Fertility and Poverty in less developed countries: a comparative analysis

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Abstract: Poverty analysis has a central part in Development Economics, whereas studies of fertility behaviour have an equally important standing in the Demography literature. Poverty and fertility are two important aspects of welfare that are closely related. In this paper we use unique longitudinal data sources to study the relationship between poverty and fertility at household level over a two to five year period. In particular we compare the relationship between fertility and poverty in four countries: Ethiopia, Vietnam, Indonesia and Albania. These countries differ greatly in their history, average income, social structure, economic institutions and demographic features. Given such differences, the paper aims to discern the extent of commonalities and differences in the poverty fertility relationship and to what extent these can be explained by the differences in economic and demographic development.

Keywords: Panel data, fertility, poverty, poverty dynamics.

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1 Introduction

The relationship between poverty and fertility is a long contested issue among demographers and economists. The general empirical observation that poorer countries tend to have higher population growth rates and that larger households tend to be poorer, underlies the presumption of a positive causal relation between poverty and fertility at the national and household levels respectively. The macro level argument relies on the neo-classical paradigm that a higher population growth rate depresses capital accumulation and wages. Poverty in turn is considered as a key factor in driving high fertility and therefore high rates of population growth, consequently delaying the demographic transition. The standard *micro* explanation is that households, which rely on primitive farming technologies, have a greater need for cheap labour, and therefore a higher demand for children. Moreover, given lack of state benefits and pensions, it is frequently argued that increasing demand for children is a means of insurance or security in old age.

Developing countries are at different stages both in terms of the fertility transition and economic progress, and the poverty/fertility relationship is likely to vary accordingly. Moreover, the nature of the poverty/fertility relationship is likely to be an institutionally contingent relationship, and any generalisation that neglects those institutional settings is likely to fail. Individual level fertility behaviour adjusts to changes in perceived and actual costs and benefits of children. Economic forces, social organisations and cultural patterns in turn influence prices that determine costs and benefits of children. Not only will the poverty and fertility link be dependent on the social and institutional environment, there will also exist policy instruments that impinge on both processes. These include education, health services and family planning policies.

There is now a substantial literature on the poverty/fertility relationship (see section 2). A drawback of these studies is that they differ with respect to data and methodology, which makes it is difficult to discern clear cut results on poverty and fertility dynamics across countries and time. Moreover, all of the studies rely on either cross sectional or aggregate level data. Cross sectional surveys cannot provide reliable poverty measures at different points in time, and is therefore unable to say much about the extent to which poverty might drive fertility and/or vice versa. Though there is an emerging literature on poverty dynamics in developing countries (see section 2), none of these consider the link between poverty and fertility explicitly. In this paper we follow up on these studies by considering the fertility issue in greater depth. We use longitudinal data from four

countries (Ethiopia, Indonesia, Vietnam and Albania), all of which differs in economic and demographic development, to assess commonalities and differences of the various channels for which poverty and fertility interacts, emphasising how these relate to the country specific characteristics. By applying the same methodologies to each longitudinal survey, we are able to present a more coherent picture on fertility and poverty dynamics compared to previous studies.

The selected countries should obviously be considered as case studies rather than a representative sample of developing countries. Ethiopia is the only country where fertility levels are still very high, and poverty is still extremely severe. For the other three countries, the demographic transition has clearly taken place, though perhaps not completed in all three cases. At the same time they have experienced strong economic growth, followed by a significant reduction in poverty. Of course, the countries differ in many other respects, such as religion, culture and political situation. Given these differences, the aim of our analysis is to establish commonalities and differences in the poverty – fertility relationship. In particular we put focus on the various channels through which poverty and fertility interact in different circumstances.

We find that in a cross sectional perspective there is always a positive association between poverty and number of children. However, our dynamic analysis shows that poor households do not necessarily have a higher rate of fertility, but households with many children (i.e. high fertility) tend to have a higher rate of entering poverty and lower rate of exiting poverty. We also find that for the countries considered, there is a substantial difference in the relative importance of the determinants of poverty dynamics and fertility; the persistence of high levels of fertility and poverty in Ethiopia is driven by lack of economic growth and poor access to family planning; education and health provision are crucial elements in reducing poverty and fertility, as is clear from Vietnam, Indonesia and Albania.

The paper is outlined as follows: section 2 gives an outline of the literature emphasising the poverty/fertility relationship; section 3 gives a brief outline of the theoretical perspective and how it is related to the four countries; section 4 presents the data; section 5 the econometric analysis, whereas section 6 provides a discussion.

2 Previous research

Existing empirical studies concerning the relationship between poverty and fertility based at the micro-level rely on cross sectional data. They show mixed results, indicating that the relationship does not appear to be unidirectional. Some studies suggest a positive relationship, others find it to be negative, and yet others find it to have an inverse J-shaped relationship. Yet other studies find very little evidence of any relationship at all. The literature has tried to reconcile these discrepancies by differentiating countries by their level of economic development and demographic transition. Within the poorest countries, the relationship between poverty and fertility is often negative. Fertility appears higher among "wealthier" households, which is a result of low reproduction capability and general higher rates of infertility among the poor (Lipton 1998; Livi-Bacci and di Santis 1998). Studies from the 60s and the 70s pointed to such patterns in rural areas of Bangladesh, India, Indonesia, Pakistan and Sierra Leone. The most common relationship between poverty and fertility in contemporary less developed countries is however positive. For instance countries with low fertility levels during the eighties and the nineties (TFR less than 3.5 – including Vietnam, Costa Rica, urban Paraguay, and urban South Africa) and with high fertility levels (TFR above 4.5, e.g. Guatemala, Cameroon, Bolivia, Calcutta in India, Belize), as well as medium level fertility (TFR between 3.5 and 4.5, e.g. Mexico, rural India, rural South Africa, Brazil, El Salvador, Ecuador, Paraguay), all show a positive relationship. Shoumaker (2003) using DHS surveys from sub-Saharan countries supports a general positive relationship.

There are however many cases where the positive relationship between poverty and fertility is rather weak. Examples include countries in demographic pre-transitional phases with very high TFR (e.g. Costa Rica, urban Sudan, Iran, Burkina Faso, Pakistan, urban India, rural Philippines) and also during the 90s in countries with relatively low fertility (TFR less than 3.5, such as in Maurice and urban Morocco). In some cases, such as rural areas of India and Cameroon where fertility rates are very high, the relationship takes an inverse "J shape", implying that both low and high-income households have lower rates of fertility, whereas medium level income households have higher fertility. It is argued that very low income households tend to be landless farmers, hence less reliant on children as cheap labour, whereas those with the highest income has lower fertility due to higher investment in child quality. The middle income families are landholding farms which depend on cheap labour, and therefore have a higher demand for child quantity,

which explains the apparent inverse J-shape. (see Schoumaker & Tabutin 1999 for further details).

Of course all of the studies referred to above are based on cross-sectional data, and provide therefore only a static view on the poverty/fertility relationship. Though still rather limited, research on poverty dynamics for developing countries is now emerging. Examples include Jalan and Ravallion (2000) using a panel from rural China focussing on the issue of transient and chronic poverty; Mculloch and Baulch (2000) using a five-year panel of 686 households from rural Pakistan showing that large reductions in poverty can be achieved through policies aiming at smoothing household incomes – simply because a large part of poverty is indeed transitory; Dercon and Krishnan (2000) using three waves of the Ethiopian Rural Household Panel (ERHP) shows that individual consumption levels varies widely by year and season, and indicate that a much larger proportion of households are vulnerable to poverty than what cross sectional poverty statistics may suggest[1]. Other examples of detailed analysis of poverty dynamics include Kedir and McKay (2004), using the Ethiopian Urban Household Panel (EUHP), Bigsten et al (2004) using both the ERHP and the EUHP, and Justino and Litchfield (2001) analysing poverty dynamics in Vietnam.

3 Theoretical considerations and description of the countries

A positive relationship between fertility and poverty is frequently explained in a micro-economic framework: children are considered as the work force of the household to generate household income, and as insurance against old age. The demand for children is therefore higher among the poorest. In rural underdeveloped regions, which largely rely on primitive farming technology and with no or little access to state benefits, this argument makes a great deal of sense. A high number of children and their participation in household production imply that parents are less able to invest in their children's human capital (i.e. education), maintaining the low-income status of the household, and thereby creating or perpetuating a poverty - fertility trap. In the short run, childbearing may reduce a woman's working time or decrease her productivity by taking more resources away from her. As households gain higher income and wealth they tend to have

1 Baulch and Hoddinott (2000) summarises these findings by suggesting that the pool of poor households consist of both chronic poor and transitory poor, where the latter is surprisingly large, and this is the case independent of whether poverty is measured in relative or absolute terms.

fewer children either through quantity-quality trade-off suggested by Becker and Lewis (1973) or by higher opportunity cost of women associated with higher income suggested by Willis (1973). An equally plausible explanation behind high fertility rates concern availability and provision of family planning. In so far family planning is lacking, women will not be able to plan their fertility career and not able to avoid unintended pregnancies (Easterlin and Crimmins 1985).. There is solid evidence for a negative relationship between provision of fertility control and observed fertility rates, though there is equally hard evidence to suggest important differentials by income and human capital, poorer households, often found in rural areas, have in general a much lower contraceptive prevalence rate.

