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## Education, incomes, poverty and inequality in Ghana in the 1990s

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### Abstract

Three issues are addressed in this paper. First, we use both household and macro data to establish how fast per capita consumption and incomes grew in Ghana in the 1990s. Second, we ask how much of the rise in incomes was due to rises in the level of human capital and how much reflected underlying technical progress. Third, we assess the implications of how incomes rose for the interpretation of changes in the poverty profile. Four household surveys are used to show changes in both expenditures and incomes over the decade. The household surveys show that both consumption per capita and incomes rose by 12 per cent, a rate of 1 per cent per annum. This figure is identical to the growth rate for consumption per capita implied by the macro accounts. The average level of education of the population rose by 27 per cent over the decade which led to a rise of 3 per cent in per capita consumption. We find, on average, no evidence for any underlying technical progress. We show that the rise in income was associated with modest falls in the head count and poverty gap measures of poverty but with virtually no change in the severity of poverty measure. The fall in the head count measure was too small to prevent the absolute number of poor people from rising. Inequality increased with the incomes of the non-agricultural self-employed, with given levels of human capital, falling both absolutely and relative to wage workers.

JEL Classification: J30 and O55.

Key words: Ghana, real incomes, poverty.

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## 1. Introduction

The central policy objective set by the major development organisations has been the reduction of poverty. It has been argued that economic reforms in sub-Saharan Africa can lead to higher incomes and lower levels of poverty, Demery and Squire (1996). Ghana is unusual in having household surveys covering the period of a decade which enable changes in incomes and poverty to be measured. Two reports have presented data showing that poverty in Ghana has declined, the first compares 1987/88 with 1991/92, the second compares 1991/92 and 1998/99, GSO (1995, 2000). In this paper a longer run perspective will be taken on the data and we ask whether incomes have risen or fallen in the 1990s, specifically over the period from the first survey in 1987/88 to the most recent in 1998/99.

In analysing the determinants of both incomes and poverty a central focus has been on the role of education as a determinant of both aggregate and individual income. The importance of human capital in explaining aggregate income and its growth is contentious. The large literature on growth stemming from the work of Barro (1991, 1997) has found some measure of human capital significant in determining growth. Gemmel (1996) finds both the levels of human capital and their growth rates to be important. Benhabib and Spiegel (1994) present evidence that education influences rates of technological progress. None of these papers address issues of causation. Bils and Klenow (2000) ask if the observed correlation between school enrolments in 1960 and growth over the period from 1960 to 1990 can be interpreted as causal. They argue that it cannot. In considering the determination of aggregate incomes, as distinct from growth rates, Hall and Jones (1999) argue that “differences in physical capital and educational attainment explain only a modest amount of the difference in output per worker across countries” (p.92). The implication of these papers is that low rates of human capital formation are one of the consequences of, for example, poor social infrastructure, not a cause of poor performance. In a recent contribution Easterly and Levine (2000) argue, along similar lines, that factor accumulation is not the key to growth.

In contrast to this ambivalent record of the importance of human capital in the determination of aggregate income and growth has been the success of Mincerian earnings functions on individual data. The semi-logarithmic specification has proved one of the most robust in empirical economics. Equally universal has been the finding that education gets people out of poverty. The two sets of findings are not necessarily in conflict. It may be difficult at the aggregate level to capture the impact of education on *levels* of income as high education economies are ones with higher levels of physical capital, separating out the two effects may be asking too much of aggregate data. Running Mincerian earnings functions on cross-section data is clearly uninformative of any role of education in generating *growth* of incomes.

Whether investment in education does affect the growth rate of the economy, or the level of its income, has important implications for the analysis of changes in a poverty profile in a country. An expansion

of education may raise income and reduce poverty, through the effect of factor accumulation on the level of incomes, but may not alter the incomes of those with given amounts of human capital if there is no impact of education on underlying growth rates. With repeated cross-sections of data, such as are available for Ghana over the 1990s, it is possible to investigate this issue. Our question is whether incomes rose due to those with given endowments benefiting from rising incomes or, alternatively, due to rises in endowments. In the former case the rise in income, and associated fall in poverty, will be due either to underlying technical progress or to increased returns from asset ownership. In the latter case those who were poor initially, and had completed their education, would have seen no rise in their incomes even though measured poverty in the economy may well have fallen. This distinction is of some importance as it is possible in this latter case for those with completed education, who were poor, to remain so even though incomes in the economy are rising.

In the next section we summarise the consumption data available from household surveys and the macro data to establish the extent of the change in consumption per capita over the 1990s. In section 3 we move to a consideration of the employment choices of the population and examine how the changes in consumption per capita for households of different types compare with changes in incomes. Incomes are widely regarded as an inadequate indicator of welfare in African economies as measured incomes are substantially lower than consumption levels. However our interest is in changes in income so issues of levels are less important. It remains an important empirical question whether self-employed individuals in such economies give accurate answers to questions designed to obtain information on income. We will argue that the data from the surveys indicates that such surveys are remarkably successful in eliciting such information. In section 4 we use the income data for both wage earners and the self-employed to address two questions. First, how do the returns to education differ by category of employment. Second we ask whether, with controls for human capital, there was any increase in underlying incomes. In section 5 we assess whether the returns to education for wage workers are affected by selectivity issues. In section 6 we consider the non-human capital that may be affecting the incomes for the self-employed. The implications for the relationship between investments in education and changes in poverty and inequality are discussed in section 7. A final section concludes.

## **2 Expenditures in Ghana: 1987/88 to 1998/99**

We begin by setting out the figures for expenditure from the published reports on these data. Table 1 line 1 shows figures from GSO (1995) for household expenditure per capita in 1991/92 prices, line 2 shows the figures from GSO (2000) for household expenditure per adult equivalent from 1991/92 to 1998/99 in 1998/99 prices. If we link these figures to provide an index of household expenditure per capita (thus ignoring any differences between numbers and adult equivalents) we obtain a rise in per capita expenditure of

35 per cent over the decade. The index number is shown in line (3) of Table 1.

In this paper we wish to adopt a measure of per capita expenditures so as to be able to compare the micro evidence with the macro. To that end we show, in line (4) of Table 1, the nominal figures for expenditure per capita over the four periods. It will be noted that the figures for 1991/92 and 1998/99 are very close, although not identical, to the relevant ones from the published reports. In the Table we report the CPI indices we are using and then provide two series of constant price household expenditure per capita.<sup>1</sup> The implications of these calculations are shown in index number form in line (9) of the Table. Per capita household expenditure rises by 16 per cent, approximately half the figure in line (3), obtained by linking the GSO studies.

Finally in the Table we turn to the macro data. Table 1 lines (10)-(12) show per capita figures for GDP, investment and consumption taken from the World Bank Indicators Data for 2000. The final line in the Table, line (13), shows the implied rise in consumption per capita to be 12 per cent which is lower, although not by very much, to the figures from the surveys given in line (9). We conclude that there is a broad concordance between the micro and macro data. The two surveys reports should not be linked as we have done in line (3) in part because the estimate of household expenditure per capita for round 3 of the survey was substantially reduced when the fourth round was analysed.<sup>2</sup> The published reports do not allow comparisons to be made over the decade which is our purpose in this paper.

### **3 Employment, Expenditures and Incomes**

In order to track down how this rise in expenditure was brought about we need to link expenditures to incomes. As a first step in that process we show how the composition of employment has changed over the course of the surveys. Table 2 shows the proportions of the labour force divided into five broad categories: wage employees, farmers, the non-agricultural self-employed, unpaid family labour and the unemployed. For the wage employees there is a further distinction between three categories of employees: government employees, those working in state enterprises and the private sector. The definition of the labour force we have used is all individuals who either have, or seek, gainful employment and are aged 18 or over.

The labour force is dominated by self-employment either as farmers or in the non-agricultural sector.

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<sup>1</sup> For the third and four waves of data the CPI indices are the deflators used by the published reports. For the first two waves of the data we have linked these figures to a measure of the CPI derived from figures from the Ghana Statistical Office.

