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Abstract

Egypt is on track to achieve its long-term goal of reducing the poverty rate to 6 percent by 2022. Continued progress towards this goal will require rapid employment growth for which agriculture growth, through its impact on demand for goods and services in the rural non-tradable sector will be of fundamental importance. This paper considers which agricultural policies will be most effective at reducing rural poverty in Egypt. Using household survey data from 1997 the study analyzes household income structure and determinants. Results indicate that agricultural policies that help to raise unskilled labor wages and/or increase demand for unskilled labor as well as those that support small animal/bird raising, in particular poultry, are best suited to help the poor. A longer-term strategy must also focus on enhancing formal sector employment through increased access to education for men and in particular women.

Key words: Egypt, household income structure, household income determinants, income distribution, rural sector.

JEL:D30, O12

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1. INTRODUCTION

Poverty reduction is one of the key goals of development policy in Egypt. The country's experience in this regard has been positive and between 1990/1991 and 1999/2000 the poverty rate fell from 24.3 to 16.7 percent (United Nations and Ministry of Planning, 2004).[2] The country is on-track to achieve its long-term goal of reducing the poverty rate to 6 percent by 2022. A number of factors make Egypt's progress remarkable and will likely make continued progress towards the Millennium Development Goal (MDG) target increasingly difficult. In particular rapid population growth will mean that in 2050 127.4 million Egyptians will share already scarce land and water resources. The current population to arable land ratio of 7.5 is perhaps the highest in the world and water, at only about 926 cubic meters per capita of renewable freshwater available (FAO, 2001) is also a serious constraint.

It is very likely that the rapidly growing rural labor force will increasingly depend on off-farm employment and small-scale household enterprise activities for their income. Already non-agricultural wage and household enterprises account for about 41 percent, on average, of household income (from table 2).[3] Furthermore, Mellor and Ranade (2002)[4] report that 62 percent of the labor force is employed in the non-tradable sector, two-thirds of which are in the rural non-tradable sector while agriculture accounts for 23 percent of employment. However, they, and Mellor and Gavian (1999), find that agricultural growth, through its impact on the demand for goods and services in the rural (and small-town) non-tradable sector, plays a fundamental role in employment growth. Indeed, they predict that zero agricultural growth will virtually eliminate any improvement in labor incomes, and increase income inequality and poverty. This result implies the continued importance of agriculture to future economic growth in Egypt.

In this paper I look at the related question of which agricultural policies will be most effective at reducing rural poverty in Egypt. Building on Adams (2002) I use the same 1997 household survey data to study the structure and the determinants of rural household income. Adams' key findings where that policy makers must pay more attention to non-farm income if they want to reduce poverty and improve income inequality. He finds that from an equity standpoint a focus on non-farm unskilled labor would be most effective. Finally he shows that agricultural income is positively correlated to landownership which is very unequally distributed while non-farm income is not linked to landownership and therefore more important for the poor. This study work complements Adams' study on the one hand because I use different income source definitions, thus providing another angle from which to analyse the data. Moreover I extend Adams' work on this topic by providing a more detailed econometric analysis of the determinants of wage employment participation and of household income per se. The results show that poor households depend disproportionately on casual labor in the private sector (both agriculture and non-agriculture) and livestock, i.e. small animals and in particular small animals, for generating income. A longer-term strategy would also focus on enhancing formal sector employment as returns in this sector are higher and it is a crucial sector with regard to helping households move out of poverty. In this regard the finding that education is the key factor in participating and in securing higher returns in wage employment is important.

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[2] Based on Household Income Expenditure and Consumption Surveys. On the basis of their lower poverty line, based on meeting basic food and non-food needs, the percentage of Egyptian's classified as food poor fell from 8.9 to 2.8 over the 1990/1991 to 1999/2000 period (United Nations and Ministry of Planning (2004)).

[3] See Reardon et al (1998) for a summary of the relative importance of the rural nonfarm sector in developing countries.

[4] This study is a part of a collection of studies prepared by the Monitoring, Verification and Evaluation Unit of the Agricultural Policy Reform Program (APRP) sponsored by the Ministry of Agriculture and Land Reclamation and the United States Agency for International Development. More details as well as the various reports and studies are available at http://www.abtassoc.com/attachments/APRP/APRP_Index.htm.

