40.00

Source: Authors' computations.

Table 8 Chronic poverty and access to credit, 1994–2000

Household types	Long term poverty, P_0	
Households with access to credit	28	(43)
Households with no access to credit	33	(47)

Source: Authors' computations. Figures in parenthesis indicate urban poverty.

4 The theoretical framework and estimation results: finance and poverty

There is general consensus on the basic premise that economic growth is central to achieve the objective of poverty reduction. In the literature, however, there is also a debate on the type of growth, that is, whether it is pro-growth or not, and the extent to which the poor gain from growth. Among others, studies by Bruno et al. (1995), Ravallion and Chen (1997), Deininger and Squire (1998) and Birdsall and Londono (1997) reported that growth has a positive impact on reducing income poverty though its effectiveness differs depending on the initial inequality level. In the cases where growth is inequitable in the poor countries, as indicated in the Kuznet hypothesis, the poverty reducing impact of growth may be hampered.

Following this literature and supporting empirical evidence in Ethiopia (see Alemayehu et al. 2003) we specify the level of poverty as a function of income, inequality and other household characteristics.

$$P = f(Y, G, \mathbf{H}) \qquad [1]$$

Where P is the level of poverty, Y is income, G is inequality and **H** household specific characteristics such as education and asset holdings.

Now turning to the determinants of poverty, we can specify the dynamics of income and inequality. As the rural households are mainly engaged in agricultural activities, what happens to agriculture directly affects their income. Thus, we specify a simple production function as:

$$Y = f(\mathbf{X}, F) \qquad [2]$$

where Y is output

> **X** is a vector of physical inputs including labour, land, oxen used in the production process.
>
> F is availability of credit.

Finally, we hypothesized inequality to depend on initial endowment and access to finance as in Banerjee and Newman (1993). We proxy initial endowment by the quality of land and number of oxen the household own.

$$G = f(\mathbf{E}, F) \qquad [3]$$

Where **E**   Initial endowment

Combining [1], [2] and [3], we can estimate a reduced form equation that links poverty with access to finance as:

$$P = f(X, E, F, H) \qquad [4]$$

In a panel framework the estimatable version of equation [4] can be written as

$$P_{it} = \beta_0 + \beta_1 (HHSZ)_{it} + \beta_2 (OXEN)_{it} + \beta_3 (LandSZ)_{it} + \beta_4 (Credit)_{it} + \beta_5 (Educ)_{it} + \beta_6 (Asset)_{it} + c_i + u_{it} \qquad [5]$$

Where P is a dummy variable indicating the absolute poverty status of the household; HHSZ is household size that we used as a proxy for labour; OXEN is the number of oxen owned by the household which can be used as a proxy for capital owing to the ox-plough culture in Ethiopia; LandSZ is size of land holding by the household; Credit is an indicator of whether the household has access to credit or not; Educ is the level of education of the household head; Asset is the total current assets of the household, c is the individual heterogeneity term that may contain initial endowment and other household specific heterogeneity; u is the idiosyncratic error term.

We estimated equation [5] using fixed effect logit estimator to account for a possible correlation between the individual heterogeneity and the explanatory variables. The

fixed effect logit estimation has an advantage over both the random effect and fixed effect probit models in that it accounts for the possible correlation between the explanatory variables and unobserved heterogeneity without running into incidental parameter problem as c_i is not estimated along with the $\boldsymbol{\beta}$s (see Wooldridge 2002). Table 9(a) presents the estimation result.

The result shows that, controlling for other factors, the probability of being poor increases with the availability of credit, which is counter-intuitive. We suspected that this is mainly due to the endogeneity of credit in our specification. That is, on the one hand the probability of being poor declines with the availability of credit and on the other hand, availability of credit is also determined by the poverty status of the household. This might drive our estimates to be inconsistent. As a result, we resorted to instrumental variable probit estimation to address the endogeniety problem.