<sup>2</sup> In GSO (1995, Table 2.1 p.6) the figure for consumption per capita is given as Cedis 215,000, as reported in our Table 1. At the time of the analysis of the fourth round this figure was revised down to Cedis 183,000, a reduction of 15 per cent. This figure can only be obtained from the data, not from the report, which gives figures in terms of adult equivalents rather than per capita and uses 1998 prices. In GSO (2000, p.3) there is a warning that "the results reported here are not strictly comparable with the previous report". In this paper we use the original data.

There is however a clear trend shown in the data with the proportion of wage employees falling from 17.3 per cent to 13.2 per cent while non-farm self-employment increased from 19.5 to 27.3 per cent. The measured rates of unemployment are very low. The rate is highest in the fourth round at 3.5 per cent. These very low rates for Ghana stand in marked contrast to those observed in other African countries. In South Africa household data for 1993 gives an average unemployment rate of 30 per cent using a broad measure of unemployment, Kingdon and Knight (1999), while data for urban Ethiopia shows unemployment rates of 39 per cent in 1994 and 30 per cent in 1997, Krishnan, Selassie and Dercon (1998).

We now proceed to link expenditures to incomes using the four categories of employed labour identified in Table 2: public and private sector wage employees, and self-employment divided between non-agricultural activities and farmers. For the expenditure categories we classify household by the employment status of the head of the household. In the top part of Tables 3 and 4 we provide the figures for expenditure per capita, in the middle part we move to expenditure per adult and in the bottom part we move to incomes. The expenditure data is on a household basis. Incomes are individual based data where we have sought to obtain from the data a measure of annual income in the principal job. It is thus not a measure of total income nor a measure of income per hour as the figures do not control for hours. For the self-employed category, both non-agricultural and farmers, our measure of income includes returns from labour, capital and land; only for the two wage categories is it a measure of labour income. For all the categories there is a return to human capital which we will seek to identify by running standard earnings function in the next section.

Table 3 reports the means for these data and Table 4 the means of the logarithms. As all the series are close to being log normal we concentrate on Table 4 as being a better measure of central tendency for the data than the figures in Table 3. There is no necessary close link between our measures of expenditure and those of income for the four categories. How the expenditure per household responds to changes in individual income depends on a variety of factors, not least of which is the composition of the household. So for our purposes we wish to note that the rise in incomes in the principal job, from the first to the fourth survey, at 12 per cent is almost exactly equal to the rise in expenditure per capita, at 11 per cent, and much higher than rises in expenditure per adult at 6 per cent. Incomes rose for all categories of employees. By far the lowest rise in incomes occurs in the non-agricultural self-employed sector of the economy while by far the largest rises occurred for public sector workers.

In Figure 1 we summarise the information we have extracted from the survey and the macro data for the growth rates of incomes and expenditures in Ghana in the 1990s. We have two expenditure measures based on household data, expenditure per adult and per capita, information on real incomes in the principal job and finally the macro consumption per capita figure. Three of these measures, expenditure per capita, income and macro consumption all give virtually the same figure for the growth rate of 11-12 per cent per decade or 1 per cent per annum. As Figure 1 shows it is the estimate obtained by linking the two poverty

studies which gives a wholly misleading picture of the growth in consumption over this period.

#### 4 The Determinants of Income

Having established that incomes in the principal jobs rose in line with household expenditure we now wish to address the question as to the role of education in the determination of those incomes. Table 5 provides the data for the two dimensions of human capital we will model, education and age. We note that over this decade the average years of education of the population rose by 27 per cent from 4.5 to 5.7 years, the average age of the employed also rose. There is a clear hierarchy of use for education. The most educated workers are in the public sector with, by the end of the period, 12.4 years of education, those in the private wage sector had 9.3 years, while those in non-agricultural self-employment had 6 years and farmers 3.6. The rise in average education over time was fairly uniform across all four categories of employees. The final part of Table 5 shows the distribution of the levels of education by stage completed. By far the highest proportional increases were at secondary school and higher. As we will show it is at this level that the returns to education are highest.

The specification chosen is the Mincerian semi-logarithmic specification.

$$\ln E_{it} = \beta_0 + \beta_1 H_{it} + \beta_2 \ln K_{it} + \beta_3 C_{it} + \tau_t t \quad (1)$$

where  $E$  is the income reported by the individual. We model this income as being due to human ( $H$ ) and non-human capital ( $K$ ). We also use controls for hours worked, location and region, and aspects of parental background ( $C$ ). We interpret the coefficient on time,  $\tau$ , as a measure of technical progress in the economy. The distinction we seek to draw is between rises in income due to an increase in assets, particularly the level of human capital, and the underlying rate of increase of income in the economy.

As a first step we run the earning function on the four income categories excluding non-human capital and with no allowance for the selectivity problems that arise from the fact that wage earners are not a random draw from the population. We address the selectivity problem in the section 5 and we introduce non-human capital in the earnings functions in section 6.

We note four important findings. First the Mincerian returns to education for all, except farmers, is strongly non-linear with rates of return rising with the level of education.<sup>3</sup> Second, the returns to education at the means are far higher for wage earners than they are for the non-agricultural self-employed. Third, this difference is due, not to differences in the returns to education between wage earners and the non-agricultural self-employed, but simply to the differences in their average levels of education. Fourthly, for the pooled data, there is no evidence for any rise in underlying incomes over the period and the only group of employees to

have seen any underlying rise in earnings are public sector workers.<sup>4</sup>

Figure 2 shows in graphic form these results for each type of worker. The incomes all rose although by very different amount. In the bottom half of Figure 2 we show how incomes changed over the decade holding the human capital characteristics of the workers constant. It is this figure which comes closest to showing what would have happened to the income of the median individual in an occupation over the whole period. For the sector which saw the major expansion of employment, the non-agricultural self-employed, there was a substantial fall in underlying income of 22 per cent over the decade. For farmers, the majority of the population, and by far the most important part of the poor, there was no increase. These conclusions need to be assessed in the context of selectivity and omitted variable problems. We turn to these in the next two sections.

## 5 Selectivity and the Returns to Education for Wage Employment

In interpreting the results in Table 6 for the earnings function of wage employees we face two problems. The first is that the results may be biased due to the non-random nature of being in the wage sector. The second is that male and female workers may have very different age earnings profiles and the returns on education may differ. In order to address both these problems we now proceed to allow for selectivity into wage employment separately for men and women.<sup>5</sup> We allow for selectivity between the non-agricultural self-employees and wage employment by using parental background and education in a probit selection equation. We report the equation by gender in the appendix. The equations confirm that, for both men and women, the probability of obtaining a wage job declined markedly over the period. We do find different patterns by gender. The age profile for women is much flatter than that for men. In Tables 7a and 7b we report the results for private and public sector workers, by gender, with the inverse of the Mills ratio from the probit equation used to control for selectivity.

Table 7a shows there is no evidence for a selectivity effect for the private sector. However the pattern of growth of real wages is different by gender. The point estimate shows a fall for women while, if the insignificant selectivity term is dropped, there is now a significant rise in the real wages of male workers over

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<sup>3</sup> Appleton, Hoddinott and Mackinnon (1996) show this pattern to be one common across sub-Saharan Africa countries.

<sup>4</sup> Teal (1999) shows that for Ghana's manufacturing sector there is no evidence of any underlying rise in productivity so the firm level data is consistent with the household in showing no evidence of technical progress.

<sup>5</sup> Glewwe (1996) uses the data from the second of the surveys used in this paper to estimate returns to education for wage earners. He finds for private sector workers that with controls for selectivity that there are no returns to education, his Table 2 p.275. We found, with our larger data set, that aggregating male and female workers gave a negative effect for the lambda term for both private and public sector workers. The lambda term was significant at the 10 per cent level or lower. We interpret this as evidence that, with our larger sample, disaggregating by gender is desirable.

the decade of 19 per cent.<sup>6</sup> Confining attention to the equations dropping the selectivity term the rate of return on education is slightly higher for women than it is for men and for both the quadratic term in education is highly significant. For both men and women rates of return on education rise with the level and allowing for selectivity does not alter this conclusion.

Table 7b reports the results for the public sector. Here the selectivity term appears to be significant for male workers and its inclusion acts to raise, not lower, the return on education. It appears, however, that our identifying assumption that the educational background of the parents affects only entry into the wage market and not the wage is invalid for public sector workers. We have experimented with changing the identifying restrictions and if these parental education variables are added to the wage equation the selectivity term for male public sector workers becomes insignificant. The returns to education are largely unaffected whichever assumption is made about the validity of the variables in identifying the selectivity term.