2. OVERVIEW OF THE DATA

Our analysis of the rural household income structure is based on the 1997 Egypt Integrated Household Survey (EIHS) [5] which covered 2500 rural and urban households from 20 governorates. The survey used a two-stage, stratified selection process. In the first stage, 125 primary sampling units (PSU) were randomly selected with probability proportional to size. In the second stage 20 households were randomly selected from each PSU. The design of the survey also stratified selection on the following five regions of Egypt: Metropolitan, Lower urban, Lower rural, Upper urban and Upper rural. [6] The rural part of the survey includes 1327 households from 17 rural governorates. [7] The survey covers a wide range of topics and is therefore well suited to an analysis of the links between different household income sources and household assets and characteristics as well as public assets. Incomes are disaggregated into six categories: [8] i) wage income, both formal and informal, origination in either the non-agricultural or the agricultural sector; ii) crop and livestock income includes revenues from crops [9] and livestock (sale of live animals, sale of animals for slaughter, sale of animal products) [10] production as well as rental income from ploughing and machinery services; iii) household enterprise income, includes enterprises in the agricultural and non-agricultural sector; iv) financial income, includes returns on financial assets; v) transfer income, includes remittances and transfers sent to the household as well as income from pensions (I do not use net transfers), and; vi) real estate income, includes rent from agricultural (and other) land as well as rent from household dwelling (renting out part of own dwelling) and rent from other assets.

Table 1 gives the breakdown of per-capita income, in levels and shares by source both at the national level and by Upper and Lower region. Wage employment, both formal and informal, makes up the largest part of household income in rural Egypt. It accounts for just over 43 percent of household income nationally and for 46.4 and 40.1 percent for Lower and Upper Egypt respectively. Agricultural income, at 29.1 percent is the second most important income source, and its share is slightly lower in Lower Egypt (27.4 percent) relative to Upper Egypt (31.1 percent). Also important are transfers, which is the only item that is constant in terms of levels across regions, and which account for 16.5 percent of household income at the national level. Households in Lower Egypt are significantly better off and this derives in particular from their much higher average per-capita wage income levels.

Table 1: Per-capita income levels (in Egyptian Pounds – LE) and income shares (in brackets) by source and region for rural Egypt, 1997

Category	Lower	Upper	Overall
Wages	372 (46.4)	277 (40.1)	328 (43.2)
Crop and Livestock	303 (27.4)	248 (31.1)	277 (29.1)
Household Enterprises	76 (6.7)	64 (7.1)	71 (6.9)
Financial	18 (1.5)	26 (2.2)	22 (1.8)
Transfers	129 (15.4)	130 (17.9)	130 (16.5)
Real Estate	28 (2.7)	16 (1.7)	22 (2.2)
Total	926	760	849

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[5] The 1997 Egypt Integrated Household Survey (EIHS) was undertaken by the International Food Policy Research Institute in collaboration with United States Agency for International Development (USAID), the Ministry of Agriculture and land Reclamation of the Government of Egypt and the Ministry of Trade and Supply of the Government of Egypt. The EIHS survey was funded under USAID Grant No. 263-G-00-96-00030-00. See also Datt, Jolliffe and Sharma (1998) for more details.

[6] Datt, Jolliffe and Sharma (1998) note that this regional classification has been used often by the Central Agency for Public Mobilization and Statistics (CAPMAS).

[7] The analysis uses 1305 observations as some observations were lost due to missing/incomplete data.

[8] The categories differ from those used by Adams (2002). In particular Adams included wages received from agricultural labor in agricultural income. I also treat household enterprises as a separate entity while Adams includes this item under the non-farm category. Finally, I include livestock in agricultural income.

[9] I replaced negative crop income numbers (28 observations) with zero.

[10] Includes value of animals slaughtered for consumption/gift.

3. HOUSEHOLD INCOME STRUCTURE BY INCOME QUINTILE

Table 2 gives the breakdown of per-capita income, in levels and shares, by source and by income quintile. A breakdown of shares by income quintiles shows that wage employment is relatively more important for the second and third quintiles and less so for the top quintile, implying an inverted-U shape type of relationship between wage income and total income. This increased share for the middle quintiles is accounted for by formal employment which for the bottom quintile is well below the national average. This proportion drops steadily as income increases and for the top quintile it is below 10 percent. The third quintile earns twice as much from formal employment as compared to the bottom quintile. Indeed, for the poorest, casual employment accounts for over a quarter of total per-capita income.

Perhaps somewhat surprisingly agricultural income as a share of total income accounts for between 24.8 and 28 percent of income for the bottom three quintiles, but then increases to 34.6 percent for the top quintile. Crop incomes steadily increase in importance, rising from 11 percent to 24.3 percent from the bottom to the top. The share in total income from livestock and livestock products is quite steady for the top four quintiles but much higher for the bottom quintile. Indeed, for the poorest group livestock income is more important than crop income – precisely the opposite of the relative proportions of the two at national level. The most important types of livestock for the bottom quintile are chicken, pigeons, ducks and rabbits (small animals) which together account for 72 percent of total livestock income (chicken alone account for 61 percent of livestock income). The remainder is due to cows, bullocks and buffalos. Chicken in particular account for the bulk of livestock income also for higher quintiles (falling to 44 percent for the fifth quintile) and cows, bullocks and buffalos are increasingly important for higher income groups and account for about a third of livestock income for the top quintile.[11]

Finally, I note that transfers are most important for the bottom quintile as well as the second and the top quintile. While transfers declined steadily, with a slight increase for the top quintile, I note that pension income is comparatively equally important for households across income quintiles. On average pensions account for nearly 10 percent of per-capita income.