Table 9(a) Result of the logit fixed effect model

Dependent: absolute poverty		
	Coefficient	z-values
Household size	0.08	(2.05)*
Total land of household in hectares	-0.25	(5.93)**
Number oxen owned	0.03	(0.55)
Credit	0.38	(3.56)**
Total current value of household assets	0.00	(1.54)
Observations		2083

Notes: Education level of the household head is omitted due to no within-group variance.
Absolute value of z statistics in parentheses. * significant at 5%; ** significant at 1%.

The main problems in using the IV estimation are getting a 'right' instrumental variable(s) and that the other variables in the model are exogenous. We argued that the total asset holding of the household, number of oxen owned and total crop sales to be good indicators of access to credit as they show the repayment capacity of the household. However, since total asset holdings and crop sales are correlated with the dependant variable, we could not use them as instrument. Rather, we used the total number of oxen to instrument for credit as it is not significantly correlated with the dependent variable as shown in our fixed effect logit model. The result of our IV probit estimation is presented in Table 9(b).

Our IV probit result passes the Wald test for exogeneity, thus, confirming the endogniety problems we noted earlier. The result in Table 9(b) shows that availability of credit has a significant impact in reducing the probability of being poor. This underscores the importance of finance (and financial development) in reducing poverty.

Table 9(b) Probit estimation of poverty and credit

	Coefficients	Marginal effects
Credit	-1.285	-0.4788671
	(0.000)***	
Household sze	0.078	0.0310112
	(0.000)***	
Total land of household in hectares	-0.119	-0.0475257
	(0.000)***	
Has the household head completed primary school?	-0.242	-0.0954966
	(0.002)***	
Female headed households	0.091	0.036457
	(0.084)*	
Has the wife completed primary school?	-0.149	-0.0588589
	-0.344	
Age of household head	0	-0.0001902
	-0.719	
Crop sales	0	-0.0001602
	(0.000)***	
Off farm employment	0.113	0.0449408
	(0.007)***	
Constant	0.46	
	(0.059)*	
Observations	3637	
Robust p values in parentheses		

Notes: Wald test of exogeneity (/athrho = 0): chi2(1) = 9.78 Prob > chi2 = 0.0018. * significant at 10%; ** significant at 5%; *** significant at 1%.

One caveat to note in estimating the model in [5] allowing for the possible endogeneity between poverty and the access to finance is the fact that the endogenous variable is also a dummy variable. When the endogenous variable is a binary one having a non-normal distribution, the instrumental variable method may not be valid. As a result, we also used a bivariate probit model to deal with the problem of endogeneity and check the reliability of our result.

To allow for the possible unobserved correlation between poverty (P) and access to finance (C), we let the error terms of the two equations to be distributed as a bivariate normal. As our interest is to model the relationship between these two discrete variables, the decisions involve four cases – that is, $P = 0$ and 1; and $C = 0$ and 1. The likelihood function that captures these features can be presented as a bivariate probit model (see Carrasco 1998 and Evans and Schwab 1995). The bivariate probit model can, hence, be formulated as

$$P_{it} = \beta X_{it} + \delta C_{it} + \varepsilon_{it}$$
$$C_{it} = \gamma Z_{it} + \mu_{it} \qquad\qquad [6]$$
$$E(\varepsilon_{it}) = E(\mu_{it}) = 0;\ Var(\varepsilon_{it}) = Var(\mu_{it}) = 1;\ \mathrm{cov}(\varepsilon_{it}, \mu_{it}) = \rho$$

The model is identified if there is at least one variable in *Z* that is not contained in *X*. As in our previous estimation, we used number of oxen owned as an identifying instrument. The result of the bivariate model is presented in Table 9(c).