None of our conclusions drawn in the last section about the nature of the returns to education for wage workers is affected by the control for selectivity. However the inference that there was no rise in wages for private sector workers needs qualification. It appears that male workers, in both the private and public sectors, obtained a real rise of some 20 per cent over the decade while there was clearly no rise for women. We turn now to the possible omitted variables in the earnings equation for the non-wage earners.

## **6 Non-Human Capital as a Determinant of Earnings**

For both the farmers and non-agricultural workers some of the earnings are a return to land and other non-human forms of capital. To allow for this we have constructed household level variables for five categories of assets. These are the land owned by the household, the value of farm livestock, the value of farm equipment and the assets of non-farm self employed households. All these are available from the household part of the questionnaire. The value figures are deflated to give a constant price series. In Table 8 we report the results of including these asset variables in the earnings function and also controls for parental education. The key point in which we are interested is whether the hierarchy of returns on human capital is affected by any of these controls.

Before turning to consider the returns on human capital we note that the earnings functions we have estimated for non-wage income perform remarkably well. In the questionnaire all individuals who report employment are asked on an individual basis the payments (both wage and non-wage) they have received. The relevant question is phrased in terms of the amount of money received for a specified time period. Hours

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<sup>6</sup> Teal (2000) using labour market data from the manufacturing sector shows that real male wages changed little over the period 1992 to 1996. This finding is consistent with this household data which shows no rise for male private sector workers between 1991 and 1998, ie the third and fourth rounds of the household data.



spent earning this money are also asked. It must clearly be open to some doubt whether the self-employed can, or will, give accurate answers to such a question. In fact, as is shown in Tables 6 and 8, the  $R^2$  for the farmer's earning function is the highest of the four groups identified. While that for the non-agricultural self-employed is lower than that for private employees, it is not markedly so, 0.18 compared with 0.20. The survey appears to have successfully elicited information on incomes which can be well explained by a limited range of human capital variables.<sup>7</sup>

It is clear that the introduction of the non-human capital does not affect the estimates for the returns on education at all for either the farmers or the non-agricultural self-employed. For the farmers all the assets which affect farming - land, farm livestock and equipment - have significant effects on the measure of farmer's earnings. This confirms that the earnings measure we are using is not solely a measure of labour income, but suggests that the returns from human capital are not affected by the lack of controls for these variables in Table 6. The measured assets of the non-agricultural self-employed do not affect their earnings and this almost certainly reflects how poorly this variable is measured. It is also the case for both categories of workers that parental educational background plays no role in determining earnings.

## 7 Poverty, Education and Inequality

We now turn to the issue raised in the introduction as to how the changes in incomes can be related to changes in the various measures of poverty. Our procedure enables a comparison to be made over a longer period than previous studies. We use the measures of poverty that have been used in GSO (1995, 2000), which are taken from the widely used  $P_\alpha$  indices of poverty proposed by Foster, Greer and Thorbecke (1984).

$$P_\alpha = \frac{1}{n} \sum_{i=1}^q \left( \frac{z - y_i}{z} \right)^\alpha \quad (2)$$

$$P_0 = \frac{q}{n} \quad (3)$$

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<sup>7</sup> Vijverberg (1995) uses rounds 1 and 2 of the Ghana data to assess the returns to schooling in non-farm self-employment. He models enterprise income rather than individual incomes in the principal job. His results show a significant return on education for the household head of 1.6 per cent (Table 3, column (2), p.1220) which is lower than our individual based estimate. There is no evidence from his study that our method leads to too low an estimate of the return on education for the non-agricultural self-employed.

$$P_1 = \left(\frac{q}{n}\right) \left(\frac{z - \mu_p}{z}\right) \quad (4)$$

The  $P_0$  measure is the headcount measure of poverty,  $P_1$  is the poverty gap measure and  $P_2$  is a measure of the severity of poverty. Table 9 shows these three measures over this decade. The headcount measure of poverty using the higher poverty line adopted in the GSO (2000) report fell from 0.49 to 0.45, the  $P_1$  measure declined from 0.18 to 0.17 and the  $P_2$  measure from 0.07 to 0.06. All the measures thus show some decline in poverty. As we know from the income regressions that the incomes of wage earners, who are relatively better off, are rising relative to the self-employed we would anticipate that inequality in the society has been increasing. We report in Table 9 two measures of inequality, the standard deviation of the log of per capita expenditure and the Gini coefficient for each wave of the data. Both show rises in inequality in this period. We also report in Table 9 a standard breakdown of the  $P_0$  poverty measure by the education of the household head. While for each survey there is a decrease in the probability of being poor as education rises there is no uniform pattern over time. There is no decrease in the probability of being poor for those with no education or those with secondary education over the decade. There are substantial decreases for those with primary and post-secondary education. To investigate the links from education to changes in poverty over time we need to model per capita consumption, which we do below. First we consider the issue of whether these results are sensitive to the choice of the poverty line.

The measures presented in Table 9 are for one poverty line. We now wish to investigate how sensitive our view of the changes in poverty is to the poverty line. In Figures 3 we show how the measures of poverty change depending on the poverty line chosen. For all poverty lines there is a decline in the head count poverty measure,  $P_0$ . However it is clear that at a poverty line of Cedis 700,00 or less this decline is very small. A similar pattern holds for the  $P_1$  measure. If we consider the  $P_2$  measure there is only a very marginal decline in poverty whatever the poverty line chosen. At the bottom of the Table we provide a key that enables these Cedi numbers to be translated into US purchasing power parity (PPP) dollars at 1993 prices. At the US\$ 1 per day poverty figure, commonly cited in international poverty comparisons, there was virtually no change in any of the measures of poverty in Ghana over the decade. It is also the case that, whatever the poverty line chosen, the fall in the head count measure was too small to prevent the absolute number of poor people increasing. The maximum fall in the  $P_0$  measure was 10 per cent for the highest of the possible poverty lines shown in Figure 3. As population increased by some 28 per cent over the period the implication is that the absolute number of poor people will have increased.

How much of the rise in incomes that produced the falls in poverty was due to education? In Table 10 we present regressions for consumption per capita. In these regressions we control for the age and education of the head of the household. We also control for the age and education of other adult members of the

household. So education can affect household consumption through two routes; one through the education of the household head, the second through a measure of the average level of education of all adult members of the household. In Table 10 we present three regressions. The first controls for the age and education of the household, the second controls for hours worked and household size, the third controls for the other assets of the household. For each specification we report the Mincerian return on education, now interpretable as how much an additional year of education increases household per capita consumption. Over the three specifications the return rises from 1.9% to 2.9%. This suggests that the increase in education would have increased consumption by about 3 per cent. In other words about a third of the increase in decadal consumption of 11% can be imputed to education. The point estimate of the time dummies is either close to zero or negative for the final round of the survey implying no underlying growth in per capita consumption over the decade.

## **8 Summary and Conclusions**

The link from investment in education to poverty is one of the most important dimensions of policies towards poverty. Education may affect poverty in two ways. It may raise the incomes of those with education. It may in addition, by promoting growth in the economy, raise the incomes of those with given levels of education. Which of these roles education plays is very important for understanding the implications for any decline in measured poverty in a country over time. The existence of repeated cross-sections of data on consumption and incomes enables us to decompose any rise in incomes between that due to changes in the average amount of education and that due to underlying technical progress.

We have used four surveys in Ghana to link education to the mechanism by which the fall in poverty was achieved over the 1990s. Previous studies have provided a comparison of the third with the first survey and a comparison of the fourth with the third. We have shown that it is not possible to link these studies to obtain an overall figure for growth over the decade. Both the expenditure and income data from the surveys point to a rise in per capita consumption of 12 per cent over the decade, a rise of 1 per cent per annum. This figure is almost exactly that in the macro data. Per capita GDP grew faster than this as investment as a percentage of national income rose rapidly over this period. This modest rate of growth was sufficient to effect a small fall in the headcount and poverty gap measure of poverty. There was virtually no change in the severity of poverty measure.