Table 2: Per-capita income in levels and income shares (in brackets) by source and income quintile for rural Egypt, 1997
(for sub-sources only the shares are shown)

Category	Bottom quintile	2nd	3rd	4th	Top quintile	Overall
Wages	**89 (42.2%)**	**195 (47.4%)**	**308 (50.1%)**	**420 (44.8%)**	**607 (32.7%)**	**328 (43.4%)**
Non-agricultural formal	14.9%	21.8%	27.9%	29.6%	20.3%	23.3%
Non-Agricultural informal	12.0%	15.2%	10.0%	8.9%	7.8%	10.8%
Agricultural formal	0.8%	2.2%	3.6%	2.5%	2.2%	2.3%
Agricultural informal	13.9%	8.6%	7.5%	3.5%	1.8%	6.9%
Crop & Livestock	**45 (28.0%)**	**108 (26.1%)**	**156 (24.8%)**	**302 (32.1%)**	**764 (34.6%)**	**277 (29.1%)**
Crop	11.0%	14.7%	17.2%	21.1%	24.3%	17.6%
Livestock	17.3%	11.2%	8.2%	11.0%	10.1%	11.4%
Household Enterprises	**13 (6.4%)**	**24 (5.8%)**	**41 (6.3%)**	**63 (6.4%)**	**211 (9.4%)**	**71 (6.9%)**
Financial	**2 (0.7%)**	**7 (1.6%)**	**8 (1.3%)**	**25 (2.6%)**	**70 (3.0%)**	**21 (1.8%)**
Transfers	**42 (20.1%)**	**74 (18.0%)**	**101 (15.7%)**	**114 (12.0%)**	**318 (17.0%)**	**131 (16.5%)**
Remittances	8.6%	7.3%	8.3%	4.4%	6.4%	6.8%
Pensions	11.9%	10.3%	7.4%	8.1%	10.9%	9.8%
Real Estate	**5 (2.6%)**	**5 (1.2%)**	**12 (1.8%)**	**22 (2.2%)**	**66 (3.3%)**	**23 (2.2%)**
Total	**195**	**412**	**625**	**945**	**2035**	**849**

Table 3 gives the sector – public versus private – of employment by income quintile. Individuals across income quintiles are fairly evenly distributed in the private sector (with a small drop in the top

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[11] Calculations based on sub-sample that received positive income from livestock.

quintile) which accounts for 73 percent of employment in rural Egypt. But public sector employment is significantly skewed towards the top three quintiles.

Table 3: Number of individuals employed in the private and public sectors by income quintile for rural Egypt, 1997
(in brackets: the share in private + public sector employment for that quintile)

Industry	Bottom quintile	2nd	3rd	4th	Top quintile	Overall
Private	321 (85.8)	336 (79.8)	320 (70.8)	316 (63.2)	281 (67.2)	1574 (72.7)
Public	53 (14.2)	85 (20.2)	132 (29.2)	184 (36.8)	137 (32.8)	591 (27.3)

Includes formal and informal types of labour.

This is particularly significant when considering the earnings structure for private and public employment. Tables 3 and 4 show that even though the public sector accounts for much less of overall employment the returns to public sector employment are clearly much higher than in the private sector. In particular the public sector accounts for only 14 percent of jobs for the bottom quintile but provides 33 percent of the wage income. For the top quintile the public sector accounts for 33 percent of jobs and for 60 percent of wage income. Interestingly the share of wage income from public sector employment is more or less constant for the top three quintiles. At the aggregate level public sector wage income accounts for about 55 percent of total wage income.

It is interesting to contrasts this result with of Adams' (2002) finding that government employment accounts for 43 and 42.2 percent of non-farm income for the lower and the highest income quintile, respectively. He consequently argues that government employment is very important for the poor. The difference in findings are easily explained (by the difference in income groups used): if agricultural wage employment is netted out and non-farm enterprise income is added in – to the private sector income (which is closer to what Adams does), the share of non-farm income from public sector wage employment is 38 (43), 42 (39), 53 (54), 56 (51) and 43 (42) percent for the 1st, 2nd, 3rd, 4th and 5th quintile respectively (much closer to the numbers – given in brackets - reported by Adams).[12] The results presented here do not change Adams' findings. Rather they put more emphasis on wage employment, in particular casual wage employment, as being particularly important for the poor. And in terms of generating wage income government employment is important for the poor but much less so than private sector employment.