Table 9(c) Bivariate Probit estimation of poverty and credit

		Marginal effects	Auxilary regression
	Poverty	Pr(poverty = 1, credit = 1)	Credit
Credit	-0.927	-0.2093725	
	(0.000)***		
Household sze	0.092	0.0197964	-0.016
	(0.000)***		(0.027)**
Total land of household in hectares	-0.136	-0.0374564	-0.027
	(0.000)***		(0.044)**
Has the household head completed primary school?	-0.227	-0.091633	-0.244
	(0.005)***		(0.003)***
Female headed households	0.107	0.0278861	0.013
	(0.042)**		-0.809
Has the wife completed primary school?	-0.209	-0.03525	0.154
	-0.18		-0.31
Age of household head	-0.001	-0.0000825	0.001
	-0.615		-0.712
Crop sales	-0.000483	-0.000107	0.000064
	(0.000)***		-0.123
Off farm employment	0.118	0.0417128	0.079
	(0.006)***		(0.073)*
Number oxen owned (bulls, oxen and young bulls)			0.074
			(0.000)***
Constant	0.207		0.182
	-0.201		(0.028)**
Observations	3637		3637
Rho	0.6398438		
Wald test of rho=0: Prob >Chi2	(0.0003)***		

Notes: Robust p values in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%

13

Our result suggests that the bivariate specification is a valid one as ρ is significantly different from zero. Controlling for household characteristics and other factors, our result shows that availability of credit significantly and negatively affects the probability of being poor. As the marginal effects suggest availability of credit reduces the probability of being poor by around 21 per cent. This reduction is much lower than what our instrumental variable estimation result has provided, that is, 47 per cent.

The overall picture suggested the importance of access to finance for poverty reduction. Thus, it is imperative to examine the channels through which finance, as found in Tables 9(b) and 9(c), could affect poverty. We identified two major channels through which it does affect poverty: (i) through consumption smoothing and (ii) through allowing to skip poverty trap that could emanate from liquidity constraint. The next two sections offer empirical evidence on this.

4.1 Consumption smoothing and access to credit

Due to the dependence of the rural economy on rain-fed agriculture, the income and consumption of the rural population are highly volatile depending on the weather. With the absence of formal insurance and credit market, consumption smoothing is one of the most difficult challenges for rural households. As can be read from Table 2, about 29 per cent of the rural population in the sample fall into poverty at least once, indicating the difficulty in smoothing consumption for which liquidity constraint and absence of insurance mechanisms could be the main culprits. Though the rural farmers adopt different consumption and income smoothing mechanisms with absent or under developed formal insurance and credit market (see Morduch 1995, for instance), access to credit from the informal market and running down one's assets and savings are still important smoothing mechanisms.

As a credit market is not completely lacking in rural villages, using a model of consumption determination, it is possible to pick up the importance of access to credit for consumption smoothing. Equation (1) provides an estimating equation of the determinants of long term consumption (C_i) on a set of exogenous variables (X). Since C_i is mean consumption over six years for each household i the vector of explanatory variables are all initial endowments as reported in 1994. Thus, the Xs in equation (1) are instruments uncorrelated with the error term and OLS gives consistent and efficient estimates of the regression coefficients.

$$\ln C_i = \beta_0 + \beta X + e_i \qquad (1)$$

The estimated results of this model are reported in Table (10) and are quite interesting in many ways. Long term income of a typical rural household is negatively correlated with size of the household, the head of the household, that is, whether female or male. On the other hand, such factors as initial wealth, assets, experience and most of all access to credit have a positive effect on 'permanent' consumption. This is a further evidence of the positive role that access to credit plays on household welfare. The importance of access to finance in reducing poverty is especially important since income variability is a major factor in inflicting poverty in Ethiopia. The latter can be inferred from the fact that the transitory component of poverty which comprises about 15 to 20 percentage points of the total poverty. Access to credit, thus, helps to squarely

address such poverty by allowing to smooth consumption as can be inferred from its strong impact on permanent income reported in Table 10.

Table 10 Determinants of 'permanent income' in rural Ethiopia

Dependent variable: logarithm of real income	Cofficients	t-statistics
Household size	-0.096	(16.57)**
Farming systems	0.411	(8.21)**
Female headed households (female reference group)	-0.05	-1.27
Primary school completion of the household head	0.098	-1.76
Primary school completion of wife	-0.013	-0.12
Total land of the household	0.075	(2.92)**
Age of the household head	0.001	-1.16
Total current value of household assets	0	(4.83)**
Crop sales either previous meher and belg (r1 & r4) or after last interview	0	(3.75)**
Population of nearest town divided by the distance in km from the site	0	(2.89)**
Dependency ratio	-0.117	(-1.28)
Worked on someone elses land or other employment?	-0.103	(3.21)**
Dummy for households which harvested teff during last season	0.011	-0.28
Dummy for households which harvested coffees last season	0.124	(2.24)*
Dummy for household which harvested chat last season	0.238	(4.93)**
Number oxen owned (bulls, oxen and young bulls)	0.019	-1.71
Access to credit	0.112	(3.68)**
Constant	3.605	(24.83)**
Observations	1159	
R-squared	0.37	

Notes: * significant at 5%; ** significant at 1%.
Source: Shimeles (2004b).