We have investigated the role of education in effecting this rise in consumption and decline in poverty. We have shown that, with the exception of male wage workers, there was no significant rise in underlying incomes. This conclusion has been reached by estimating an earnings function for four categories of workers: farmers, the non-agricultural self-employed and public and private sector wage earners. It has

been shown that individual based data can successfully measure incomes of the self-employed. Once controls for human capital characteristics and hours worked are included in the regression the faster growing group of workers, which is the non-agricultural self-employed, experienced a decline in underlying income of 22 per cent over this decade.

There was a substantial rise of 27 per cent in the average level of education of the population. This rise in education increased consumption per capita by 3 per cent over the decade. There is, on average, no evidence of any underlying technical progress. It is important to note that, with no technical progress, measured poverty decline is consistent with those poor initially not getting any richer. In fact the implication of our earning functions is that the non-agricultural self-employed, with given levels of human capital, will have seen substantial falls in their incomes. The relative declines for the poorer occupations were associated with a monotonic rise in inequality over the whole decade.

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## **Appendix: A Note on Using the Surveys**

There are alternative procedures within the GLSS data to assess the employment status of an individual. We have chosen the method that ensures the maximum degree of comparability across the surveys. Individuals who report any labour income are classified into one of four classes on the basis of their main job: wage employees, farmers, non-agricultural self-employed workers, and unpaid family workers. Those who were not employed, but were seeking work, are classed as unemployed and included in the labour force. The sample is confined to those aged over 18.

In rounds 1 and 2 the questionnaire used was identical so exactly the same variables can be extracted from both questionnaires. It is possible to establish the labour force status of the individual from two different sections in the questionnaire. One approach is to use the answers to the questions in section 5a which classify individuals into three categories: (1) wage employee, (2) self-employed in agriculture and (3) self-employed in non-agricultural activities. In contrast to the way these questions were asked in the third round of the survey these categories are not mutually exclusive. The respondents could identify themselves as having more than one occupation. If the respondents did not identify themselves as either employees or self-employed then they were asked a series of questions about whether they looked for paid work and, if they did not, the reasons for this. In this paper an individual is defined as unemployed if either of two conditions is met. If they looked for work in the last seven days but did not find it they are classified as unemployed. They are also classified as unemployed, if they did not look for work, but, when asked why, they answered either that they were awaiting a reply from an employer or they believed that no work existed.

The second route by which the occupational status of the respondent can be identified in rounds 1 and 2 is from the questions asked about their main occupation. This set of questions was asked twice. First, in section 5b, about their main job in the last seven days and secondly, in section 5e, about their main job in the last 12 months. In fact the questions in 5e were only asked if their main job in the last 12 months differed from their main job in the last seven days. One of the questions asked of the respondents was whether they were employees or self-employed. They were also asked their industry and occupation so it is possible from these questions to divide the sample between the agricultural and non-agricultural self employed on the basis of the main occupation of the respondent. Four categories of those in the workforce were identified from this part of the questionnaire: (1) employees with wage jobs either in the private, government or parastatal sector, (2) farmers, (3) non-agricultural self-employees, (4) unpaid family workers. To obtain the labour force it is necessary to add the unemployed, which was done using the definition of unemployment given above.

In contrast in both the third and fourth wave of the survey individuals were asked (section 4a) questions regarding their occupational status sequentially so, for example, if they answered yes to the question "During the last 12 months have you done work for which you received a wage or other payment"

(section 4a, question 1) the self-employment questions were skipped. Thus in the round 3 and 4 questionnaires the occupational categories were mutually exclusive and the method seems to have been successful in identifying the main occupations of the respondent.

In order to ensure as close a comparability as possible between the rounds the occupational status of the respondent in rounds 1 and 2 was identified using the second of the procedures set out above so individuals were classified as employees or as self-employed in either agricultural or non-agricultural activities on the basis of their answers to sections 5b and 5e. To these respondents was added those defined as unemployed from the answers to questions 5a.

**Table 1 Expenditures in Ghana 1987/88-1998/99: Household Survey and Macro Data**

		GLSS1 1987/88	GLSS2 1988/89	GLSS3 1991/92	GLSS4 1998/99
1	HHEXP/Capita ('000 cedis 1991/92 prices) (a)	198.3	187.5	215.0	
2	HHEXP/AE ('000 cedis 1998/99 prices) (b)			1130.8	1412.1
3	Index 1998/99=100	73.9	69.9	80.1	100
	<b>HHEXP/Capita</b>				
	Weights used for GLSS 4				
4	Nominal ('000 Cedis)	87.0	107.9	208.9	1,336.3
5	CPI 1998/99 prices	6.8	8.6	15.8	88.7
6	CPI 1991/92 prices	43.3	54.6	100	561.2
7	Real ('000 Cedis 1998/99 prices)	1,283.2	1,249.1	1,326.8	1,336.3
8	Real ('000 Cedis) 1991/92 prices)	202.7	197.4	209.6	235.0
9	<b>HHEXP/Capita</b> <b>Index 1998/99=100</b>	<b>86.5</b>	<b>85.7</b>	<b>90.5</b>	<b>100</b>
10	GDP per Capita ('000 Cedis 1998/99)	796	814	857	940
11	Investment per Capita ('000 Cedis 1998/99)	145	167	176	208
12	Consumption per Capita ('000 Cedis 1998/99)	643	653	665	719
13	<b>Consumption per Capita Macro Index</b> <b>1998/99=100</b>	<b>89.4</b>	<b>90.8</b>	<b>92.4</b>	<b>100</b>

Sources: GLSS Surveys and World Development Indicators (2000). As noted in the text the aggregate expenditure data for the third round of the survey were revised at the time the fourth round was analysed. We use throughout this study the original data so that we can compare our results with those published in GSO (1995).

(a) Household Expenditure per Capita (HHEXP/Capita) is taken from GSO (1995, Table 2.1 p.6).

(b) Household Expenditure per Adult Equivalent (HHEXP/AE) is taken from GSO (2000, Appendix 1, p.35).



**Table 2a Labour Force Status: Percentages of Individuals by Category of Employment**

	1987/88	1988/89	1991/92	1998/99
Wage Employees	17.3	18.1	15.4	13.2
Government	8.0	7.9	7.8	5.9
State Enterprise	1.9	2.3	1.2	0.6
Private	7.4	7.9	6.4	6.7
Farmer	58.7	54.6	56.7	55.7
Non-Agricultural Self Employment	19.5	24.2	23.5	27.3
Unpaid Family	2.2	1.1	1.3	0.3
Unemployed	2.2	1.9	3.2	3.5
Total	100	100	100	100
Labour Force participation	0.87	0.89	0.89	0.86

**Table 2b Labour Force Status: Sample Size (Number of Observations)**

	1987/88	1988/89	1991/92	1998/99
Wage Employees	1,053	1,133	1,231	1,327
Government	485	492	627	597
State Enterprise	118	142	94	55
Private	450	499	510	675
Farmer	3,567	3,420	4,548	5,586
Non-Agricultural Self Employment	1,185	1,513	1,885	2,738
Unpaid Family	135	73	255	28
Unemployed	136	120	102	346
Total	6,076	6,259	8,021	10,025

Sources: GSO Surveys. The approach taken to ensuring the maximum degree of comparability across the surveys in determining the labour force status of the individual is described in the appendix.

**Table 3 Expenditures and Incomes: Annual in '000 1998/99 Cedis**

	1987/88	1988/89	1991/92	1998/99
<b>Household Expenditure per Capita</b>				
N	[3,171]	[3,434]	[4,550]	[5,998]
Households whose head is a:				
Public Wage Employees	1,630	1,605	1,786	1,880
Private Wage Employees	1,908	1,766	1,858	2,173
Non-Agricultural Self Employment	1,487	1,427	1,590	1,786
Farmer	1,002	961	969	1,007
All	1,283	1,249	1,326	1,487
<b>Household Expenditure per Adult</b>				
Households whose head is a:				
Public Wage Employee	2,748	2,632	3,071	3,183
Private Wage Employee	2,757	2,442	2,786	3,141
Non-Agricultural Self Employment	2,813	2,494	3,058	3,051
Farmer	1,834	1,667	1,811	1,774
All	2,232	2,070	2,367	2,447
<b>Incomes from the Principal Job (a)</b>				
N	3,651	4,313	4,599	5,397
Public Wage Job	1,725	1,804	4,291	3,067
Private Wage Job	1,857	1,623	1,941	2,086
Non-Agricultural Self Employment	2,688	3,149	2,376	2,662
Farmer	644	561	755	735
All	1,469	1,600	1,748	1,692

(a) The sample is confined to those individuals for which there are a complete set of data on age, education, hours worked, parental background and household assets. Weights are used for GLSS 4.