Table 4: Per-capita wage income by sector of occupation and income quintile for rural Egypt, 1997
(in brackets: share of private/public sector wage income in total wage income for that quintile)

Category	Bottom quintile	2nd	3rd	4th	Top quintile	Overall per-capita wage income
Private sector	60 (67.4)	114 (58.5)	140 (45.5)	159 (37.9)	250 (41.2)	144 (43.9)
Public sector	29 (32.6)	82 (42.1)	170 (55.2)	265 (63.1)	360 (59.3)	180 (54.9)
Per-capita wage income	89	195	308	420	607	328

Joint private/public and NGO sectors are negligible and omitted

Table 5 shows employment for each quintile by industry. Perhaps surprisingly the proportion of employment in agriculture and hunting to overall total employment is fairly constant across income groups. The biggest difference, across income groups, is for the category Community/Social/Personal

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[12] Keeping wage income and adding-in enterprise income (to the private sector) I find that the share of public sector income falls for all income groups, but more so for the top two quintiles. Private sector income looms larger, but the distribution of public sector income (on the basis of the wage income shares) is more even.

Services. The top two quintiles have between 2.5 and 3 times as many household members employed in this sector as the bottom quintile which includes public administration and defence. About 90 percent of jobs in this sector are classified as public sector jobs and 82 percent of these positions are salaried posts (indeed this sector accounts for 55 percent of all salaried posts).

Table 5: Employment in levels and share by type of industry by income quintile for rural Egypt, 1997
(in brackets is the share of that quintile and industry in total employment)

Industry	Bottom quintile	2nd	3rd	4th	Top quintile	Overall
Agriculture & Hunting	189 (8.8)	188 (8.7)	203 (9.4)	203 (9.4)	186 (8.6)	969 (44.9)
Manufacturing	33 (1.5)	55 (2.6)	63 (2.9)	59 (2.7)	42 (2.0)	252 (11.7)
Construction	41 (1.9)	48 (2.2)	22 (1.0)	28 (1.3)	24 (1.1)	163 (7.6)
Trade/Restaurants/Hotels	30 (1.4)	30 (1.4)	32 (1.5)	29 (1.4)	16 (0.7)	137 (6.4)
Transport/Storage/Communication	20 (0.9)	27 (1.3)	28 (1.3)	25 (1.2)	21 (1.0)	121 (5.6)
Community/Social/Personal Services	48 (2.2)	64 (3.0)	92 (4.3)	140 (6.5)	121 (5.6)	465 (21.6)

Includes all types of labour, casual, salaried, self employed and farming. Some industries are omitted as they contain few observations (Mining and quarrying, electricity/gas/water, finance and business services).

The results show that public sector employment benefits in particular the better-off and is likely to dampen the income inequality reducing effect of wage employment. We return to this issue later.[13]

Of relevance to the discussion with regard to casual wage labor are the findings by Datt and Olmsted (1998) on the link between food prices and the agricultural wage rate. They report that in the short-run only about ¼ of food price increases are absorbed into higher nominal wages. While they eventually catch up this takes up to five years and as a result real wages decline substantially in response to food price increases. They also report that agricultural yields did not affect agricultural wages but that growth in total cropped area did. With regard to non-agricultural sources of labor demand they found that increases in both private and public industrial output per-capita have a positive impact on agricultural wages and that in the short-run the impact of increases originating in the public sector was about twice that of private sector increases.

Related also, in the sense of understanding which are the likely sources of increased employment, is the work of Gavian, El-Meehy, Bulbul and Ender (2002) who consider the role of small (5-14 employees) and micro (1-4 employees) enterprises (SMEs). The find that the majority of established SMEs and home base enterprises (HBEs) reported that a shortage of demand was their most binding constraint. However, SMEs were not found to be ready to respond to an increase in demand by adding workers with most SMEs having significant excess labor capacity and almost none employing seasonal labor. The majority of established SMEs had no change in employment throughout their business lives and only 8 percent of rural SMEs said that they would add workers in response to increased demand. They conclude that growth in SME income comes from government and medium/large business or agriculture. Economic reforms mean that the government will generate less employment, while medium and large businesses are only a small piece of the economy and their role in generating employment is expected to be relatively small in the short to medium term. They conclude that growth of agricultural

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[13] El-Laithy, Lokshin and Banerji (2003), using HIECS data for 1999/2000, report that the largest proportion of poor rural households have a head that is employed in the agriculture and construction sectors. Datt, Jolliffe and Sharma (1998) report, using the EIHS data, that poverty rates by industry are highest for Construction, Trade and Services and Agriculture and Forestry. Of all rural males currently employed and classified as poor most worked in Agriculture (43.43%), followed by Trade and Services (14.1%), Manufacturing (12.44%), Construction (10.61%), Community and Personal services (9.24%) and Others (10.18%). They also report poverty rates by industry (by constructing an occupational poverty profile) which shows that poverty rates are highest for construction (35.56%), Trade and Services (30.61%) and Agriculture, forestry (30.5%), while it was lower than the national average of 26.87% for Manufacturing, Community and Personal Services and Others.