4.2 Finance and the poverty trap: liquidity constraint and poverty

The discussions in the preceding section have brought out important facts regarding the role of credit for household welfare and overall poverty. The first point of interest is that a large percentage of people in rural areas do not have access to credit. And, these

people make up a large proportion of the chronically poor population. Second, households with access to some credit generally have a higher long term per capita consumption so that consumption smoothing occurs with relative ease among this group as opposed to the credit constrained population. This essentially brings into the picture the notion of a poverty trap. The idea is that credit or liquidity constrained households tend to experience long-term poverty due to slight shocks in the past. The nature of previous period or past consumption therefore has an important impact on current consumption. This is in sharp contrast to the life-cycle hypothesis of consumption growth, where among other things, due to perfect capital markets assumption, consumption will be unaffected by consumption or its determinants in the previous period since shocks are fully taken care of through the use of the financial market in that period.

The most commonly applied theoretical models of household consumption growth are based on a general framework where households are assumed to maximize lifetime utility U, defined over consumption, subject to lifetime budget constraint (see Shimeles 2005 for detail).

$$E_t \sum_{\tau=0}^{T-\tau} (1+\delta)^{-\tau} u(c_{t+\tau}) \tag{2}$$

Subject to the budget constraint:

$$\sum_{\tau=0}^{T-\tau} (1+r)^{-\tau} (c_{t+\tau} - w_{t+\tau}) = A_t$$

Where, E_t is mathematical expectation conditional on all information available to the individual at time period t, δ is rate of subjective time preference, r is real rate of interest, c_t is consumption, w_t is earnings and A_t is physical assets. Using the sequential maximization rule, at any period t, optimal consumption will be given by Euler's equation[3] for constant rate of time preference and interest rate with the additional assumption that the only uncertainty the household faces originates only from the income earning process:

$$E_t u'(c_{t+1}) = [(1+\delta)/(1+r)] u'(c_t) \tag{3}$$

Equation (3) states that a typical household sets the marginal utility of expected consumption equal to the marginal utility of current consumption weighted by the rate of time preference and asset prices. This general formulation of the optimal consumption rule has sparked a large literature on consumption growth and its determinants in the theoretical as well as empirical literature. Particularly notable is the work by Hall (1978) which provided a testable hypothesis for the Life Cycle Model of Modglinai and Permanent Income Hypothesis of Friedman on household consumption growth. The immediate implication of equation (3) is that:

---

[3] For a straightforward derivation of the Euler's equation see for instance Hall (1978).

$$u^{'}(c_{t+1}) = \frac{1+\delta}{1+r} u^{'}(c_t) + \varepsilon_{t+1} \tag{4}$$

where ε_{t+1} is a random disturbance term and $E_t\varepsilon_{t+1} = 0$. Equation (3) provided the basic framework for the large empirical literature that followed Hall's (1978) seminal paper. Depending on the specific functional form of the utility function, a number of variants of equation (4) have been suggested, empirically estimated and in the process have spurred a controversy that is still alive and thriving.[4] The first to spark immense attraction is Hall's assumption of a quadratic utility function with a 'bliss' maximum point and constant rate of discount rate and interest rate, which led to a consumption function of the following form:

$$c_{t+1} = \beta_0 + \gamma c_t + \varepsilon_{t+1} \tag{5}$$

If we further assume away the 'bliss' point and add the assumption that the rate of time preference and interest rate are equal (which also could be interpreted as equality between the marginal rate of substitution between future and current consumption with marginal rate of transformation), we get the parsimonious model of consumption growth. That is, $\gamma = 1$, or current consumption has a unit root with respect to lagged consumption implying that consumption growth is a random-walk, except for its trend.[5] Equation (5) and its variants also imply that utility is time-separable and also additive. In addition, over their lifetime, households are assumed to be fully insured from income risk so that consumption is not affected by transitory changes in income. Thus, consumption growth is independent of past, current, or predictable changes in income. In addition, consumption patterns are independent of the riskiness of income.[6]