Acquiring children certainly decreases the share of household resources available for each member. In addition, newly born children may decrease the productivity of the mother either by taking more resources (such as food) from her or by taking her away from work, when she is a primary earner in a household. On the other hand, children may bring more resources to a household by working for wage or by a transfer from other relatives. Therefore, the net effect of childbearing on poverty is not clear. As the review in the previous section suggests, the poverty/fertility relationship is hardly homogenous across countries, even if they are at similar levels in demographic and economic development – suggesting that it is hard to establish a universal causal link between fertility and poverty.

It is useful to assess to what extent the simple theoretical predictions fit into the countries that we are presenting in our present study. Table 1 gives summary data on the demographic and economic conditions prevailing in the four countries since 1980[2]. It is immediately clear that they have experienced rather different development paths over the last two decades, and that they are at very different levels in terms economic development. The country that stands out is Ethiopia where poverty is more severe than in the other three countries and more than two-thirds of the population live on less than $2 per day. Despite a series of economic reforms gradually being introduced in the late eighties, leading to a more mixed economy, the Ethiopian economy remains heavily agriculture-centred with around 85% of households being classified as farmers and by any

[2] All figures quoted in this section come from the *World Development Indicators* database (see http://www.worldbank.org/data/wdi2004/)

measure the mode of production is primitive and labour intensive[3]. Provision of family planning services is also poor, especially in rural areas. By 2000 the contraceptive prevalence rate (CPR) in rural Ethiopia was only six percent, whereas it was around 45 percent in urban areas. The political history of Ethiopia has obviously hindered progress in health provision and promoting economic reforms. After the traditional monarchy was replaced in 1974 by the provisional military government, much of the Ethiopian economy was nationalised. The 1980s followed with political unrest and upheavals, and the country was plagued by a series of famines, all with devastating effects.

The fertility rates during this period, as depicted in Figure 1, remained high. The pattern is in stark contrast to the other countries, all of which have experienced the demographic transition, here highlighted by dramatically declining fertility levels. At the same time they have experienced impressive rates of economic growth and development. Table 1 shows other interesting factors that are correlated both with fertility levels and economic development. One issue concerns child labour which has steadily declined in Vietnam and Indonesia and is now close to non-existent in Albania. But it is still high in Ethiopia and remains critically important in a heavily agricultural based economy (Admassie, 2002). Moreover, school enrolment and literacy rates, especially in rural areas, are extremely low in Ethiopia, whereas they have been on the increase in the other countries.

Though it seems clear from these simple statistics that as countries progress in their economic development – fertility rates also tend to decline, one should not make sweeping generalisations of the fertility/poverty relationship. An important issue concerns urban/rural differentials. Periods of strong economic growth is often followed by a decline in the rural population due to migration (Table 1). In Indonesia the rural to urban migration has been dramatic, reflecting important structural changes of the economy that has reduced the dependency on rural economic activities. At the same time the migration has made access to family planning easier. Consequently poverty and fertility has also declined, whereas participation in education has increased. The agricultural sector has seen significant reforms, most importantly in terms of private ownership, which now stands at over 90%, and this might explain the fact that poverty in rural areas is only

[3] One important problem of the Ethiopian agricultural sector concerns land tenure arrangements. Farmed land is owned by the state, and though farmers have claims on the land through lease contracts, a substantial proportion of farmers feel uncertain about future land redistribution schemes. This has been debated by the various political parties for several years. It has been argued that uncertainty of future land tenure contract produces a disincentive for farmers' own investment in enhancing productivity.

marginally higher than in urban areas, and there is little difference between urban and rural fertility levels.

In contrast Ethiopia has experienced only a very modest growth in GDP and rural to urban migration has been less pronounced. There have been few economic reforms in the Ethiopian agricultural sector, and the current system is still characterised by state control, with very limited private ownership. Though there is little difference between poverty in rural and urban areas (it is high everywhere), there is a dramatic difference in fertility levels. The TFR in urban areas is around 3.4, whereas in Addis Ababa, by far the largest urban concentration in Ethiopia, the TFR is as low as 1.9, which is below replacement level. In rural areas, in contrast, the TFR is as high as 6.5 (Kinfu, 2000). A corollary of this of course, is that fertility decline is not necessarily followed by a reduction on poverty. In fact our data indicates that urban poverty increased slightly between 1994 and 1997, whereas it declined somewhat in rural areas of Ethiopia.

Vietnam can be considered at a stage in between Ethiopia and Indonesia. The country was one of the worlds' poorest countries in the beginning of the 1980s, but has since the beginning of the nineties experienced strong economic growth followed by substantially reduced poverty (Glewwe et. al. 2001). Much of this improvement has been attributed to the "Doi Moi" policy[4]. This was initiated in the late 1980s and roughly coincided with the collapse of the Soviet Union, on which Vietnam had been heavily dependent. The main elements of Doi Moi were: replacement of collective farms by allocation of land to individual households; legalisation of many forms of private economic activity; removal of price controls; and legalisation and encouragement of Foreign Development Investment (FDI). Substantial progress has been achieved, reducing poverty rates from around 56 percent in 1992 to 36 percent in 1997, reaching a level around 29 percent in 2004. Despite this substantial reduction, there are still significant differences between urban and rural areas, both in terms of fertility and poverty.

Albania is somewhat different in our analysis, given its rather modest population of 3.4 million in 2001 and close proximity to Europe. However, it shares many similarities in demographic and economic development as Vietnam and Indonesia. The country has experienced rapid political, social and economic changes since 1992, when democracy was re-installed. Between 1993 and 1996 GDP grew by about 9 percent

[4] Ttranslated in English as "renovation".

Table 1: Demographic and economic indicators

		1980	1990	2000	2003
Total Fertility Rate	Albania	3.6	3.0	2.4	2.2*
	Ethiopia	6.6	6.9	5.7	5.7*
	Indonesia	4.3	3.0	2.5	2.3*
	Vietnam	5.0	3.6	2.5	1.9*
Life expectancy at birth (years)	Albania	69.3	72.3	74.0	73.99*
	Ethiopia	42.0	45.0	42.3	42.1*
	Indonesia	54.8	61.7	66.0	66.7*
	Vietnam	60.1	64.8	69.0	69.7*
Population growth (% annual)	Albania	2.0	1.2	0.4	0.6
	Ethiopia	2.7	3.7	2.4	2.1
	Indonesia	2.1	1.8	1.3	1.3
	Vietnam	2.1	2.2	1.3	1.1
Total population (mill.)	Albania	2.7	3.3	3.1	3.2
	Ethiopia	37.7	51.2	64.4	68.6
	Indonesia	148.3	178.2	206.3	214.5
	Vietnam	53.7	66.2	78.5	81.3
Rural population (% of total)	Albania	66.3	63.9	58.1	56.2
	Ethiopia	89.5	87.3	85.1	84.4
	Indonesia	77.9	69.4	58.0	54.5
	Vietnam	80.6	79.7	75.7	74.2
GDP per capita ($US 1995 prices)	Albania	910.0	841.9	1008.0	1190.4
	Ethiopia	..	107.3	115.1	115.0
	Indonesia	503.0	776.7	1014.6	1089.8
	Vietnam	..	211.2	369.5	437.9
Child labour (% of 10-14 age group)	Albania	3.6	1.9	0.3	0.2
	Ethiopia	46.3	43.5	41.1	40.4
	Indonesia	13.5	11.3	7.8	6.8
	Vietnam	21.8	13.0	5.2	2.6

*Data refer to 2002, last year available (Source: *World Development Indicators* database)

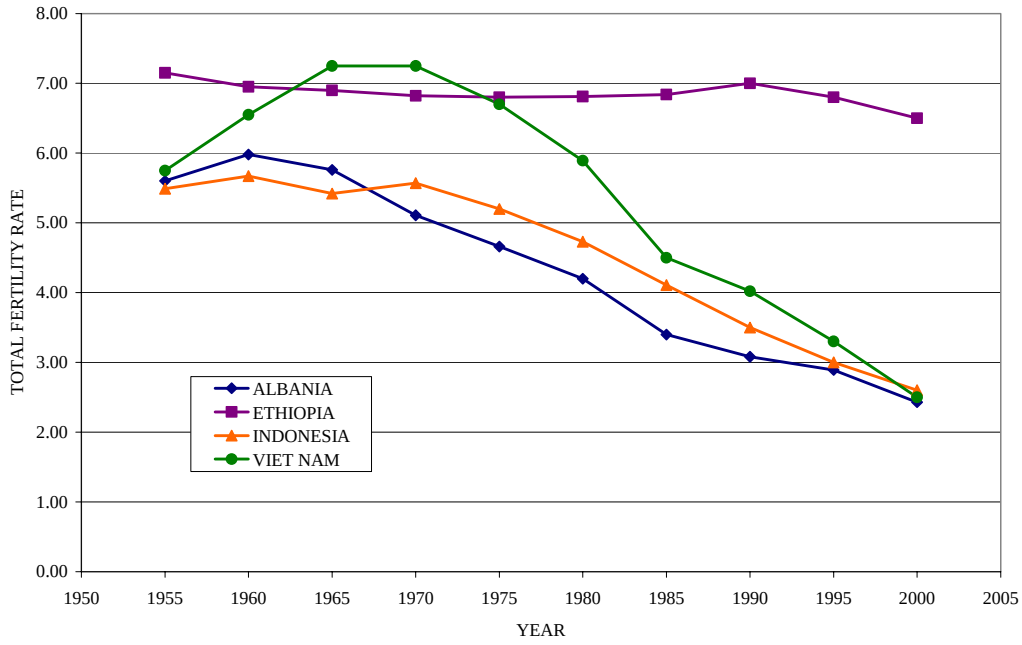

Figure 1: Trends in total fertility rates (Source: UN estimates and projections)