incomes and demand will be critical to creating new jobs.[14] The findings by Datt and Olmsted (1998) taken together with those of Gavian et al (2002), Mellor and Ranade (2002) and Mellor and Gavian (1999) implies that agriculture sector growth is fundamental to labor employment and wage growth through its impact on demand for the output of the small-scale non-tradable sector. Specifically Mellor and Gavian (1999) find that 49 percent of the employment created by high, sectorally balanced growth, is the result of increased agriculture incomes stimulating growth in the labor intensive rural and small-town sector (what they label the "Agriculturally Driven Non-Agricultural" (ADNA) sector). A further 17 percent of the employment growth is directly due to agriculture while 44 percent of employment growth is due to the autonomous non-agriculture sector (metropolitan activities of manufacturing, government, etc.). Their model assumes the autonomous non-agriculture sector growth is crucial in the sense that it demands agriculture sector products and that rapid agriculture sector growth is fuelled by livestock and horticultural sector growth.

Finally, as a matter of interest I note that Egypt had experienced a period of rising agricultural wages in the period 1975-85. This was followed by a decline: Siam (2005) reports that the ratio of the agricultural wage index to the rural cost of living index fell from 1.0 in 1970-73 to 0.7 in 1992-02. Goueli and El-Miniawy (1994) note that high oil prices in the 1970s and early 1980s led to a regional boom that included oil exporting Arab countries. This translated into increased remittances by Egyptians working abroad. Adams (1991) showed that 339 out of 1000 surveyed households sent someone to work abroad in the ten years before 1986. This source of income stimulated demand for off-farm employment. At the same time Egyptian government policy continued to create jobs at a rapid rate and finally land reclamation added to demand for farm labor. The current economic situation appears similar, except for rapidly increasing public sector employment.

4. HOUSEHOLD INCOME STRUCTURE BY LAND OWNERSHIP

Table 6 gives information on income sources by land-ownership. Only about 24 percent of households own land and I note that wage income accounts for nearly 50 percent of per-capita income for households that own no land. While still important for households with little land this share drops to under 11 percent for households with more than 3 feddan. Informal wage employment falls from 21 percent of income for land-less households to 11.6 percent in the 0-1 feddan category to 5.6 percent in the 1-3 feddan category and to 2.2 percent in the > 10 feddan group. Households with 1 or more feddan are generally better-off in terms of per-capita income as compared to the landless or the 0-1 feddan group.

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[14] They did not have data on start-up SMEs and could therefore not discuss employment growth from that source.

Table 6: Per-capita income and income shares and household characteristics by source and land ownership, rural Egypt, 1997

	Land owned (feddan)					
	= 0	> 0 & < 1	>= 1 & < 3	>= 3 & < 5	>= 5 & < 10	>= 10
Household per-capita income, LE	776	773	1174	1457	1746	2180
Wages as share of income	49.8	30.0	18.6	8.2	10.8	10.7
Non-Agricultural formal	26.3	16.5	12.3	2.9	6.8	8.1
Agricultural formal	2.2	1.9	0.8	2.0	0.7	0.4
Non-Agricultural, informal	13.1	5.6	3.0	0.4	1.3	0.0
Agricultural, informal	8.1	6.0	2.6	2.9	2.0	2.2
Crop & Livestock as share of income	18.2	54.5	68.7	80.1	85.0	71.7
Crop	8.7	34.1	51.6	69.5	73.7	54.7
Livestock	9.5	20.3	16.5	10.3	8.4	16.9
Household Enterprises as share of income	8.2	2.8	3.0	3.3	2.8	0.0
Non-Agricultural	7.9	2.6	2.0	2.8	0.0	0.0
Financial returns as share of income	2.0	1.0	2.5	0.0	0.0	0.0
Transfers as share of income	19.3	11.1	6.0	3.3	1.4	15.4
Transfers in	8.4	3.1	2.2	0.7	0.9	13.1
Pension	11.0	8.0	3.7	2.6	0.5	2.3
Real Estate returns as share of income	2.5	0.6	1.2	5.1	0.0	2.2
Education: Proportion of adult (over 15) household members who have completed at least:						
Elementary	0.19	0.22	0.17	0.16	0.14	0.09
Preparatory	0.11	0.10	0.10	0.05	0.08	0.18
High school	0.02	0.02	0.03	0.03	0.10	0.05
Technical	0.14	0.14	0.16	0.10	0.20	0.22
Higher inst.	0.01	0.03	0.01	0.01	0.02	0.03
University	0.03	0.02	0.03	0.04	0.05	0.16
Other	0	0	0	0.01	0	0
Land cultivated (feddan/household)	0.25	0.68	1.82	3.88	5.54	20.19
Number of observations	985	158	116	27	10	9

The results show that landownership is associated with higher income but that land is owned by relatively few households. Indeed land is very unequally distributed – the Gini coefficient for landownership is 0.900 and for land cultivated is 0.827, which compares to a gini coefficient of 0.532 for income.[15] Poor households are 'pushed' out of agriculture and in particular into the casual wage employment and livestock rearing sectors.