Augmenting equation (5) with current disposable income and other wealth variables ($X_{it}s$) therefore provides a basis for testing the life-cycle hypothesis:

$$c_{it+1+} = \beta_0 + \gamma c_{it} + \sum \beta_k X_{kit} + \varepsilon_{it} \tag{6}$$

Where β_k are coefficients of the asset variables and the subscripts refer respectively individual household i, time t, and k asset-holdings. The implications of equation (6) and its variants in a developing country context have been investigated in the empirical literature (e.g. Morduch 1990, Deaton 1992, Ravallion and Chaudri 1997, Jocobi and Skoufias 1998). Recently, using data for selected developing countries, including that for Ethiopia, Skoufias and Quisumbing (2003) employed this framework to relate a household's consumption variability with its vulnerability to poverty where per capita consumption growth is regressed on per capita income growth. Two sets of issues are at hand regarding equation (6) and its implications. With a quadratic utility function, and equality between rate of time preference and return to asset holdings, consumption over

---

4 A useful survey of this literature is found in, for example, Browning and Lusardi (1996), Hayashi (1997), Carroll (2001) and Browning and Crossley (2001).

5 If consumers are relatively impatient ($\beta<1/(1+r)$), consumption declines gradually and if they are patient it rises.

6 See Coleman (1998) for further details of the implications of the quadratic expected utility functional form.

time will be a random walk, except for its trend. Second, information on pervious earnings, asset holdings and other features of household fortune should not affect future consumption. Thus, a test of the life-cycle hypothesis involves examining the coefficients of c_{it} and X_{kit}.

Table 11 illustrates this fact very clearly where lagged consumption expenditure turned out to be an important factor in driving current consumption among poor households, while it did not among the persistently non-poor households. This suggests that the Martingale hypothesis is strongly rejected among poorer households perhaps due to the interplay of shocks and liquidity constraints. The negative sign of the coefficients of the lagged variables among poorer households is even more consistent with the liquidity constraint hypothesis where current and lagged consumption move in the opposite direction in response to unforeseen income shocks.

The presence of liquidity constraint in our set-up suggests the possibility of multiple equilibria (see Figure 1) resulting in non-linearity in consumption growth (see also Jalan and Ravallion 2001). In this report we investigate for the existence of a poverty trap by examining non-linearity in consumption dynamics. From Figure 1 we see that concavity or non-linearity in consumption with respect to lagged consumption generates two stable or equilibrium points (Y* and Y**). The lower consumption level indicates a low-equilibrium trap.

Shimeles (2005) reports that that between 1994 and 1995 approximately 44 per cent of households in the panel did experience a decline in their real per capita consumption expenditure or had negative consumption shock. Among these, only 50 per cent of households recovered fully from the negative shock in consumption expenditure in 1997. Again among those who did not recover in 1997 from the 1994 negative shock, 28 per cent recovered fully in 2000. Nearly 72 per cent of those with negative income

Table 11 Real household consumption and its lag rural areas by the poverty status of households

One period lagged variable	Poor households		Non-poor households	
	Coefficient	P-value of Sargan's Test	Coefficient	P-value of Sargan's Test
Real total consumption expenditure	-0.428 (-4.8)	0.0000	0.495 (1.4)	0.8185
Real food consumption expenditure	-0.442 (-4.75)	0.0000	0.484 (1.42)	0.8493
Real non-food consumption expenditure	0.128 (1.76)	0.0022	0.046 (0.57)	0.0000