annually, followed by slightly lower growth thereafter, though the growth has been sustained. There has also been important structural adjustment following the collapse of the communist regime, involving banking, land market, and privatization of strategic sectors like telecommunications but also of small and medium enterprises. However, Albania is by far the poorest country in Europe and is ranked only 65th of 177 countries by the human development indicator of 2002 (Human Development Report 2003). Figure 1 indicates the decline in fertility which stood at 2.2 in 2003 (Human Development Report 2003 on data of 2002), whereas the high life expectancy at birth (currently 74 years) is comparable with European countries. An important feature of Albania is the very high level of emigration. Migration is the most common livelihood against poverty and an important escape valve for unemployment. Albania has experienced a high internal migration from rural to urban areas. Since 1990 about one fifth of the total population has left the country and is living abroad mainly in Italy or Greece. As a result remittances are estimated to account for about 13 percent of total income among Albanian households (INSTAT, 2002). Despite the economic benefits of remittances, migration also implied high social costs. According to INSTAT 2002 emigration was particularly evident among males, whose population dropped over 20 percent between 1989 and 2001. In the last decade emigration has deprived the country of the most active labour force[5].

4 Data

Longitudinal surveys for less developed countries are still rare and certainly less extensive than typical panel studies from developed countries. A particular challenge in the study of fertility and poverty from a longitudinal perspective is that the surveys do need adequate information on both. Demographic and Health Surveys (DHS) normally contain extremely good information on fertility histories but little information to assess poverty. For expenditure surveys, the problem is the opposite, in that demographic information is often limited. The surveys selected for our studies contain information on both aspects. In our dynamic analysis we concentrate on two selected waves. Some of the surveys selected here have more than two waves. There is for instance one additional wave for urban Ethiopia surveyed in 2000, and another wave surveyed for Indonesia in

[5] Carletto, G., B. Devis, M. Stampini, Trento S. and Zezza A. (2004) and Uruçi, E. and I.Gedeshi,. (2003) for an analysis on internal mobility, international migration and remittances management in Albania. See

2000. However, Ethiopia was at war with neighbouring Eritrea from 1998 – 2000 and Indonesia was rocked by the East-Asian financial crisis in mid 1997 (after the field work of the second wave). Both events represent important shocks to the economies, and as a result we have refrained from using these waves for our analysis. See Appendix 2 for further details.

4.1.Poverty measurement

Since we are primarily interested in analysing fertility and household welfare for households with subsistence level of income, we compare poor households with non-poor households rather than treat expenditure as a continuous variable. Poverty status is specified as a discrete state, and is derived from the more general FGT family of poverty measures (Foster, Greer and Thorbecke, 1984). Let ν be the number of household members, y be the household's welfare indicator (per capita consumption) and let τ be the poverty line. In population terms, the FGT index is defined as follows:

$$FGT_\alpha = \frac{E(\nu\delta_\alpha(y))}{E(\nu)} \tag{1}$$

where E is the expectations operator and $\delta_\alpha(y)$ is the function:

$$\delta_\alpha(y) = \begin{cases} (1 - y/\tau)^\alpha & \text{if } y < \tau \\ 0 & \text{if } y \geq \tau \end{cases} \tag{2}$$

and $\alpha \geq 0$ is the coefficient of poverty aversion. $\alpha = 0$ gives the poverty headcount (the proportion of individuals living in households below the poverty line) and $\alpha = 1$ gives one form of the poverty gap. It is the cost of making good the consumption shortfall of all poor households, expressed as a proportion of aggregate "subsistence" income, τ E(ν). The choice $\alpha = 2$ is a common choice for a measure more strongly targeted on those in deep poverty. For simplicity we focus here on the head count ratio.

The distribution of consumption expenditure within the household is unlikely to be uniform across household members, and it is probable that children consume less than adults. The standard solution is to impose an assumption on intra-household resources allocation, and adjustment is done by applying an equivalence scale that is consistent with

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World Bank report No. 36313-AL (2003) and Betti, G. (2003) for a detailed discussion on Albania poverty assessment.

the assumption made – producing a measure of *expenditure per adult equivalent*. Unfortunately, there is limited consensus on the appropriate choice of equivalence scales, and this is perhaps not surprising, since household allocation patterns may vary between countries, regions and cultures. As a result of this official poverty statistics are frequently based on per capita household income or expenditure, which in effect means that in terms of household allocation, each household member is given *equal* weight. An implication of this approach is that households with a large number of *dependent* children are more likely to be recorded as being poor. In the present paper we maintain consistency with official poverty statistics, and define poverty over per capita consumption expenditure[6]. Clearly this assumption needs to be taken into account in interpreting the estimates.

We specify the poverty line τ using a 'cost of basic needs' approach following Ravallion and Bidani (1994). In brief this involves estimating the cost of a certain expenditure level which corresponds to a minimum calorie requirement. A food poverty threshold is defined as the expenditure needed to purchase a basket of goods that will give the required minimum calorie intake. Following FAO recommendations this threshold is set 2288 calories for Albania, and 2100 calories for the other three countries[7]. The general poverty line combines the food poverty threshold with an average non-food consumption expenditure of those households whose food consumption level represents the food poverty threshold. A quantitative comparison on the magnitude of poverty across four countries is difficult due to the difference in the details regarding the adjustment for food basket, reference group, and regional prices.[8] Nevertheless, we use a poverty measure consistent within each country so that we can compare the poverty dynamics in the four countries at a qualitative level.

[6] Equivalent scales can be estimated by using Engel coefficient as in Lanjouw and Ravallion (1995). Although estimating the effect of household size on Engel coefficient requires a range of assumptions on the consumption behaviour of household, the theoretical foundation is certainly an advantage. Another avenue for future research is to examine how sensitive the correlation between fertility and poverty is to the choice of equivalent scale. The weight on a child's consumption relative to that on an adult and the scale of economy are two dimensions to be considered.

[7] This is an average amount, and obviously the minimum amount depends on age, gender, and physical work of the individual. In other words, correct poverty thresholds should strictly speaking take this issue into account. However, in official poverty estimates this issue is often ignored, and the poverty threshold is instead based on an average calorie intake.

[8] The poverty lines in ALSMS and VLSMS are constructed by the World Bank. The poverty line for Ethiopia is based on the World Bank Approach and controls for regional prices, including controls for urban and rural areas. The poverty line in IFLS is constructed so that the provincial poverty rates in IFLS2(1997) replicate those in Strauss *et al* (2004). Strauss *et al* (2004) construct provincial poverty lines adjusted for regional prices and change in food basket of the reference group.

4.2. Comparability issues

We take the household as the unit of analysis. Consequently fertility decisions are implicitly assumed to be made at the household level, and as a result we concentrate on the characteristics of the household and the household head in explaining poverty and fertility patterns. The approach has a direct impact on the way the dependent variable is defined in the econometric framework detailed in section 5 below. For the static analysis this is taken to be the number of children living in the household. Thus it does not capture the number of children that might have died or left the household. For the dynamic analysis, the dependent variable is defined as the number of births occurring between the two waves, controlling for household composition in the first wave.

Another issue concerns the time span between waves, which differs for the four countries: in Vietnam the interval is five years apart, for Indonesia fours years, for Ethiopia three years, and for Albania only two years. The implication is that the number of recorded births and poverty transitions (i.e. number of births and poverty transitions) will differ between countries. This affects the accuracy of the estimates, especially for Albania where the interval between waves is only two years[9], and this needs to be taken into account when making the cross national comparison.

Some variables cannot be easily compared. This includes regions, religion and ethnicity. Another difficulty concerns the activity status of the household head. In the Ethiopian samples we have information about the activity status (i.e. farmer, civil servant skilled worker and so on). In Vietnam and Albania, which follows the LSMS format we have instead the occupational status. Despite our attempts in harmonizing the categories in the four surveys, caution is needed when making interpretations of these variables. In contrast, variables measuring the household's human capital and potential income and expenditure are similar.

5 Empirical analysis

Given the interaction between fertility and poverty, we first examine the effect of poverty on fertility and second the effect of fertility on poverty. We do so by analysing

[9] A fourth wave is planned for Albania, and is expected to be implemented in 2006.

both static and dynamic perspectives. Our econometric strategy consists of first estimating a poisson model of children and a probit regression of poverty, respectively, in the *initial* wave. These regressions provide a snapshot or a cross sectional view of the pattern of poverty and fertility for the four countries. We then implement dynamic models by estimating a poisson regression of the number of newborn children[10] recorded between waves. In contrast to the cross sectional regression this informs us about how the *rate* of childbearing differs by background characteristics. Finally we estimate the *rates* of poverty entry and exit. In order to avoid endogeneity issues, we control for background variables that are recorded in the initial wave only.

Of interest for us is to capture the impact of those variables which reflects the resources, or lack thereof, available to the household. We include detailed control for educational attainment for which high levels normally reflects higher household income. Educational attainment is captured by the years of schooling of the household head. In addition we include control for the educational level of remaining household members. These are implemented by simply counting the number of individuals who had more than compulsory education, the number having just compulsory education, and the number of individuals having less than the compulsory level. We also make control for the profession of the household head, which is also likely to reflect household income. Farm household is one of the activity status categories, and in so far the mode of farming is at a primitive level, we would expect unambiguously higher demand for children among farm households[11].