These results are in line with findings reported by Datt et al (1998). Small farms and non-cultivators have higher poverty rates – 35 percent – as compared to medium farms and large farms – 24 and 7 percent respectively. Access to land is an important factor in household welfare but El-Laithy et al (1999) report that 70 percent of landowners own less than one feddan while 93 percent own less than 4 feddan while at the other end 2 percent own 33 percent of the land.

Earnings from livestock are, relative to crop income, particularly important for the 0-1 group. For land richer households crop earnings dominate (although livestock again rises in importance for the land-richest group). Enterprise activities, in particular non-agricultural enterprises, clearly are important for the

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[15] He reports that the Gini coefficient for per-capita expenditure data is 0.321.

non-land holding households. Finally I note that transfers are more important for the land-poor (and again for the top group). In particular pensions are important for the land poor but the share of income from this source falls off steadily with increasing landownership.

At the bottom of the table the average number of household members aged 15 or older falling into the different education categories is indicated. Land-holding is associated with higher levels of education in the household, in particular the top two categories have a higher human-capital stock – and have a relatively high proportion of members with high/technical high school and university education. I return to this issue below.

5. INCOME INEQUALITY BY INCOME SOURCE

Table 7 gives details of the decomposition of income inequality by income source.[16] It shows that wage employment and agriculture weigh most heavily in income, followed by transfers. Wage employment has the lowest coefficient of variation, followed by agricultural income and transfers. The relatively low coefficient of variation and moderate correlation of wage income with total income means that wage employment reduces overall inequality. However, considering wage income from public and private sector sources I find that it is the latter which has the strongest impact in terms of reducing inequality. The relative concentration coefficients for public and private sector wage income are 0.71 and 0.33, respectively. Most, 73 percent, of the contribution of wage income to inequality is accounted for by public sector employment. Having said this, public sector wage employment still reduces income inequality, but less so than private sector wage income. This result is interesting also because Adams (2002) found that government employment was the most important inequality-decreasing component of non-farm income. The conclusions remain the same: unskilled labor is key, but private sector income is relatively more important when putting agricultural wage income together with non-farm wage income – as done in this paper. Transfer payments also reduce inequality while all other types of income sources contribute to increasing income inequality. Crop and Livestock accounts for 47 percent of income inequality while wage income accounts for 21 percent. I note that disaggregating crop and livestock income shows livestock income being neutral with respect to income inequality.

Table 7: Decomposition of income inequality by income source

	Wage	Agricultural	Projects	Transfers	Real Estate	Financial
Weight of income source, $w_i = \mu_i/\mu^*$	0.384	0.326	0.083	0.154	0.026	0.026
Coefficient of variation, CV_i	1.38	2.18	4.67	2.55	6.10	7.19
Correlation(y_i, y), r_i	0.38	0.65	0.34	0.28	0.19	0.23
Relative variation, CV_i/CV	1.41	2.23	4.76	2.60	6.23	7.34
Relative concentration $c_i = r_i \cdot CV_i/CV$	0.54	1.45	1.61	0.72	1.18	1.67
Decomposition of CV, $w_i \cdot c_i$	0.21	0.47	0.14	0.11	0.03	0.04
Total per-capita income derived from source	328	277	71	130	22	22

* μ μ_i are the mean of total income and income from category i, respectively.

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[16] The approach taken for the decomposition of income inequality follows de Janvry and Sadoulet (2001).

6. DETERMINANTS OF HOUSEHOLD INCOME: THE MODEL

In the previous sections I concluded that as informal sector employment is relatively much more important for the poor the appropriate strategy would be to boost informal sector wages. However a longer-term strategy would also focus on enhancing formal sector employment as returns in this sector are higher and it is a crucial sector with regard to helping the households move out of poverty. I now turn to an analysis of household level determinants labor allocation and earnings. With regard to wage employment I note that results pertaining to individual employment refer to the formal sector while those for household wage earnings refer to formal and informal employment.