Note: Terms in parenthesis are z-values.
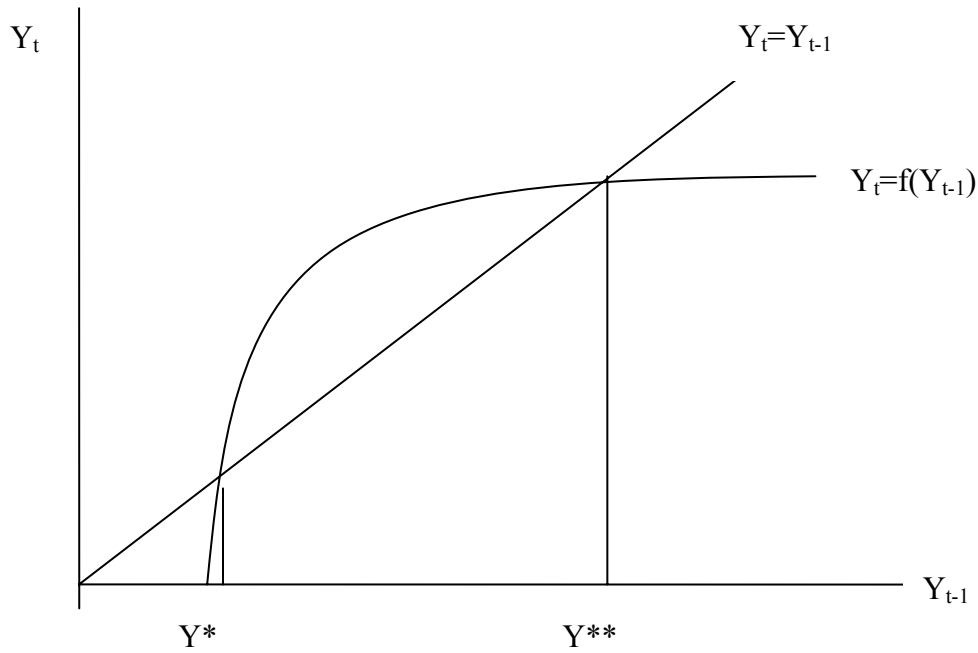Source: Shimeles (2005).

Figure 1 Consumption dynamics and poverty trap

shocks that did not recover in 1997 continued to live below an expenditure level they had had in 1994. All in all, about 16 per cent of sample households had a negative consumption shock in 1994 that was not recovered at all in 2000. From this brief encounter in consumption dynamics, it is easy to see that there may be some households who might find it very difficult to bounce back following an initial income shock either to their previous level of consumption or beyond. This motivates for a need to look at consumption growth or transitory consumption shocks a non-linear setting.

The general empirical strategy we used below to test for non-linearity in consumption dynamics follows the specifications of Jalan and Ravallion (2001) as stated in equation (7):

$$y_{it} = \alpha + \gamma_t + \beta_1 y_{it-1} + \beta_2 y^2{}_{it-1} + \beta_3 y^3{}_{it-1} + u_i + \varepsilon_{it} \ (i = 1,..n; \quad t = 1,2...T)$$

(7)

where y_{it} is per capita consumption in period t by household i. The econometric specification in (7) is typical of a dynamic panel data specification with fixed effect error correction. We used the Arnold-Bond Generalized Moments Method to estimate the coefficients of equation (7) for rural households in Ethiopia. The results are reported in Table 12 and evidently confirm for the existence of poverty traps as shown by the roots of the polynomials underlying the dynamics and the significance of the coefficients for higher order consumption lags.

Table 12 Non-linear dynamic model of consumption expenditure: rural areas

	All households	Poor households
Intercept	-18.58	0.0314
	(-9.72)	(0.62)
Lagged per capita consumption expenditure	-0.0676	0.0054
	(-3.56)	(1.13)
Squared lagged per capita consumption expenditure	0.0003312	0.0313
	(58.2)	(97.0)
Cubic lagged per capita consumption expenditure	-2.03e-08	-0.0029
	(-43.28)	(-55.71)
Sargan's Test of overidentifying restrictions	0.0000	0.3417

Note: Terms in parenthesis are z-values.
Source: Shimeles (2005).