5.1. Fertility: the static perspective

The cross sectional pattern of childbearing presented in Table 3 show no major surprises. In all four countries poor households tend to have more children. The correlation is strongest for Vietnam in terms of both magnitude and significance. However, the magnitudes of the poverty status coefficients in the four countries do not necessarily resemble the differences in average per capita income or total fertility rate as depicted by the aggregate figures provided by Table 1, suggesting that cross-country

[10] Newborn children refer to new children of the Household Head.

[11] There is a literature considering the relationship between fertility and mode of farming. The argument is that if the farm is owned by the household head, and farming technology is primitive, generates an incentive for having more children since they provide cheap labour. However, in a system where the agricultural sector is owned by the state, and where farmers are merely employees, the demand for children will be reduced (See Bigsten et al 2004)

variation of income and fertility do not explain the differences in the correlation between poverty incidents and number of children *within* each country.

Education and human capital accumulation is also important, though the estimates are somewhat mixed. The strongest impact of education is for Vietnam, where high education of the household head is associated with higher fertility. Of course, the reference group includes here individuals with no education, and in Vietnam with an extensive educational system, this is possibly a quite selected group. Indonesia shows more of non-linear effect of education, whereas in Albania and Ethiopia the educational level of the household head does not have a strong impact on the cross sectional pattern of childbearing. Accumulated human capital of remaining household members shows a negative trend. The higher education of the spouse or children, the lower is the overall fertility. The Ethiopian pattern is in contrast to Vietnam and Albania, where investment in children's education seems to be negatively associated with the number of children.

Activity and occupational status of the household head are also important. Here the reference group constitute the most vulnerable of households, which includes those out of the labour force, single mothers, disabled and casual workers. In Ethiopia households heads classified as managers, self-employed (running their own business), civil servants, and farmers, all have higher number of children. There are of course important rural/urban differences here, since farmers are prevalent in the rural areas, and all the other activity statuses are associated with households living in urban areas. For Vietnam and Albania only farm household have significantly higher fertility, whereas in Indonesia we find little effect of activity status.

5.2. Childbearing: the dynamic perspective

Next we estimate the Poisson regression of number of newly born children between two waves using household observable characteristics in the first wave as regressors[12]. In contrast to the static perspective, this regression reflects differences in the childbearing intensity. The results, presented in Table 4, tell us a different story from that in the static framework. At a conventional level of significance, poor households in the

[12] A potential problem concerns the identity of household head, which may change across waves, which will in turn have a direct impact on the recording of childbearing events. Fortunately this problem only applies to few households; these households are excluded from the analysis.

Table 3: Poisson regression of number of children in first wave (t-statistics in parenthesis)

	Albania	Ethiopia	Indonesia	Vietnam
Poverty status	0.155	0.246	0.247	0.331
	(2.65)	(7.72)	(7.63)	(11.33)
Age of HH head	0.348	0.206	0.26	0.307
	(12.24)	(18.34)	(24.91)	(29.20)
Age of HH head squared	-0.005	-0.002	-0.003	-0.004
	(-13.94)	(19.09)	(-26.87)	(31.32)
# adults	-0.134	-0.024	-0.086	-0.008
	(-2.88)	(1.83)	(-4.43)	(0.47)
HHH low education	-0.042	0.043	0.096	0.126
	(-0.2)	(1.02)	(2.54)	(2.10)
HHH medium education	0.253	0.015	0.074	0.204
	(1.15)	(0.29)	(1.42)	(3.47)
HHH high education	0.228	-0.067	0.034	0.105
	(0.94)	(1.01)	(0.61)	(1.47)
#post compulsory ed.	-0.252	-0.023	-0.025	-0.078
	(-4.39)	(1.40)	(-1.19)	(4.74)
#compulsory ed.	0.005	0.018	-0.021	-0.025
	(0.1)	(0.56)	(-0.88)	(1.05)
HH head married	1.182	0.727	1.111	1.048
	(6.32)	(15.16)	(15.76)	(17.90)
# generations	0.297	0.209	0.327	0.086
	(4.0)	(6.23)	(10.65)	(2.57)
Activity status 1	0.198	0.099	-0.263	-0.020
	(1.27)	(1.88)	(-1.99)	(0.29)
Activity status 2	0.134	0.474	0.073	-0.098
	(0.81)	(2.77)	(1.49)	(0.95)
Activity status 3	0.16	0.251	0.091	-0.241
	(0.92)	(3.92)	(1.73)	(1.33)
Activity status 4	0.256	-0.071	0.037	0.006
	(0.89)	(1.13)	(0.82)	(0.11)
Activity status 5	0.066	0.246	-0.033	-0.153
	(0.6)	(2.71)	(-1.05)	(1.64)
Activity status 6	0.177	0.088		0.104
	(2.25)	(0.75)		(1.87)
Farm household	0.138	0.146	-0.279	0.151
	(1.9)	(2.58)	(-1.41)	(4.44)
Constant	-7.461	-4.778	-5.716	-6.570
	(-10.72)	(17.33)	(-24.23)	(26.39)
Observations	1503	2251	4497	4020

Regression includes control for ethnicity, religion and region.

first wave do not have more newborn children between two waves than non-poor households in each of four countries. The result suggests that poor and non-poor households tend to have similar spacing between birth events. The fact that wealthier households have fewer children in general, which is clear from the static analysis, means that childbearing careers for these women are on average shorter. Hotz et al (1997) argue that in the absence of credit markets, households with a steeper income profile have an incentive to space birth more widely. According to this argument, our estimates suggest that the slopes of the income profiles for non-poor and poor households are similar[13]. But a more plausible explanation concerns the issue of cost of fertility control. For instance, non-poor households are more likely to have access to modern contraceptives than poor households. But women in poor households may breastfeed for longer durations. Overall, this may explain the similarity of birth hazards between poor and non-poor households. Although this hypothesis needs more scrutiny in looking at the level of family planning program and pattern of breastfeeding in four countries, the results in Table 4 together with those in static framework suggest that poor households give births over a longer period of time, favouring the hypothesis that poor households tend to have more children due to imperfect birth control in the four countries under our study.

Though poverty status itself has little impact on the birth hazard, other variables which certainly reflect the resource level of the household do. We consider first the work ratios for men and women in Ethiopia. A high work ratio among men reflects an income effect, and should be positively associated with childbearing. For women, a high work ratio also reflects a higher opportunity cost of having children, and the negative impact (though not significant) found for Ethiopia is consistent with this view. The fact that the male work ratio does not have any impact on childbearing is somewhat unexpected.

Households where the head has very high educational level are less likely to have children. Likewise, a high number of household members with post compulsory education tend to have fewer children, and these estimates are all consistent with the theoretical perspective. Thus, households with high human levels of human capital have a lower birth hazard, and which reflects wider birth spacing. Of course, the proportion of highly educated individuals is in general low in Ethiopia, and as such education cannot be

[13] However, the different signs of the coefficients on poverty in Table 4 also suggest more investigation into income profile, composition of income, and access to credit market among poor and non-poor households in four countries.

considered an important factor in limiting fertility levels[14]. Nevertheless, these findings do suggest that improving education and employment opportunities for women is a route to control fertility. The activity status of the household head is also important, and here we find that higher professional status is associated with higher fertility. We also find that farm households are one of the groups with the highest propensity of having children. Again the reference group is here those who are considered disadvantaged, such as those without work or disabled.

To what extent are these estimates different in the other countries? For Indonesia we find that the impact of the stock of children present in the household in the first wave shows a similar pattern to that of Ethiopia. The work ratio of household members shows however, a different pattern. In Indonesia, a high male work ratio is positively associated with childbearing, which reflects an income effect, insignificant female work ratio, but a strong negative impact of the child work ratio. This latter effect, which is not actually significant for Ethiopia, is more complicated to explain. There are two important effects at work here. First, if the level of investment on human capital of existing children reflects the investment in *all* children, working children imply a lower investment on children, and thereby a lower cost of having another child[15]. On the other hand, households in which a large number of the children work, reflects a higher cost of having further children in that older children may be less available for the caring of younger children.

We find that farm households do *not* have a higher rate of childbearing compared to the other household types, which is contrast to Ethiopia where farm households has one of the highest propensities of childbearing. Another difference concerns the activity statuses, which in Indonesia are negatively associated with childbearing. As for education variables we find similarities with Ethiopia in that only those households with very high levels are less likely to have children. In contrast, there is little impact of the human capital accumulation of remaining household members.

Moving onto Albania and Vietnam we find poverty status to have more of a positive impact on fertility, though only for Albania is the estimate found to be strong and significant (at the 10 percent level). But for Albania the regression is in general poorly defined, which is partly due to the interval between the waves (here only two years), and the sample size is 1503 households, which limits the number of recorded birth events. The

[14] Only about 20 percent of the population in Ethiopia are considered literate.