I assume that the underlying behavioural model determining optimal levels of investment resource allocation is one of utility maximization subject to several constraints as in the standard rural household model of Singh, Squire and Strauss (1986).[17] The time of individual household members is allocated on the basis of their marginal value of home activities, on-farm work and off-farm work. The marginal value of labor time in any one particular activity will depend on a common set of exogenous output and input prices, technology, personal characteristics of the individual and other household members, and ownership of land and non-land resources as well as access to public goods and services. Community level variables reflect the opportunities available to households while individual and household level variables capture the capacity of individuals to respond to the opportunities. The household's production and consumption decisions may not be separable and neither is information on factor prices and quantities available and I therefore focus on reduced-form income share and level equations. The former represents allocation decisions while the latter is a household earnings function. In both cases I estimated reduced form equations where participation and income are a function of the factors outline above.

7. THE DATA

The analysis uses both individual and household level observations from the EIHS. At individual household member level I have 4205 observations for rural households while at the household level I have 1112 households. Observations were lost due to missing values with regard to education and district level variables.

As a first step I consider descriptive differences in household characteristics across income groups. Household size falls as income rises with better-off households having fewer dependents. Schooling too increases with income, with heads of the bottom quintile having on average 3 years of schooling while heads of the top quintile have an average of 6 years. Better-off households have better educated heads and more members that have achieved higher levels of education.

Land ownership is skewed towards better-off households but with rental activity the gap between bottom and top falls, yet remains large. Livestock ownership of sheep/goats and of donkeys/mules is more evenly distributed than ownership of cows/bullocks/buffalos and it would appear that chicken/pigeons/geese/rabbits. The top quintile owns on average three times the value of livestock compared to the bottom quintile. The amount of farm equipment owned is generally higher for the richer households. Typically there is a large gap between the top quintile and the rest (except for cart ownership were the top two quintiles are much better endowed) The value of all farm equipment is only LE 37 for the bottom quintile and then is between LE 326-433 for the middle three quintiles but jumps to LE 1417 for the top quintile. A difference can also be found in the proportion of females and males working, with a particularly strong effect for males. This is despite the fact that the top quintile has only 5.3 members on average, as compared to 7.1 for the bottom quintile. Perhaps surprisingly, enterprise ownership is quite limited and with only a relatively small difference between top and bottom quintile. Finally, I note that the community level variables show little divergence between richer and poorer.

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[17] For more details on some of the theoretical issues and empirical findings with regard to rural non-farm employment see, for example, Reardon et al (1998), Escobal (2001), Fafchamps and Quisumbing (2003), Berdegué, Ramírez, Reardon and Escobar (2001), and Taylor and Yuñez-Naude (2001).

Table 8: Household characteristics by income quintile and overall, rural Egypt, 1997