The existence of the poverty trap suggests that due to the liquidity constraint and the resultant inability to smooth consumption over time, the bulk of rural households are entrapped in a low level equilibrium. This result has an interesting policy implication; that introducing efficient financial intermediaries in the rural villages may reduce poverty by easing the liquidity constraints of the poor.

5 Conclusion

This paper assesses the importance of financial development (in terms of access to credit) in explaining poverty and a poverty trap. Using panel data from Ethiopia that covers the period from 1994 to 2000, we, first, tested whether access to credit matters for the poverty. Using a parsimonious poverty-finance model and controlling for the possible endogeneity between access to credit and the poverty status of the households, we found out that access to credit significantly reduces absolute poverty. Having this result we attempted to investigate the channel through which finance may impact on poverty. This is found to be through (i) consumption smoothing and (ii) helping to escape the possibility of escaping a poverty trap which in turn is related to liquidity constraint.

Second, we examined the importance of access to credit for consumption smoothing. Our results show that access to credit has a positive and significant effect on 'permanent' consumption implying that credit is an important component of consumption smoothing and hence it is pro-poor as it enhances the welfare of the households. We also tested whether liquidity constraints lead to a poverty trap or not. As evidenced from the non-linearity of our dynamic consumption function, the rural households are faced with a poverty trap due to their inability in smoothing their consumption as a result of liquidity constraint.

An important policy implication of our result is that promoting the financial sector is a desirable pro-poor policy as it eases liquidity constraints. In addition, facilitating credit facilities for the rural poor where the formal sector is less interested to be involved in, can be an important intervention area for a sensible poverty reduction. It is imperative to note that the use of finance to address poverty is found to be as important as other determinants of poverty, finance being among the top five (out of 17) determinants of poverty with strong and statistically significant effect.

References

Addison, T. and Alemayehu Geda (2003) 'Ethiopia's New Financial Sector and its Regulation', in T. Addison (ed.). *From Conflict to Recovery in Africa*. Oxford: Oxford University Press for UNU-WIDER.

Alemayehu Geda (2005) 'The Structure and Performance of Ethiopia's Financial Sector in the Pre and Post Reform Period: With Special Focus on Banking', mimeo, Department of Economics, Addis Ababa University.

Alemayehu Geda, A. Shimeles and J. Weeks (2003) 'Growth, Poverty and Inequality in Ethiopia: Which Way for Pro-poor Growth?', MOFED Research Report, Addis Ababa: MOFED.

Amin, S., A. S. Rai and G. Topa (2003) 'Does Micro Credit Reach the Poor and Vulnerable? Evidence from Northern Bangladesh', *Journal of Development Economics* 70: 59–82.

Banerjee, A. V. and A. F. Newman (1993) 'Occupational Choice and the Process of Development', *Journal of Political Economy* 101(2): 274-98.

Beck, T., A. Demirguc-Kunt and R. Levine (2004) 'Finance, Inequality and Poverty: Cross-Country Evidence', World Bank Policy Research Working Paper 3338, Washington DC: World Bank.

Bigsten, A., B. Kebede, and A. Shimeles (2005) *Poverty, Income Distribution and Labor Market Issues in Ethiopia*, Uppsala: Scandinavian Institute of African Studies.

Bigsten, A., B. Kebede, M. Taddesse and A. Shimeles (2003) 'Growth and Poverty Reduction in Ethiopia: Evidence from Household Panel Surveys', *World Development* 31(1): 87-106.

Birdsall, N. and J. L. Londono (1997) 'Asset Inequality Matters: An Assessment of the World Bank's Approach to Poverty Reduction', *American Economic Review* 87: 32-7.

Browning, M. and T. Crossley (2001) 'The Life-Cycle Model of Consumption and Saving', *The Journal of Economic Perspective*, 15(3): 3-22.

Browning, M. and A. Lusardi (1996) 'Household Saving: Micro Theories and Micro Facts', *Journal of Economic Literature* 34: 1797-1855.

Bruno, M., M. Ravallion and L. Squire (1995) 'Equity and Growth in Developing Countries: Old and New Perspectives on the Policy Issues', in V. Tanzi and K. Y. Chaleds (eds) *Income Distribution and High Quality Growth*, Cambridge MA: MIT Press.