Table 4: Poisson regression of number of newborn children between waves (t-statistics in parenthesis)

	Albania	Ethiopia	Indonesia	Vietnam
Poverty status in wave 1	0.581	-0.013	-0.122	0.117
	(1.8)	(0.14)	(-1.62)	(1.50)
Age of HH head	-0.148	-0.043	-0.027	-0.055
	(-7.18)	(8.59)	(-9.73)	(14.34)
#children 0 - 4	-0.035	0.329	0.116	0.071
	(-0.16)	(5.98)	(2.67)	(1.50)
#children 5 - 9	0.036	0.079	-0.019	-0.191
	(0.17)	(1.63)	(-0.47)	(4.52)
#children 10 - 14	-0.637	-0.042	-0.192	-0.219
	(-2.01)	(0.69)	(-4.86)	(3.91)
Other children	-0.044	0.025	0.047	0.113
	(-0.06)	(0.37)	(1.00)	(1.77)
# adults	-0.003	0.034	0.052	-0.053
	(-0.01)	(0.84)	(1.32)	(1.12)
Male work ratio	0.909	0.008	0.377	0.776
	(2.02)	(0.04)	(3.77)	(5.14)
Female work ratio	0.006	-0.309	-0.018	0.007
	(0.02)	(1.55)	(-0.27)	(0.06)
Child work ratio	-1.646	-0.103	-0.699	-0.908
	(-0.89)	(0.55)	(-1.91)	(4.48)
HHH low education	0.431	-0.138	-0.007	-0.080
	(0.4)	(1.17)	(-0.09)	(0.62)
HHH medium education	0.398	0.138	-0.107	-0.296
	(0.35)	(0.91)	(-0.99)	(2.25)
HHH high education	1.26	0.417	-0.184	-0.280
	(1.0)	(1.95)	(-1.62)	(1.67)
#post compulsory ed.	-0.202	-0.289	0.051	-0.146
	(-0.55)	(4.02)	(1.22)	(3.02)
#compulsory ed.	0.013	0.010	0.034	-0.007
	(0.04)	(0.10)	(0.70)	(0.10)
HHH married	1.077	0.509	-0.007	0.074
	(1.02)	(3.03)	(-0.07)	(0.58)
# generations	-0.256	0.081	0.168	-0.082
	(-0.67)	(0.78)	(2.65)	(0.94)
Activity status 1	-0.142	-0.089	0.008	0.343
	(-0.16)	(0.54)	(0.04)	(2.11)
Activity status 2	-0.171	1.034	-0.392	0.121
	(-0.21)	(1.66)	(-3.31)	(0.39)
Activity status 3	-0.598	0.247	-0.271	-0.216
	(-0.53)	(0.85)	(-2.15)	(0.43)
Activity status 4	-13.138	0.093	-0.35	-0.160
	(-0.01)	(0.35)	(-3.06)	(0.91)
Activity status 5	0.009	0.609	0.021	0.040
	(0.02)	(1.71)	(0.30)	(0.16)
Activity status 6	0.063	0.711		0.020
	(0.15)	(2.39)		(0.13)
Farm household	-0.428	0.698	-0.304	0.171
	(-0.94)	(3.78)	(-1.02)	(1.88)
Constant	-11.365	-1.134	-0.22	0.815
	(-0.02)	(2.22)	(-0.97)	(2.14)
Observations	1503	2251	4497	4020

Regression includes control for ethnicity, religion and region.

[15] Working children may have a direct income effect, but it seems here negligible.

only other variables which have a significant impact are the age of the household head, the number of children aged between 10 and 14, which has a negative impact, and the strong positive effect associated with the work ratio of men. Vietnam resembles Indonesia in many respects. This includes the stock and age of the children present in the household, the education variables, and also the work ratio variables. Overall these variables have more explanatory power in the Vietnam sample. As for education we find that for households in Vietnam, a high number of For instance we find that farm households in Vietnam have a higher rate of childbearing, though one should bear in mind that the classification of the activity statuses are somewhat different form Indonesia.

5.3. Poverty: the static perspective

We now focus on the effect of childbearing on poverty. The results of the probit estimates of poverty status in the initial wave are given in Table 5. We start by considering the effect of children, and their age distribution, on the likelihood of falling under the poverty threshold. In the cross-sectional view, there are clearly positive correlations between number of children and poverty incidents in all four countries. In addition, the results suggest that age distribution of children matters. In Albania, Indonesia, and Vietnam, the number of young children (age 0-4) is associated with higher poverty incidents, and the correlation becomes smaller monotonically for a number of older children (age 5-9, age10-14). In Ethiopia, however, the correlation is not monotonic although it is significant for all age groups of children. The higher the ratio of working adults to the total number of adults, the lower is the probability of being poor. Vietnam represents here an exception in that these ratios have a positive sign (though not significant). This is explained by the very high rates of work participation in Vietnam, which is close to 90 percent for both men and women. Thus, there are very few households that have low work ratios, which are here reflected by the insignificance of the estimates. In contrast, unemployment in Albania and urban Ethiopia is rife, and as a result the covariates reflecting the work ratios distinguish the poor from the non-poor to a much greater extent.

For Ethiopia the child work ratio is negatively associated with poverty (though not significant at the 5% level). Given that 40 percent of children in Ethiopia are recorded as

Table 5: Probit estimates of poverty status in first wave (t-statistics in parenthesis)

	Albania	Ethiopia	Indonesia	Vietnam
Age of HH head	-0.02	0.001	0.005	-0.005
	(-4.54)	(0.34)	(2.53)	(2.31)
#children 0 - 4	0.336	0.154	0.323	0.523
	(3.93)	(3.53)	(8.05)	(12.16)
#children 5 - 9	0.288	0.096	0.122	0.344
	(4.20)	(2.76)	(3.34)	(10.53)
#children 10 - 14	0.109	0.189	0.053	0.133
	(1.85)	(5.38)	(1.65)	(4.09)
#children 15 plus	-0.021	0.097	0.061	0.046
	(-0.39)	(3.19)	(1.52)	(1.20)
Other children	0.163	0.103	0.092	0.251
	(2.49)	(2.76)	(2.32)	(6.35)
# adults	0.16	-0.016	0.175	0.136
	(2.52)	(0.55)	(4.60)	(3.47)
Male work ratio	-0.238	-0.190	-0.095	0.065
	(-2.14)	(2.16)	(-1.21)	(0.92)
Female work ratio	-0.369	-0.120	-0.06	0.116
	(-3.69)	(1.23)	(-1.07)	(1.47)
Child work ratio	0.221	-0.157	0.416	0.141
	(1.01)	(1.42)	(2.06)	(1.54)
HHH low education	-0.244	-0.130	-0.125	-0.331
	(-1.62)	(1.70)	(-2.09)	(3.98)
HHH medium education	-0.424	-0.073	-0.177	-0.383
	(-2.30)	(0.75)	(-1.99)	(4.42)
HHH high education	-0.539	-0.512	-0.338	-0.835
	(-2.32)	(4.50)	(-3.24)	(7.37)
#post compulsory ed.	0.085	-0.118	-0.237	-0.224
	(1.39)	(4.06)	(-6.39)	(8.00)
#compulsory ed.	0.089	0.024	-0.081	-0.105
	(1.68)	(0.40)	(-1.95)	(2.51)
HH head married	-0.085	-0.001	-0.215	-0.197
	(-0.66)	(0.01)	(-2.67)	(2.70)
# generations	-0.194	0.156	0.019	-0.068
	(-2.12)	(2.57)	(0.35)	(1.20)
Activity status 1	-0.576	0.168	-0.223	-0.330
	(-1.90)	(1.68)	(-1.55)	(2.48)
Activity status 2	-0.154	-1.699	-0.251	-0.391
	(-0.64)	(3.94)	(-2.67)	(1.94)
Activity status 3	-0.55	-0.545	-0.352	-0.071
	(-1.60)	(4.61)	(-3.41)	(0.24)
Activity status 4		-0.398	-0.055	-0.341
		(3.53)	(-0.59)	(3.26)
Activity status 5	-0.187	-0.246	0.25	-0.460
	(-1.10)	(1.35)	(4.28)	(3.00)
Activity status 6	-0.699	-0.200		-0.198
	(-5.03)	(1.02)		(1.85)
Farm household	0.418	-0.154	0.01	0.547
	(3.62)	(1.57)	(0.04)	(9.78)
Constant	0.434	-0.773	-1.26	0.651
	(0.93)	(3.15)	(-6.07)	(2.46)
Observations	1676	2459	4797	4302

Regression includes control for ethnicity, religion and region

working (see Table 1), this indicates that child labour is indeed an important economic resource for the households and is likely to be important in preventing poverty. Of course, it is not necessarily the case that child labour should have a negative sign with respect to poverty. It can be the case that households are forced to make their children work if they face extreme poverty. If this is the case, then the child work ratio may in fact be positively associated with poverty. This seems to be the case for Indonesia, where the coefficient is positive and significant. We also know that during the nineties, child labour has been on the decline in Indonesia, and is considerably lower than in Ethiopia. This suggests that children tend to work because they are poor in Indonesia (less than 3% of children are working).

Another very important predictor for poverty is accumulated human capital. The overall picture is that high education is associated with a lower probability of being poor, and in most cases there is monotonic gradient: the higher the level, the lower the poverty. The only discrepancy to this pattern is in Ethiopia, where we find those with medium level education not to have a lower poverty rate than those without any education. However, those with high education have a significant lower rate of poverty. As for human capital accumulation of remaining household members, we also find a negative association. In particular, high proportions of individuals with post-compulsory education are strongly associated with lower poverty. The variables do not distinguish poor from non-poor in Albania. The reason is that the level of individuals completing compulsory education is very high. Moreover, a considerable amount of these individuals tend to go beyond the 8 years of compulsory education.