**Table 4 Expenditures and Incomes: Ln [Annual (1998/99) Cedis]**

	1987/88	1988/89	1991/92	1998/99
<b>Household Expenditure per Capita</b>				
N	3,171	3,434	4,550	5,998
<i>Households whose head is a:</i>				
Public Wage Employee	14.06 [0.68]	14.03 [0.69]	14.09 [0.77]	14.20 [0.69]
Private Wage Employee	14.18 [0.74]	14.09 [0.76]	14.16 [0.77]	14.34 [0.76]
Non-Agricultural Self Employment	13.94 [0.72]	13.88 [0.74]	14.01 [0.72]	14.13 [0.76]
Farmer	13.58 [0.68]	13.52 [0.69]	13.54 [0.70]	13.55 [0.70]
All	13.78 [0.73]	13.74 [0.75]	13.80 [0.77]	13.89 [0.79]
<b>Household Expenditure per Adult</b>				
<i>Households whose head is a:</i>				
Public Wage Employee	14.68 [0.54]	14.62 [0.57]	14.73 [0.65]	14.79 [0.62]
Private Wage Employee	14.63 [0.63]	14.49 [0.66]	14.65 [0.66]	14.78 [0.64]
Non-Agricultural Self Employment	14.61 [0.68]	14.52 [0.66]	14.71 [0.68]	14.71 [0.69]
Farmer	14.22 [0.63]	14.15 [0.60]	14.22 [0.64]	14.16 [0.65]
All	14.40 [0.66]	14.33 [0.66]	14.44 [0.70]	14.46 [0.72]
<b>Incomes from the Principal Job (a)</b>				
N	3,651	4,313	4,599	5,397
Public Wage Job	14.26 [0.45]	14.30 [0.48]	14.48 [0.81]	14.62 [0.82]
Private Wage Job	13.97 [0.94]	13.94 [0.88]	14.17 [0.81]	14.18 [1.0]
Non-Agricultural Self Employment	13.97 [1.29]	13.98 [1.33]	14.01 [1.16]	14.01 [1.22]
Farmer	12.58 [1.28]	12.33 [1.36]	12.91 [1.09]	12.73 [1.17]
All	13.32 [1.39]	13.23 [1.51]	13.52 [1.24]	13.44 [1.36]

(a) The sample is confined to those individuals for which there is a complete set of data on age, education, hours worked, parental background and household assets. Weights are used for GLSS 4. Figures in [ ] parentheses are standard deviations.

**Table 5 Education and Age by Type of Worker: Individual Based Data**

		1987/88	1988/89	1991/92	1998/99
<b>Public Wage Job</b>	N	490	537	560	474
Education		9.4 [5.3]	10.0 [5.3]	10.2 [5.5]	12.4 [4.4]
Age		38.5 [10.2]	39.1 [9.6]	41.0 [10.1]	42.3 [9.6]
<b>Private Wage Job</b>	N	353	401	336	404
Education		7.0 [5.1]	7.5 [4.9]	8.4 [4.8]	9.3 [5.0]
Age		36.2 [13.0]	36.1 [13.1]	37.5 [11.7]	37.9 [12.5]
<b>Non-Agricultural Self Employment</b>	N	1,004	1,309	1,350	1,664
Education		4.4 [4.8]	4.8 [4.8]	5.0 [4.8]	6.0 [5.0]
Age		38.6 [13.7]	38.6 [13.8]	38.2 [12.8]	39.0 [13.1]
<b>Farmer</b>	N	1,804	2,066	2,353	2,855
Education		2.8 [4.3]	3.1 [4.3]	3.3 [4.3]	3.6 [4.5]
Age		43.5 [15.6]	43.9 [16.0]	45.6 [15.6]	46.4 [14.3]
<b>All workers</b>	N	3,651	4,313	4,599	5,397
Education		4.5 [5.2]	4.9 [5.2]	5.0 [5.2]	5.7 [5.4]
Age		40.8 [14.5]	41.0 [14.7]	42.3 [14.4]	42.9 [13.9]
Highest Educational Levels Reached (%)					
No Education		50.8	45.5	45.6	44.5
Primary or less		16.8	20.2	17.9	12.0
Middle School Completed		27.0	28.4	29.8	33.0
Secondary School Completed		2.5	2.9	3.8	5.2
Some Post secondary		2.9	3.0	2.8	5.3

Sources: GSO Surveys. The figures in [ ] parentheses are standard deviations. N is the number of observations.

TABLE 6 EARNINGS FUNCTIONS

	Farmer (a)	Non-Farm Self- Employed	Private Wage Employee	Public Wage Employee	All
<b>PARAMETER</b>					
Intercept	10.03 (60.57)	11.83 (36.96)	12.23 (40.84)	12.13 (60.07)	10.53 (60.8)
Male	0.73 (18.93)	0.43 (9.91)	0.27 (4.23)	0.09 (2.80)	0.31 (11.28)
Years of Education	0.01 (3.37)	-0.031 (2.83)	-0.037 (2.74)	0.011 (1.46)	-0.002 (0.37)
Years of Education <sup>2</sup> /100		0.47 (5.76)	0.53 (6.76)	0.20 (4.98)	0.42 (11.04)
Age	0.038 (8.01)	0.062 (9.24)	0.057 (4.47)	0.046 (5.55)	0.037 (9.31)
Age <sup>2</sup> / 1000	-0.33 (6.79)	-0.75 (10.10)	-0.58 (3.82)	-0.40 (4.11)	-0.39 (9.30)
Ln (Weekly Hours)	0.25 (9.36)	0.27 (11.52)	0.02 (0.57)	0.13 (4.78)	0.33 (16.09)
Round 2 (1988/89)	-0.19 (2.67)	-0.002 (0.03)	0.01 (0.15)	-0.003 (0.12)	-0.04 (0.70)
Round 3 (1991/92)	0.15 (2.49)	-0.17 (2.12)	0.17 (2.24)	0.14 (3.32)	0.06 (1.16)
Round 4 (1998/99)	0.004 (0.06)	-0.22 (2.82)	0.14 (1.78)	0.17 (2.97)	-0.056 (0.95)
Number of Observations	9,078	5,327	1,494	2,061	17,960
R <sup>2</sup>	0.26	0.18	0.20	0.25	0.29
Average years of Education in 1998/99	3.6	6.0	9.3	12.4	5.7
(b) Mincerian ROR (means)	1.0	2.5	6.2	6.1	4.6
Mincerian ROR (10 years)	1.0	6.3	6.9	5.1	8.2
Tests on Education over Time [p value] (c)	0.45	0.09	0.06	0.025	

The dependent variable is the log of real annual income in 1998/99 prices. *t*-statistics are based on standard errors robust to cluster effects and the observations from GLSS 4 are weighted using weights created by the survey team. The estimates were obtained from STATA. All the equations control for location and regions.

(a) The non-linear term in education was dropped for farmers as it was not significant.

(b) ROR is the Rate of Return.

(c) This test for the joint significance of the educational variables interacted with the round dummies. At the 1 per cent

significance level we can accept that they are jointly zero for all occupations.