Carroll, C. (2001) 'A Theory of Consumption Function, with and without Liquidity Constraints', *The Journal of Economic Perspectives* 15(3): 23-45.

Carrasco, R. (1998) 'Binary Choice with Binary Endogenous Regressors in Panel Data: Estimating the Effect of Fertility on Female Labour Participation', mimeo, CEMFI.

Coleman, A. (1998) 'Household Savings: A Survey of Recent Microeconomic Theory and Evidence', Treasury Working Paper 98/9, New Zealand.

Deaton, A. (1992) *Understanding Consumption*. Oxford: Clarendon Press.

Deininger, K. and L. Squire (1998) 'New Ways of Looking at Old Issues: Asset Inequality and Growth', *Journal of Development Economics* 57: 259-87.

Evans, W. N. and R. M. Schwab (1995) 'Finishing High School and Starting College: Do Catholic Schools Make a Difference?' *The Quarterly Journal of Economics* (November): 941-74.

Foster, J., J. Greer and E. Thorbeck (1984) 'Notes and Comments: A Class of Decomposable Poverty Measures', *Econometrica* 52(3): 761-6.

Galor, O. and J. Zeira (1993) 'Income Distribution and Macroeconomics', *Review of Economic Studies* 60: 35–52.

Greenwood, J. and B. Jovanovic (1990) 'Financial Development, Growth, and the Distribution of Income', *Journal of Political Economy* 98(5): 1076–1107.

Hall, R. E. (1978) 'Stochastic Implications of the Life-Cycle-Permanent Income Hypotehsis', *Journal of Political Economy* 86(6): 971-87.

Hayashi, F. (1997) *Understanding Savings: Evidence from the United States and Japan*, Cambridge MA: MIT Press.

Jacobi, H. and E. Skoufias (1998) 'Testing Theories of Consumption Behaviour Using Information on Aggregate Shocks: Income Seasonality and Rain Fall in Rural India', *American Journal of Agricultural Economics* 80(1): 215-27.

Jalan, J. and M. Ravallion (2001) 'Behavioural Responses to Risk in Rural China', *Journal of Development Economics* 66: 23-49.

Khandker, S. R. (2003) 'Micro-finance and Poverty: Evidence Using Panel Data from Bangladesh', World Bank Policy Research Working Paper 2945, Washington DC: World Bank.

Levine, R., N. Loayza and T. Beck (2000) 'Financial Intermediation and Growth: Causality and Causes', *Journal of Monetary Economics* 46: 31–77.

Morduch, J. (1990) 'Consumption Smoothing across Space: Tests for Village Level Response to Risk', mimeo, Department of Economics, Harvard University.

Morduch, J. (1995) 'Income Smoothing and Consumption Smoothing', *The Journal of Economic Perspectives* 9(3): 103–114.

Ravallion, M. and S. Chen (1997) 'What Can New Survey Data Tell us about Recent Changes in Distribution and Poverty?', *World Bank Research Observer* 11: 357-82.

Ravallion, M. and S. Chaudri (1997) 'Risk and Insurance in Village India: Comment', *Econometrica* 65(1): 171-184.

Shimeles, A. (2004a) 'Evolution of Poverty in Ethiopia', mimeo, Department of Economics, Gothenburg University.

Shimeles, A. (2004b) 'Consumption Variability, Risk and Poverty in Ethiopia', mimeo, Gothenburg University.

Shimeles, A. (2005) 'The Dynamics of Consumption in Ethiopia', mimeo, Department of Economics, Gothenborg University.

Skoufias, E and A. E. Quisumbing (2003) 'Consumption Insurance and Vulnerability to Poverty: A Synthesis of the Evidence from Bangladesh, Ethiopia, Mali, Mexico and Russia', mimeo, IFPRI.

Srinivasan, T. N. and J. S. Wallack (2004) 'Globalization, Growth, and the Poor', *De Economist* 152(2): 251-72.

Wooldridge, J. M. (2002) *Econometric Analysis of Cross Section and Panel Data*. Cambridge, MA: MIT Press.