Finally we move on to the role of activity and occupational status. Households where the head is either classified as a manager, self employed, skilled manual workers, or other types of professionals, tend to have a lower chance of poverty. For farm households the picture is somewhat more complex. For Vietnam and Albania we find that farmers are significantly poorer than the other categories. The effect is particularly pronounced in Vietnam. In Indonesia, in contrast we find no differential effects for farm households. A possible explanation for this is that the great majority of farm households in Indonesia hold a higher share of ownership (average household share of ownership is 92%.), and over the last two decades farming in Indonesia has seen steady reforms that has increased productivity and efficiency. Though the raw data indicates that poverty is slightly higher among farmers (20%) than non-farmers (17%), other regressions (not shown here) also indicate that poor farmers tend to be less educated and are

geographically concentrated. Thus, net of education and regional dummies, we cannot find that farmers are poorer than non-farmers.

More interesting is perhaps the negative (though not significant) effect for farm households in Ethiopia. This might at first seem surprising and non-intuitive, but it is important to bear in mind that the reference group includes casual workers, female headed household, and those out of the labour force, or disabled. A large part of those households in the reference group are located in urban areas, where we know poverty is almost as high as in rural areas. Comparing farm households with those of the other activity statuses, we do find that they tend to be poorer. Especially those classified as managers or running a self employed business (activity status 1 and 2 respectively) tends to have much lower rates of poverty.

5.4 Poverty: the dynamic perspective

Table 6 presents the results from our poverty dynamics regression. These are essentially the hazard rates of either entering or exiting poverty, and are implemented by estimating simple probit models of the two rates. The entry model has dependent variable equal to 1 if the household makes a transition into poverty, and is estimated from the sub-sample of households who are initially not in poverty in the first wave. The dependent variable in the exit model is equal to 1 if the household moves out of poverty, and is estimated from the sample of households who are initially classified as poor. A critical variable in these models is the household's proportionate distance from the poverty line at the initial wave, defined as $|y_0 - \tau|/\tau$. Including this variable adjust for the fact that households located close to the poverty line in the base year are more likely to make a poverty transition.

We start by considering the role of children in entering and exiting poverty. Consistent across countries, bar Albania where the estimates are less significant, is that households who have young children in the first wave, are indeed more likely to enter poverty and less likely to exit. This is of course as one might expect, given that young children are to a much greater extent classified as dependants, than what is the case for older children. The estimates become more mixed when we consider the older children, and curiously for Ethiopia – children in the age group 4 – 9 do not have much impact on changes in poverty, whereas households with more grown up children (10 to 14) are more

likely to experience poverty than the middle group. Interestingly a similar pattern seems evident for Albania, where households with many older children have significantly lower exit rates. A possible explanation behind this is that many of these older children are in the school leaving age and therefore entering the labour market. Unemployment is high both in Albania and Ethiopia (especially in urban areas) and youth wages are in any case very low. Unemployment is lower both in Vietnam and Indonesia. Overall the results suggest that women's productivity, working time and childcare arrangement associated with young children may play an important role in explaining the relationship between fertility and poverty in Indonesia and Vietnam. On the other hand, the lack of child labour market or a low wage for child labour (opportunity cost of schooling) seems to be related to the causal links between poverty and fertility in Albania and Ethiopia.

We consider next the work ratios of men, women and children, all of which representing measures of the extent household members contribute to the overall level of resources in the household. As the estimates for Vietnam suggests - a high male work ratio does not always reflect lower poverty. We would of course expect the opposite effects in so far an increase in the ratio of working men implies an increase in the disposable household income. A simple tabulation of poverty rates for households with different numbers of working men (not shown here) reveals indeed that households with one or more *non-working* male household members have lower poverty. These households are characterised by a higher age of the household head, and a higher educational attainment. It seems though that in Vietnam, male household members might retire from work if they consider that the household can afford such an arrangement.

We also find interesting results for the child work ratios. In Ethiopia child labour significantly reduces poverty entry as well as increasing the exit rate. Given that the rate of child labour in Ethiopia is around 40 percent, it is clear that this is an important contribution to the household resources, and thereby reducing the likelihood of poverty. There are similar effects for Vietnam, though the magnitude of the estimates is more modest. In Indonesia, the estimates are not significant, whereas for Albania child labour is associated with a lower exit rate. Of course, child labour in Albania is generally very low, but the estimate suggests that some household may encourage child labour as a result of economic hardship, which is reflected by the lower exit rates. Overall it seems clear that child labour is an important source of income for Ethiopia and Vietnam, but not for Albania and Indonesia given that Albania and Indonesia have a higher income per person on average (see Table 1). This, in turn, suggests a possibility of poverty trap in Ethiopia

and Vietnam where poor household tend to have more children, and lack of investment on human capital lead to poverty (Moav 2005).

Education and human capital accumulation of household members are important predictors for poverty dynamics. In general high educational level of the household head is associated with lower transition into poverty, but if entering poverty, they have a higher exit rate. The same relationship is evident when considering the number of household members with post compulsory and compulsory education: the higher the number the lower is the transition rate into poverty and the higher is the exit rate. The education variables are particularly important for Indonesia and Vietnam, whereas they appear less important for Ethiopia.

Finally we consider the role of activity status and farming. As can be seen from Table 6 many of the estimates relating to the activity statuses are missing. This is especially the case for Albania where we have a relatively small number of observations. Moreover, the missing observations are most prevalent for those variables measuring a high professional status, and in practice none of these household heads are defined as being in poverty in the first wave. As a result we are unable to estimate the transition rates. However, looking across the estimates for the various waves we find rather mixed results, and it is difficult to discern a common pattern.

Moving onto farm households, we see rather differing results across countries. Interestingly we find that farm households Ethiopia are more likely to exit poverty compared to many of the other categories. This is explained by the fact that poverty in rural Ethiopia fell between 1994 and 1997[16], whereas in urban areas the poverty rates increased slightly. Though poverty fell sharply in Vietnam from 1993 to 1997, it did so in a disproportionate fashion by benefiting urban areas more than rural areas.

This is reflected in the poverty transition regression, where we see that farm household have a higher entry and lower exit rate. In Indonesia, in contrast, there is no significant difference in poverty transitions for farm households compared to other groups.

[16] This decline in poverty among farmers during the period has been attributed to particularly good harvests (see Bigsten et al and Dercon et al)

Table 6: Poverty dynamics - entry into and exit from poverty - probit estimation (t-statistics in parenthesis)