**TABLE 7A**  
**PRIVATE WAGE EARNINGS FUNCTION ESTIMATES WITH CONTROLS FOR SELECTIVITY**

PARAMETER	Male		Female	
Intercept	12.33 (23.2)	12.68 (38.72)	11.92 (8.63)	11.25 (18.16)
Years of Education	-0.043 (2.84)	-0.043 (2.91)	-0.07 (1.75)	-0.063 (1.77)
Years of Education <sup>2</sup> /100	0.58 (6.01)	0.54 (6.4)	0.67 (1.59)	0.89 (3.49)
Age	0.071 (3.60)	0.059 (4.12)	0.049 (1.92)	0.053 (2.2)
Age <sup>2</sup> / 1000	-0.71 (3.24)	-0.58 (3.5)	-0.53 (1.8)	-0.57 (1.98)
Ln (Weekly Hours)	-0.01 (0.36)	-0.01 (0.37)	0.15 (2.3)	0.14 (2.32)
Lambda	0.31 (0.8)		-0.31 (0.51)	
Round 2 (1988/89)	-0.01 (0.09)	0.02 (0.31)	-0.02 (0.13)	-0.03 (0.22)
Round 3 (1991/92)	0.16 (1.67)	0.21 (2.51)	0.01 (0.04)	-0.01 (0.54)
Round 4 (1998/99)	0.10 (0.76)	0.19 (2.2)	-0.02 (0.1)	-0.10 (0.54)
Number of Observations	1225	1225	269	269
R <sup>2</sup>	0.19	0.18	0.24	0.24
Average years of Education in 1998/99	9.3	9.3	8.4	8.4
Mincerian ROR (at means)	6.5	5.7	4.3	8.7
Mincerian ROR (10 years)	7.3	6.5	6.4	11.5

The dependent variable is the log of real annual income in 1998/99 prices. *t*-statistics are based on standard errors robust to cluster effects and the observations from GLSS 4 are weighted using weights created by the survey team. The estimates were obtained from STATA. All the equations control for location and regions.

**TABLE 7B**  
**PUBLIC WAGE EARNINGS FUNCTION ESTIMATES WITH CONTROLS FOR SELECTIVITY**

PARAMETER	Male		Female	
Intercept	11.27 (27.67)	12.12 (50.72)	12.69 (26.27)	12.53 (33.17)
Years of Education	0.01 (1.1)	0.01 (1.0)	0.04 (2.22)	0.05 (3.13)
Years of Education <sup>2</sup> /100	0.30 (5.15)	0.19 (3.97)	0.12 (1.6)	0.14 (2.0)
Age	0.081 (5.71)	0.053 (5.57)	0.01 (0.6)	0.01 (0.62)
Age <sup>2</sup> / 1000	-0.82 (5.1)	-0.50 (4.5)	0.09 (0.4)	0.09 (0.4)
Ln (Weekly Hours)	0.12 (3.69)	0.13 (3.82)	0.15 (3.1)	0.15 (3.1)
Lambda	0.78 (2.92)		-0.07 (0.5)	
Round 2 (1988/89)	-0.07 (1.9)	0.01 (0.02)	-0.01 (0.2)	-0.01 (0.3)
Round 3 (1991/92)	0.06 (1.0)	0.15 (3.3)	0.11 (1.5)	0.11 (1.4)
Round 4 (1998/99)	0.02 (0.2)	0.21 (3.0)	0.04 (0.51)	0.03 (0.4)
Number of Observations	1549	1549	512	512
R <sup>2</sup>	0.24	0.24	0.32	0.32
Average years of Education in 1998/99	11.9	11.9	12.5	12.5
Mincerian ROR (at means)	8.1	5.5	7.0	8.5
Mincerian ROR (10 years)	7.0	4.8	6.4	7.8

The dependent variable is the log of real annual income in 1998/99 prices. *t*-statistics are based on standard errors robust to cluster effects and the observations from GLSS 4 are weighted using weights created by the survey team. The estimates were obtained from STATA. All the equations control for location and regions.



**TABLE 8**  
**EARNINGS FUNCTION FOR NON-WAGE EARNERS WITH ASSETS AND PARENTAL EDUCATIONAL**

PARAMETER	Farmer (a)		Non-Farm Self-employed	
Intercept	10.11 (59.19)	10.11 (58.72)	11.78 (36.42)	11.76 (36.34)
Male	0.72 (18.57)	0.72 (18.55)	0.43 (9.58)	0.43 (9.63)
Years of Education	0.01 (2.77)	0.01 (2.69)	-0.031 (2.86)	-0.031 (2.93)
Years of Education <sup>2</sup> /100			0.46 (5.72)	0.46 (5.59)
Age	0.035 (7.27)	0.035 (7.19)	0.061 (8.60)	0.062 (8.66)
Age <sup>2</sup> / 1000	-0.31 (6.38)	-0.31 (6.33)	-0.74 (9.57)	-0.74 (9.63)
Ln (Weekly Hours)	0.25 (9.36)	0.25 (9.37)	0.27 (11.43)	0.27 (11.46)
Ln (Land)	0.036 (5.19)	0.036 (5.19)	-0.014 (1.53)	-0.013 (1.52)
Ln (Farm Livestock)	0.014 (3.13)	0.014 (3.13)	0.001 (1.09)	0.008 (0.14)
Ln (Farm Equipment)	0.025 (3.90)	0.025 (3.91)	-0.01 (1.09)	-0.01 (1.07)
Ln (Assets of Non-Farm Self-employed Households)	0.003 (0.86)	0.003 (0.87)	0.005 (0.087)	0.005 (0.85)
Ln (Number of Adults in Household)	0.01 (0.41)	0.01 (0.42)	0.05 (1.15)	0.048 (1.18)
Education of Father		0.002 (0.44)		0.004 (0.87)
Education of Mother		-0.003 (0.30)		0.0 (0.0)
Round 2 (1988/89)	-0.18 (2.53)	-0.18 (2.53)	-0.006 (0.07)	-0.006 (0.07)
Round 3 (1991/92)	0.24 (3.79)	0.26 (3.79)	-0.17 (2.18)	0.18 (2.18)
Round 4 (1998/99)	0.07 (0.94)	0.07 (0.93)	-0.22 (2.72)	-0.22 (2.73)
Number of Observations	9,078	9,078	5,327	5,327
R <sup>2</sup>	0.28	0.28	0.18	0.18
Years of Education 1998/99	4.0	4.0	6.0	6.0
Mincerian ROR (at means)	1.0	1.0	2.4	2.4
Mincerian ROR (10 years)	1.0	1.0	6.1	6.1

The dependent variable is the log of real annual income in 1998/99 prices. *t*-statistics are based on standard errors robust to cluster effects and the observations from GLSS 4 are weighted using weights created by the survey team. The

estimates were obtained from STATA. All the equations control for location and regions.

**Table 9 Education and Poverty 1987/88-1998/99**

	GLSS1 1987/88	GLSS2 1988/89	GLSS3 1991/92	GLSS4 1998/99	Growth 1987/88- 1998/99
Poverty Measures using HHEXP/Capita Using Cedis 900,000 poverty line (a)					
P <sub>0</sub>	0.49	0.53	0.48	0.45	
P <sub>1</sub>	0.18	0.20	0.18	0.17	
P <sub>2</sub>	0.07	0.08	0.06	0.06	
Average Income of the poor (1998 prices)	568,228	552,713	568,557	553,754	-2.5
Ln( HHEXP/Capita (1998 prices) ) (b)					
Mean	13.75	13.69	13.77	13.82	7.0
Standard Deviation	0.72	0.73	0.76	0.77	
Gini coefficient based on HHEXP/Capita (1998 prices)	0.41	0.42	0.42	0.46	
Consumption per Capita Index 1998/99=100 (c)	89.4	90.8	92.4	100	11.9
Education of Household Head (years)	5.1	5.4	5.5	6.4	25.5
No Education					
P <sub>0</sub>	0.60	0.66	0.58	0.60	0.0
Share	0.47	0.43	0.42	0.38	-19.0
Primary Education					
P <sub>0</sub>	0.51	0.55	0.53	0.43	-15.7
Share	0.09	0.11	0.11	0.11	22.2
Middle-school Education					
P <sub>0</sub>	0.39	0.43	0.41	0.36	-7.7
Share	0.36	0.38	0.39	0.35	-2.8
Secondary Education					
P <sub>0</sub>	0.22	0.23	0.24	0.22	0.0
Share	0.04	0.04	0.05	0.07	75.0
Post-Secondary Education					
P <sub>0</sub>	0.30	0.25	0.17	0.18	-40.0
Share	0.04	0.04	0.04	0.08	100.0

(a) This is the upper poverty line used by GSO (2000) which translates into US\$ 393 using the actual exchange rate in 1998/99. The purchasing power parity exchange rate for consumption in Ghana from the PENN World Tables for 1992 is 37.03 per cent of the official exchange rate for consumption, see PENN World Table Data from Heston and Summers (1991). So the poverty line in GSO (2000) corresponds to US \$ PPP (at 1998 prices) 1061. If we reduce these to 1993 prices using the US GDP deflator we arrive at US\$ PPP (at 1993 prices) 966. This figure is close to three times the US\$ (PPP) 1 per day figure used for international comparisons of poverty in World Bank Report (2000/2001).