	Albania		Ethiopia		Indonesia		Vietnam	
	Enter	Exit	Enter	Exit	Enter	Exit	Enter	Exit
Age of HH head	-0.014	-0.016	0.002	-0.002	0.005	-0.008	-0.012	0.001
	(-2.41)	(-1.59)	(0.47)	(0.63)	(2.02)	(-1.74)	(2.90)	(0.39)
#children 0 - 4	0.045	-0.193	0.124	-0.093	0.194	-0.173	0.178	-0.259
	(0.34)	(-1.24)	(1.81)	(1.50)	(3.73)	(-2.22)	(1.95)	(5.35)
#children 5 - 9	0.018	-0.194	0.013	-0.031	0.062	-0.193	-0.189	-0.040
	(0.17)	(-1.6)	(0.24)	(0.62)	(1.32)	(-2.71)	(2.41)	(1.06)
#children 10 - 14	0.105	-0.24	0.151	-0.095	-0.05	0.037	-0.126	0.025
	(1.27)	(-2.06)	(2.83)	(1.90)	(-1.20)	(0.59)	(1.83)	(0.60)
Other children	-0.02	0.035	0.112	-0.042	0.057	-0.002	0.010	-0.057
	(-0.2)	(0.27)	(1.96)	(0.83)	(1.11)	(-0.03)	(0.13)	(1.23)
#men	0.13	0.012	0.006	-0.053	0.100	-0.057	0.098	-0.083
	(1.39)	(0.1)	(0.14)	(1.21)	(1.99)	(-0.78)	(1.48)	(1.83)
#women	-0.011	-0.197	-0.094	-0.056	0.063	-0.122	0.139	-0.031
	(-0.11)	(-1.67)	(1.97)	(1.33)	(1.13)	(-1.59)	(2.13)	(0.69)
Male work ratio	-0.068	-0.643	-0.111	0.074	-0.245	-0.024	0.315	0.172
	(-0.44)	(-2.7)	(0.83)	(0.59)	(-2.48)	(-0.15)	(2.20)	(1.65)
Female work ratio	0.105	-0.189	0.008	-0.211	-0.052	0.107	-0.086	-0.078
	(0.8)	(-0.84)	(0.06)	(1.46)	(-0.71)	(0.93)	(0.58)	(0.72)
Child work ratio	-0.259	-0.903	-0.310	0.486	0.038	-0.334	-0.266	0.231
	(-0.76)	(-2.27)	(1.84)	(3.15)	(0.13)	(-0.92)	(1.41)	(1.98)
HHH low education	-0.137	0.144	-0.096	-0.172	-0.100	-0.014	-0.199	0.232
	(-0.69)	(0.47)	(0.86)	(1.60)	(-1.31)	(-0.12)	(1.28)	(2.20)
HHH medium edu.	-0.011	0.147	0.176	-0.136	-0.195	0.381	-0.340	0.334
	(-0.04)	(0.38)	(1.19)	(0.98)	(-1.72)	(2.11)	(2.07)	(3.05)
HHH high education	-0.29	1.152	-0.456	-0.046	-0.268	0.52	-0.963	0.415
	(-0.83)	(1.5)	(2.83)	(0.26)	(-2.07)	(2.08)	(3.95)	(2.68)
#post compulsory ed.	-0.217	0.086	-0.007	0.025	-0.152	0.083	-0.179	0.235
	(-2.21)	(0.69)	(0.15)	(0.59)	(-3.19)	(1.11)	(3.36)	(6.50)
#compulsory ed.	0.064	-0.003	-0.101	0.052	-0.028	0.04	-0.071	0.171
	(0.87)	(-0.03)	(1.04)	(0.62)	(-0.53)	(0.50)	(0.94)	(3.22)
HHH married	-0.424	-0.22	-0.075	-0.289	-0.27	-0.026	-0.031	0.204
	(-2.46)	(-0.74)	(0.68)	(2.50)	(-2.76)	(-0.15)	(0.23)	(2.11)
# generations	-0.004	0.112	0.072	0.055	0.108	0.028	-0.096	0.143
	(-0.04)	(0.51)	(0.81)	(0.60)	(1.57)	(0.26)	(0.90)	(1.85)
Activity status 1	0.188				-0.108	0.361	0.141	0.145
	(0.44)				(-0.61)	(1.09)	(0.54)	(0.71)
Activity status 2	0.023		-0.363		0.148	0.028	-0.202	0.301
	(0.06)		(1.06)		(1.23)	(0.15)	(0.53)	(0.95)
Activity status 3	-0.448		-0.200	0.322	0.008	-0.097	0.022	
	(-0.86)		(1.23)	(1.72)	(0.06)	(-0.469	(0.04)	
Activity status 4	-0.101		-0.617	0.060	0.161	-0.002	-0.065	0.234
	(-0.16)		(3.71)	(0.33)	(1.31)	(-0.01)	(0.34)	(1.39)
Activity status 5	-0.284	1.022	0.087	0.336	0.239	0.063	-0.577	0.428
	(-1.0)	(2.31)	(0.34)	(1.25)	(3.22)	(0.53)	(1.56)	(1.31)
Activity status 6	-0.331	1.229	0.396	0.893			-0.233	0.122
	(-1.79)	(2.91)	(1.49)	(3.14)			(0.93)	(0.76)
Farm household	0.281	-0.128	0.033	0.495	0.153	0.2	0.522	-0.186
	(1.82)	(-0.52)	(0.23)	(3.75)	(0.50)	(0.42)	(4.61)	(2.23)
Distance to poverty line	0.00	-0.005	-0.001	-0.011	-0.002	-0.01	0.000	-0.025
	(2.02)	(-1.78)	(2.95)	(6.72)	(-7.85)	(-3.72)	(0.36)	(6.34)
Constant	-0.985	2.75	0.698	-0.585	-1.155	1.788	-0.143	0.994
	(-1.5)	(2.5)	(2.24)	(1.36)	(-4.389	(4.01)	(0.29)	(2.53)
Observations	1286	384	1164	1293	3937	860	1890	2404

Regression includes control for ethnicity, religion and region.

6 Discussion and concluding remarks

The existence of longitudinal information at household level for these countries facilitates highly interesting case studies, in which poverty dynamics can be studied in conjunction with demographic changes at the household level. The great majority of past studies have considered poverty from a static perspective. Studies concerned with the dynamic side of poverty are few, and none of these have explicitly considered the link with fertility behaviour. Our analysis shows that the relationship between fertility and poverty is a complex one and certainly not uniform across countries. The four countries included in this study vary greatly in terms of the demographic and economic transition. Ethiopia is by far the poorest country and has still low economic growth and a persistent degree of poverty. Indonesia and Vietnam have made great strides in boosting economic activity and thereby reducing poverty. At the same time these countries have experienced sharp declines in fertility rates. Though economic growth undoubtedly had an important contributing factor to this fertility decline, it is also the case that during the same period these countries have experienced great improvements in access to family planning. It is useful at this point to summarise what we can infer from our estimation results.

For Ethiopia most of the results are consistent with economic development theory. The number of children, both very young ones and older ones, is positively associated with poverty. However, an important finding is that the number of *working* children plays an important role in alleviating poverty. Interestingly, the dynamic analysis of fertility showed that poor households in Ethiopia do not have a higher birth hazard than non-poor households. Rather, the birth hazard seems to be driven by human capital variables, and occupation – in particular whether the household was in the agriculture sector or not. As such, high fertility in Ethiopia is largely a phenomenon related to rural communities, which constitutes around 85 percent of the population. There are two important characterising factors of the agriculture sector: 1) farming technology is highly primitive and therefore labour intensive, and 2) access to family planning is extremely poor[17]. Both are crucial factors in maintaining the high fertility rate, and several studies have reported that the problem of unmet need is substantial in rural Ethiopia. However, given the central role of child labour in reducing poverty, it is clear that there are also important demand side incentives in place. Overall, our analysis shows that both improved labour market

and educational opportunities and improvements in family planning – preferably both – should have a substantial impact on reducing poverty in Ethiopia.

From being a very poor country back in the seventies and the early eighties, Indonesia has seen tremendous economic growth, followed by important structural changes of the economy, which is reflected by the massive rural/urban migration – reducing the numbers of households being involved in labour intensive farming and giving farmers private ownership. School enrolment has been steadily increasing, child labour declining, and family planning substantially improved. These changes have obvious implications for the role of children and parents' fertility choices, and are reflected in our analysis. In contrast to Ethiopia we found that farm households do not have more children than non-farm households and that child labour is positively related to poverty, suggesting that only very poor households use child labour a "last resort" to cope with financial distress. As a result, there is little to suggest from our results that Indonesian households choose to have a high quantity of children as a means to boost household resources, and thereby reducing poverty risk. If anything, the trend seems to be the opposite.

Many of the features relevant for Indonesia are also present for Albania, whereas Vietnam is at a stage between Indonesia and Ethiopia. Though economic growth has also been strong in Vietnam over recent years, it is clear the country lags behind Indonesia significantly, and there is not a similar level of urban migration, implying a continued importance of the agricultural sector.

Though there is still a significant difference between farmers and non-farmers in terms of poverty, it is also clear that farm households benefited significantly from the economic boom. Is this then the main cause behind the fertility decline? On the basis of our analysis of Indonesia, Vietnam and Albania one might be tempted to make such a conclusion. However, one important distinguishing implemented starting already back in the sixties. For Vietnam in particular, it is clear that

feature of these countries is the role of family planning, which were gradually fertility had been on the decline for several years prior to the economic boom that started in the late nineties.

[17] The contraceptive prevalence rate in rural Ethiopia is as low as 4 percent, whereas in urban areas it is round 45 percent.

Though our analysis reveals that the poverty/fertility relationships tend to be complex, it is also the case that there are certain important commonalities. Perhaps the most important one is the role of human capital. In particular we find that the educational level of the household head is almost always negatively associated with poverty. Often, though not always, do we find accumulation of educational levels of household members to have a similar effect. But there are differences in magnitude, and we find that education has the lowest impact on fertility and poverty in Ethiopia. This is either because there is generally low return to education in Ethiopia, or, it is due to the fact that the majority has very low education – rendering the educational variables to distinguish differences in poverty and fertility. We also find that presence of young children is associated with higher poverty rates, which is the case for all countries.

Based on the insight of Indonesia, Vietnam, and Albania – to what extent can we expect poverty and fertility decline in Ethiopia in the future? Unfortunately there are several elements of Ethiopian society that is likely to impede a similar development. The all important difference is that the other countries have a long history of investment in education and family planning, both of which were a result of communist policies. Together with recent market reforms and improving land tenure rights, Indonesia, Vietnam and Albania seems to have had the appropriate foundations for reducing poverty and fertility. It seems clear that a similar replication in Ethiopia is going to be more difficult, and will certainly require long term commitments in more than one area of societal developments.

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Appendix I: The surveys

A1.I The Ethiopian Urban and Rural Household Surveys

The EUHS and the ERHS are two distinct panel surveys, but designed with the aim of comparability between them. As a result the questionnaires were almost identical. The urban surveys have been collected in collaboration with Michigan State University and University of Gothenburg; the rural surveys were conducted in cooperation with the Centre for the Study of African Economies (CSAE) at Oxford and the International Food Policy Research Institute (IFPRI). We use information from the waves starting in 1994 up to 1997, which implies three waves of urban sample and four waves from the rural sample. Both surveys interviewed 1500 households in each wave. The panel includes useful information concerning demographics (household composition, religion, ethnicity, migration), employment and income (wages, hours worked, sector of employment and occupation), business income (own account worker, income from female business activity, income from child labour activities), assets and remittances and pension income (see further information in Kedir and McKay, 2004; Bigsten et al 2003). An important drawback of the surveys is that they do not include complete fertility histories. This has important implications for the way we implement our fertility analysis.

A1.II The Albanian Living Standards Measurement Survey (ALSMS)

The ALSMS is made up of three waves (2002, 2003 and 2004). The first survey was conducted in 2002, using a sample of 3,600 households. The panel component, however, includes less than 1,800 households. The sample is drawn from 450 enumeration areas, and in each of them eight households was selected. Household membership is defined as not having been away from the household for more than six months. The survey is of the standard LSMS format. It includes information on consumption expenditure, income, migration, health, education, employment, and fertility histories. However, the survey does not include consumption expenditure in the waves 2 and 3, which impacts the way we define poverty status in this sample. The first wave contains complete fertility histories, whereas waves 2 and 3 provide additional information on any new births (through a household roster).

A1.III The Indonesian Family Life Survey (IFLS)

The IFLS consists of three waves in total, IFLS1 conducted in 1993/94, IFLS2 and IFLS2+ in 1997 and 1998, respectively, whereas IFLS3 in 2000. IFLS2+ included a 25% sub-sample of IFLS2 and was specifically aimed at capturing the effects of the financial crisis in Indonesia at the end of 1997. The survey has been conducted by RAND Corporation in collaboration with UCLA and Lembaga Demografi, University of Indonesia. The sample is representative of about 83% of the Indonesian population and contains over 30,000 individuals living in 13 of the 27 provinces in the country. IFLS1 has 7,224 households, and subsequent waves targeted all the split-off households as well as all the original households previously interviewed. Over 90 percent of original sample from 1993 has been re-interviewed in the second and third waves of IFLS. The survey contains a wealth of information collected at the individual and household levels, including multiple indicators of economic well-being such as consumption, income, and assets. It also includes information on education, migration, labour market outcomes, marriage, fertility, and contraceptive use. It also contains information about health, relationships among co-residents and non-co-resident family members and inter-generational mobility.

A1.IV The Vietnam Living Standards Measurement Survey (VLSMS)

The first Living Standard Measurement Survey in Vietnam was conducted in 1992/93 and included 4800 households. The second survey was conducted in 1997/98, and included 6000 households, whereas more than 4300 household from the first survey were re-interviewed. Both surveys are nationally representative. The attrition rate is low and the overall quality is very good (see Falaris 2003, for details). The survey follows the LSMS format and just like the Albanian LSMS, includes rich information on education, employment, fertility and marital histories, together with rich information on household income and consumption expenditure. Community questionnaires were administered to rural regions only.

Table A1: Summary characteristics of the four panel surveys

	ALSMS	EUHS	IFLS	VLSMS
Target population and sample frame	Private households	Urban households	Private households, and selected individual (for detailed information), and community	Private households
Dates of fieldwork	Three waves: Apr-Sep 2002, May-July 2003, May 2004	Four waves: Sep 1994 Nov-Dec 1995 Jan-Feb 1997 March 2000	Three waves: Aug 1993 – Feb 1994 Aug 1997 – Jan 1998 Aug 1998 – Dec 1998 Jun 2000 – Nov 2000	Two waves: Sept 92 – Oct 93 Dec 97 – Dec 98
Panel entry, exit and tracking policy	Unique cross-wave person identifier. New entrants included in sample. All exiting individuals tracked into new households.	No tracking of individuals leaving household. Cross-wave identifier constructed through relationship to household head.	Unique cross-wave person identifier. New entrants included in sample. All exiting individuals tracked into new households.	Unique cross-wave person identifier. New entrants included in sample. Split-off households are not tracked
Welfare measures available	Income and subjective indicators (all waves); expenditure (wave 1 only);	Income, expenditure (all waves)	Income, expenditure, asset (all waves)	Income, expenditure (all waves)
Sample Size (Panel)	1682 panel households	1500 urban households + 1500 rural households	6,564 households, 4,216 women with birth history	4302 panel households

Appendix 2: Data quality assessments

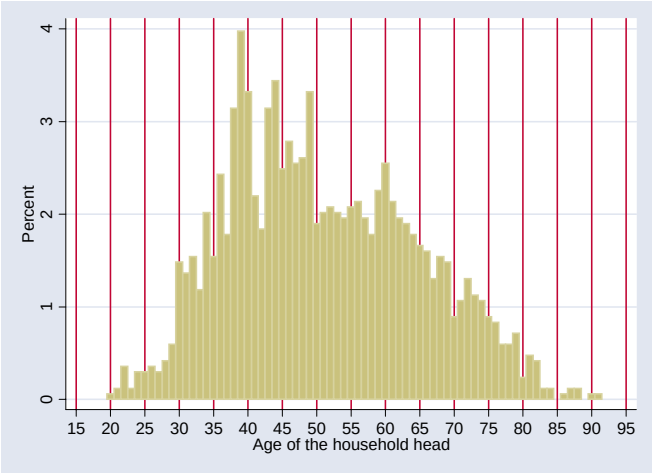
There are always serious concerns about data quality and the four surveys vary considerably in this respect. For example, although they all include information on household composition that can be used to track birth events, the Ethiopian survey does not have separate fertility histories. Another issue concerns the reporting of the timing of childbearing events. For the Ethiopian sample fertility events have to be constructed on the basis of the reported age of the children (and the age of the mother). In the other surveys, date of births are given, though it is clear that when asked for the month of the birth a substantial fraction of the sample is unable to provide reliable answers. All four surveys give some reason for concern over reported ages and year of births.

Many respondents are unable to report their year of birth but are able to give their age. However, the distributions of reported age suggest some measurement error, in the form of 'heaping': age is often reported only to the nearest five years. The four panels of Figure A1 give an indication of the varying degrees of age misreporting (for household heads at wave 1) in the four countries. It is apparent that high degrees of misreporting are particularly evident in Ethiopia, which has a relatively weak system of birth registration, and in Indonesia.

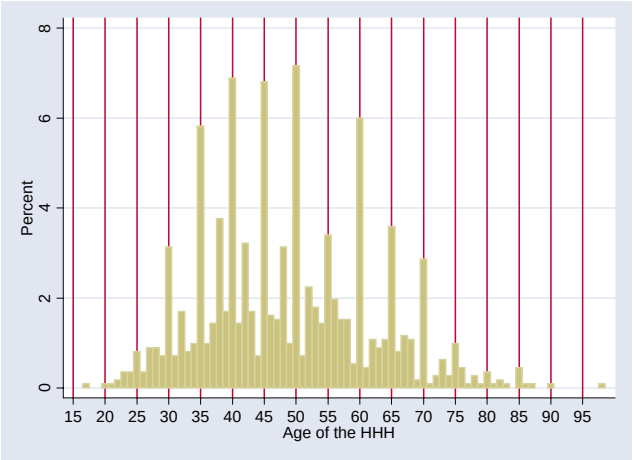
One of the advantages of longitudinal surveys is that they give an opportunity to assess the accuracy of responses, by comparing answers to questions which are repeated across waves and which should, in principle, generate the same answer. Date of birth is a critical example. The question on year of birth is not repeated in the Ethiopian survey but Table A2 reports the frequency of between-wave discrepancies in the year of birth in different waves for Albania, Indonesia and Vietnam. Discrepancies of more than one year are rare for Albania (1%), more serious for Vietnam (2.6%) and still more serious for Indonesia (7.5%). Accurate timing of events is important for demographic research, so it is important to bear in mind this source of measurement error.

Table A2: Internal consistency of repeat responses on year of birth

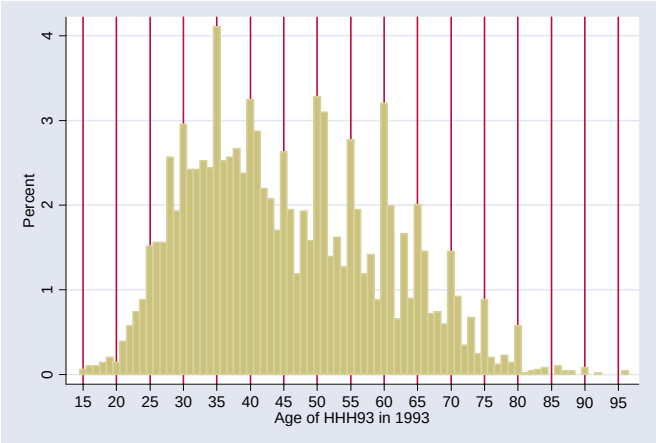
	Albania	Indonesia	Vietnam
Proportion with no discrepancy	90.1%	80.1%	90.7%
Proportion with 1-year discrepancy	9.0%	12.4%	6.5%
Proportion with 2-year discrepancy	0.4%	3.7%	1.6%
Proportion with discrepancy of 3+ years	0.6%	3.8%	1.1%



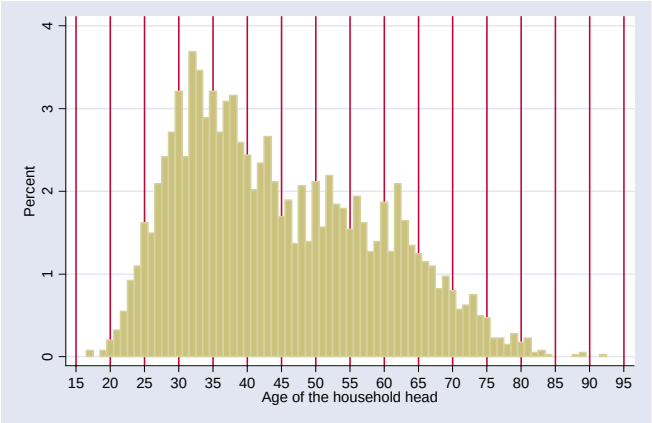
Albania 2002



Ethiopia 1994



Indonesia 1993-4



Vietnam 1992-3

Figure A1 Heaping in the age distributions