(b) These figures differ from those in Table 4 as in this Table we are using the whole sample.

(c) This is the figure from the macro data.

**TABLE 10**  
**HOUSEHOLD CONSUMPTION FUNCTIONS**

PARAMETER			
Intercept	14.22 (140.0)	13.71 (191.7)	13.96 (144.4)
Male	0.15 (8.28)	-0.004 (0.3)	-0.01 (0.04)
Years of Education of Household Head	-0.003 (0.55)	0.001 (0.2)	-0.002 (0.53)
(Years of Education of Household Head) <sup>2</sup> /100	0.18 (6.16)	0.17 (7.2)	0.19 (8.23)
Years of Education of Adult Member	0.004 (1.18)	0.007 (2.3)	0.006 (2.02)
(Years of Education of Adult Member) <sup>2</sup> /100	-0.15 (1.46)	-0.18 (1.91)	-0.15 (1.73)
Age of Household Head	-0.03 (8.74)	0.01 (5.3)	0.02 (5.98)
(Age of Household Head) <sup>2</sup> / 1000	0.27 (10.03)	-0.11 (4.63)	-0.11 (5.22)
Age of Household Adult Member	-0.008 (8.48)	-0.004 (4.73)	-0.005 (5.8)
(Age of Household Adult Member) <sup>2</sup> / 1000	0.02 (4.90)	0.02 (3.28)	0.02 (4.0)
Ln (Weekly Hours)		0.05 (9.75)	0.05 (10.2)
Ln (Number of Adults in Household)		0.27 (16.4)	0.25 (14.9)
Ln (Household Size)		-0.72 (58.8)	-0.75 (62.7)
Round 2 (1988/89)	-0.07 (2.27)	-0.10 (3.96)	-0.11 (4.3)
Round 3 (1991/92)	-0.02 (0.80)	-0.05 (1.79)	-0.02 (0.88)
Round 4 (1998/99)	0.03 (0.89)	-0.03 (0.9)	0.001 (0.03)
Controls for Household Assets	No	No	Yes
Number of Observations	13,305	13,305	13,305
R <sup>2</sup>	0.24	0.49	0.50
Mincerian ROR (at means)	1.9	2.3	2.9
Mincerian ROR (10 years)	3.4	3.7	3.3

The dependent variable is the log of real per capita consumption in 1998/99 prices. *t*-statistics are based on standard errors robust to cluster effects and the observations from GLSS 4 are weighted using weights created by the survey team. The estimates were obtained from STATA. All the equations control for location and regions. The average years of education for the household head was 5.5 years, that for all adult household members was 6.7.

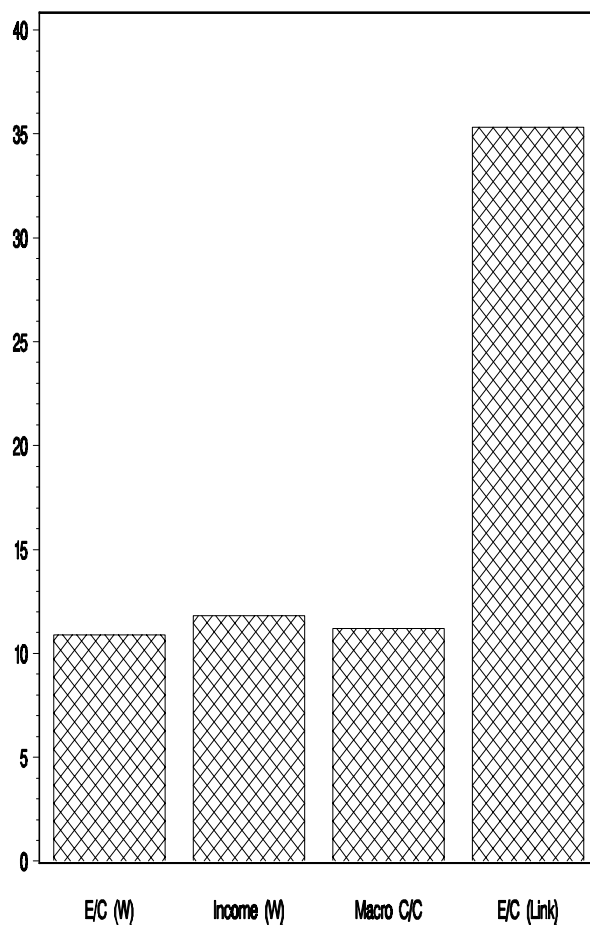
APPENDIX TABLE PROBIT ON WAGE EMPLOYMENT

PARAMETER	Male		Female	
	Coefficients	Marginal Effects (a)	Coefficients	Marginal Effects (a)
Intercept	-0.67 (2.51)		-2.06 (7.02)	
Years of Education	-0.01 (1.2)	0.016	-0.05 (2.74)	0.009
Years of Education <sup>2</sup> /100	0.46 (6.2)		1.35 (10.2)	
Age	0.066 (6.8)	0.00042	0.024 (2.1)	0.00095
Age <sup>2</sup> / 1000	-0.75 (6.96)		0.22 (1.7)	
Father's Background	0.19 (3.44)		0.06 (0.85)	
Mother's Background	0.04 (0.9)		0.08 (1.4)	
Father's Education	-0.01 (0.2)		0.02 (2.99)	
Mother's Education	0.01 (0.10)		0.01 (1.3)	
Round 2 (1988/89)	-0.21 (3.42)		-0.11 (1.54)	
Round 3 (1991/92)	-0.28 (4.4)		-0.14 (1.96)	
Round 4 (1998/99)	-0.55 (8.7)		-0.46 (6.23)	
Number of Observations	4,136		4746	
Pseudo R <sup>2</sup>	0.08		0.22	
Mean of Dependent Variable	0.67		0.37	

The dependent variable is unity if the individual has a wage job and zero if they are in non-agricultural self-employment. Farmers are not included in the sample. The equation controls for location and regions.

(a) The two marginal effects reported in this column are for the effect of education and age at their means, allowing for both the linear and quadratic effects.

**Figure 1**  
**Expenditure per Capita in Ghana: Micro and Macro Evidence**  
**Rate of Growth from 1987/88 – 1998/99 in Per Cent**



E/C(W) is Weighted Household Expenditure per Capita from this study

Income(W) is Weighted Real Incomes in the Principal Job

Macro C/C is Consumption per Capita from the Macro Data

E/C (Link) is Household Expenditure per Capita Linked

**Figure 2**  
**Changes in Real Incomes in the Principal Job: 1987/88 – 1998/99 by Type of Work**

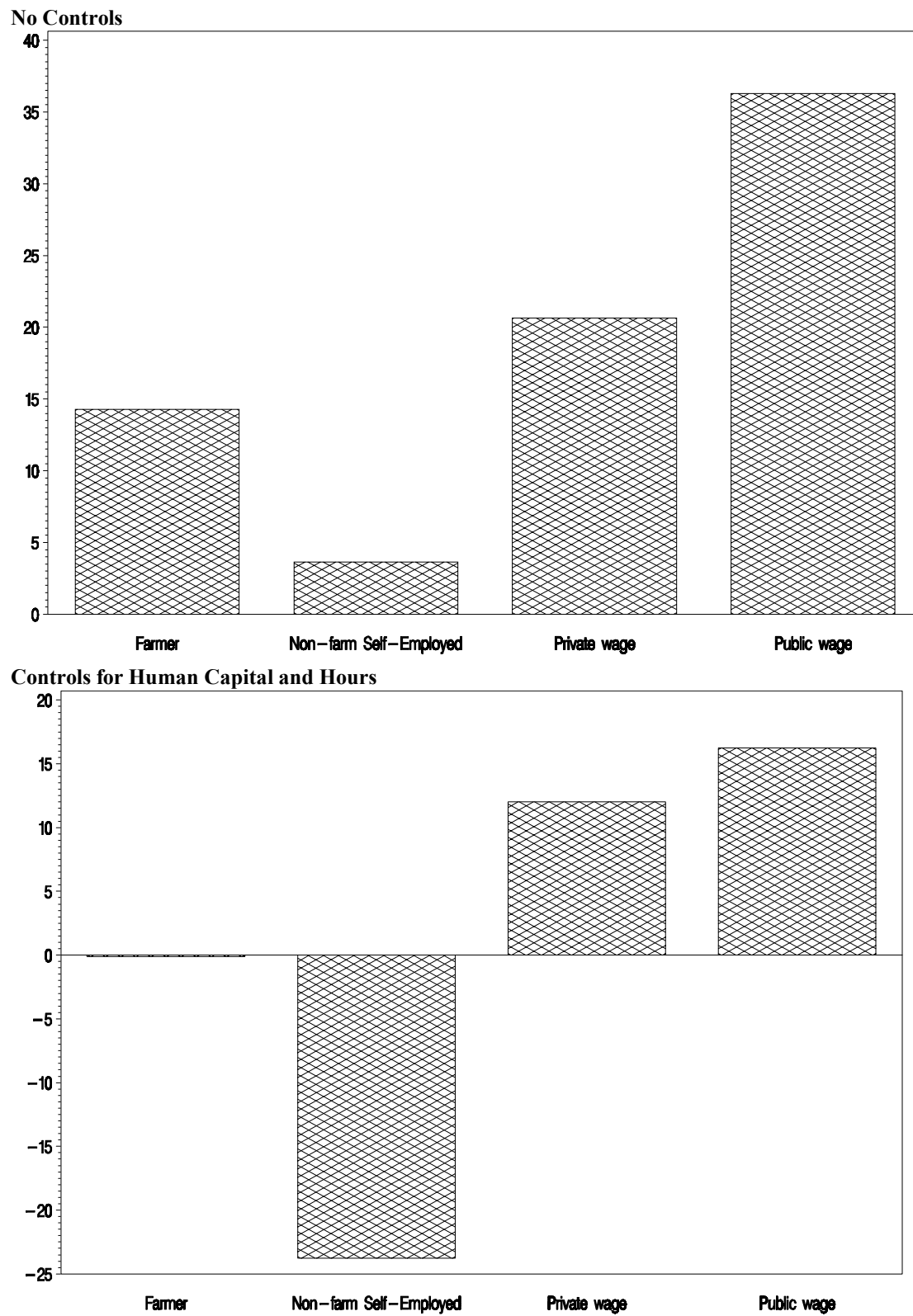
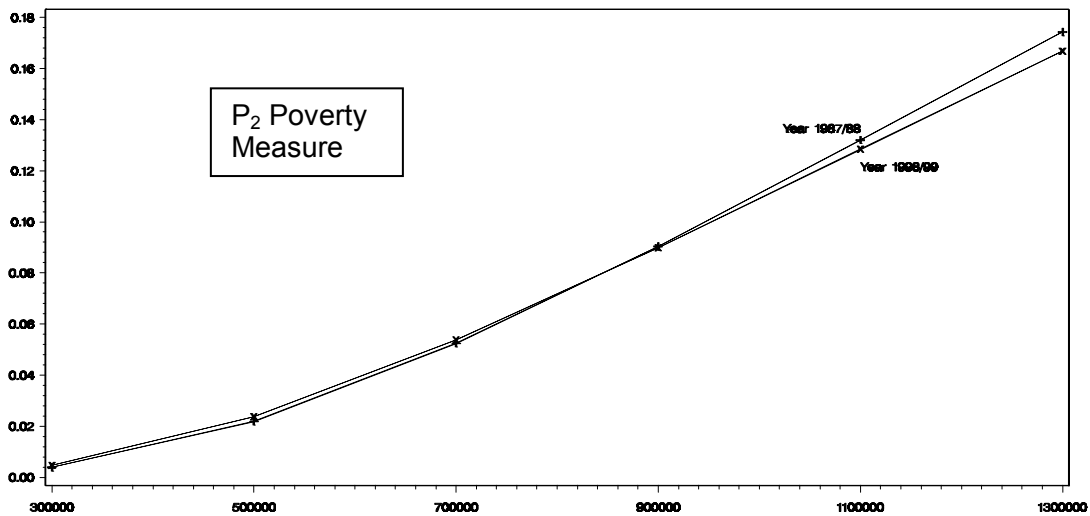
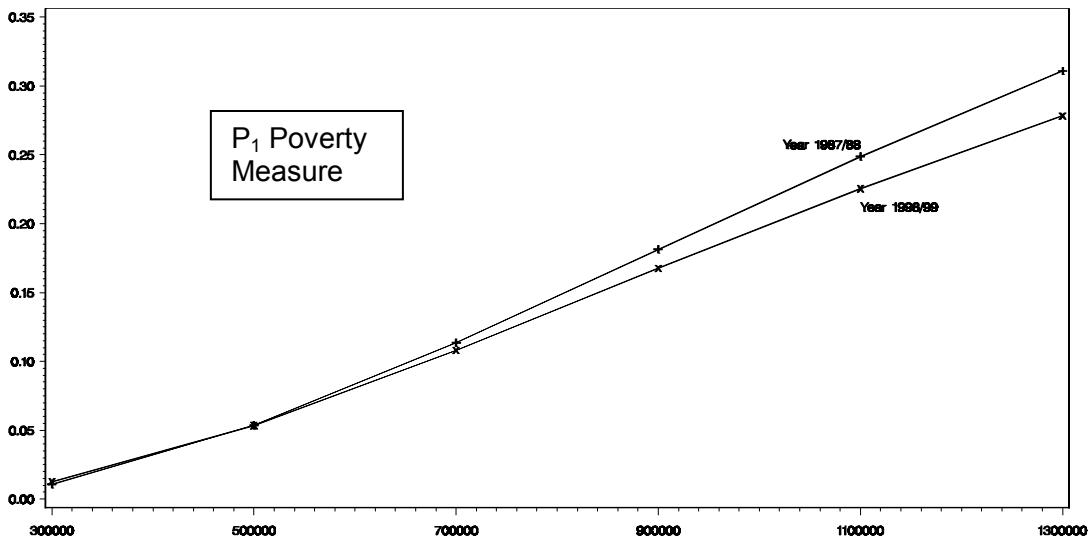
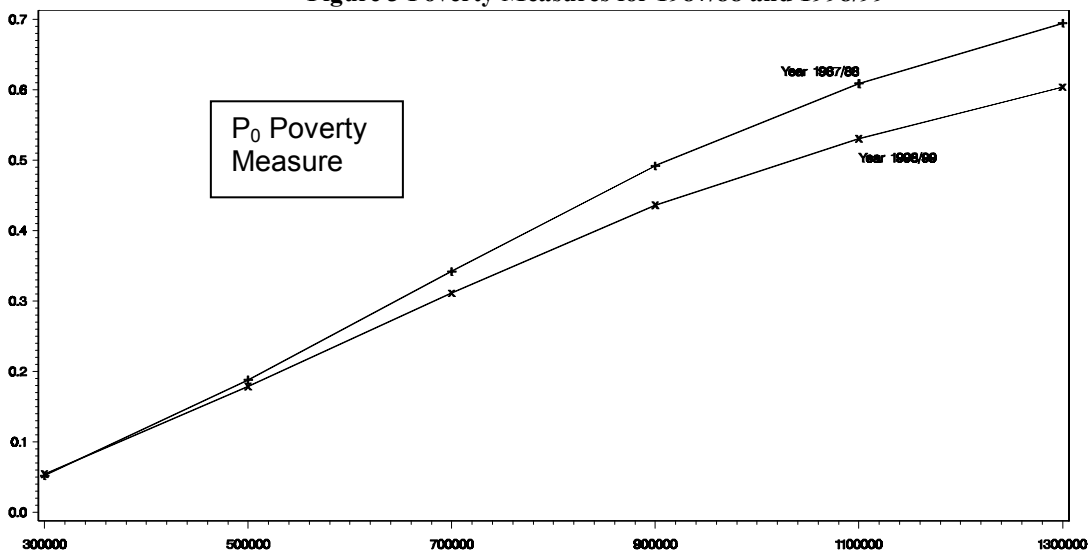


Figure 3 Poverty Measures for 1987/88 and 1998/99



Key: US \$ PPP (at 1993 prices)  
 0.88      1.47      2.1      2.65      3.2      3.8