Variables	Income Qunitiles					Overall		
	Lowest	2nd	3rd	4th	Highest	Mean	Standard Deviation	Range
Household demographics								
Household Members	7.1	7.4	6.9	6.8	5.3	6.66	3.63	1-34
# of Children under 10	2.2	2.1	1.9	1.5	1.0	1.74	1.72	0-12
# of adults over 65	0.26	0.25	0.23	0.24	0.26	0.25	0.48	0-2
# of males between 15 and 65	1.47	1.79	1.84	1.97	1.72	1.76	1.35	0-9
# of females between 15 and 65	1.73	1.92	1.89	1.90	1.54	1.79	1.13	0-10
Prop. males (15-65) working	0.21	0.23	0.26	0.29	0.33	0.27	0.17	0-1
Prop. females (15-65) working	0.26	0.27	0.29	0.31	0.33	0.29	0.17	0-1
Head female, 1 = yes, 0 = no	0.18	0.14	0.16	0.12	0.18	0.16	--	0-1
Age of head	44.6	46.5	47.7	47.3	50.2	47.3	14.1	15-96
Human capital								
Average # school yrs. adults over 15	2.2	2.5	3.5	4.1	5.0	3.50	3.35	0-17
# of school years of head	3.1	3.2	4.4	5.3	5.8	4.39	5.32	0-20
Education of Head: % of households with head having completed:								
Elementary	0.06	0.07	0.09	0.10	0.12	0.09	--	0-1
Preparatory	0.03	0.04	0.04	0.04	0.05	0.04	--	0-1
High school	0.01	0.00	0.00	0.02	0.01	0.01	--	0-1
Technical	0.09	0.06	0.13	0.14	0.14	0.11	--	0-1
Higher Inst.	0.01	0.02	0.02	0.03	0.02	0.02	--	0-1
University	0.02	0.02	0.03	0.06	0.08	0.04	--	0-1
Other	0	0	0.01	0.02	0.03	0.01	--	0-1
Education of household members: Proportion of household members over 15 having completed:								
Elementary	0.18	0.20	0.18	0.22	0.18	0.19	0.26	0-1
Preparatory	0.09	0.09	0.10	0.12	0.11	0.10	0.19	0-1
High school	0.01	0.01	0.02	0.03	0.04	0.02	0.08	0-0.6
Technical	0.08	0.09	0.16	0.19	0.16	0.14	0.24	0-1
Higher Inst.	0	0.01	0.02	0.02	0.02	0.02	0.08	0-1
University	0.01	0.01	0.03	0.04	0.06	0.03	0.13	0-1
Other	0	0	0	0.01	0.01	0	0.04	0-0.5
Asset ownership								
Land owned/capita	0.01	0.02	0.03	0.07	0.15	0.06	0.22	0-4
Land owned/household	0.08	0.22	0.23	0.64	0.96	0.43	1.72	0-28
Land cultivated/household	0.25	0.43	0.41	0.92	1.46	0.70	2.14	0-31.13
Livestock: cows/bullocks/buffalos	0.25	0.39	0.43	0.72	0.73	0.51	1.03	0-14
Livestock: goats/sheep	0.32	0.36	0.27	0.43	0.61	0.39	1.50	0-35
Livestock: donkeys/mules	0.20	0.25	0.26	0.34	0.33	0.27	0.55	0-5.5
Livestock: chicken/pigeons/geese/rabbits	7.68	12.27	10.37	17.26	17.48	13.1	18.3	0-182
Value of animals	520	767	902	1357	1561	1030	2076	0-29,298
# of tractors	0.00	0.01	0.00	0.00	0.04	0.01	0.10	0-1
# of ploughs	0.01	0.01	0.02	0.01	0.05	0.02	0.15	0-2
# of carts	0.03	0.06	0.04	0.06	0.14	0.07	0.26	0-2
# of water pumps	0.01	0.08	0.07	0.17	0.21	0.11	0.41	0-9
# of insect sprayers	0	0.01	0.02	0.02	0.06	0.02	0.15	0-2
Value of farm capital	37	359	433	326	1417	515	3824	0-74,500
Value of farm capital excl. water pumps	22	277	344	79	1155	375	3662	0-74,500
Prop. of HHs that own a water pump	0.02	0.09	0.08	0.17	0.15	0.11	--	0-1
Prop. of HHs that own an enterprise	0.11	0.11	0.13	0.13	0.16	0.13	--	0.1
Credit non-farm purpose, 1=yes, 0=no	0.15	0.17	0.25	0.18	0.12	0.17	--	0.1
Farm credit purpose, 1=yes, 0=no	0.09	0.08	0.09	0.14	0.13	0.11	--	0.1
Public goods/location factors								
Access to Agricultural extension centre by foot, 1=yes, 0=no	0.31	0.33	0.31	0.35	0.26	0.32	--	0-1
Access to bus stop by foot, 1=yes, 0=no	0.79	0.79	0.79	0.85	0.84	0.82	--	0-1
Access to bazaar by foot, 1=yes, 0=no	0.67	0.64	0.70	0.70	0.64	0.67	--	0-1
Access to market by foot, 1=yes, 0=no	0.18	0.24	0.24	0.28	0.21	0.23	--	0-1
Access to paved road, 1=yes, 0= no	0.89	0.91	0.91	0.92	0.92	0.92	--	0.1
HH has electricity, 1=yes, 0=no	0.82	0.92	0.92	0.97	0.98	0.92	--	0.1

8. RESULTS

Results for the individual employment and household level share and income equations are shown in tables 9, 10 and 11. The discussion of the results is presented in terms of broad categories (demographic factors, education and household assets, credit and community variables) for ease of exposition. Discussion of individual male and female employment in formal wage employment is added, when relevant, at the end of each pertinent paragraph. I include but do not report the estimated coefficients and standard errors for the fixed effects at the Governorate level.[18]

Demographic factors: Household size has a small positive effect on the share of income deriving from wage employment and household enterprise activity. In per-capita income terms larger households are poorer. Household enterprise activity is boosted by family size but this affects only a relatively small subset of households. The proportion of children under the age of ten is positively correlated with the share of income coming from wage employment and negatively with that from transfers. The former result may be due to child labor or the variable may capture part of the household size effect. The latter result may be due to the fact that pension payments are an important part of transfer payments and younger households are less likely to be receiving income from this source. Household size and the proportion of children under the age of ten are not found to be significant in the individual wage employment equation.

Female headed households obtain a much smaller proportion of their income from wage employment as well as household enterprise activity. Indeed, the results from the transfer equation would suggest that this group of households is particularly disadvantaged and relies heavily on remittances and other transfer payments. Although female headed households earn about 366 LE less than male headed households (on average) in terms of wage income, they receive about 396 LE more in the form of transfers, leaving the overall impact on per-capita income to be statistically insignificantly different from zero. We note that although female headed households also earn much less from household enterprise activities (when they engage in these – which they are much less likely to do) there are only 10 such observations in our sample, a majority of which also receive transfer payments. As a group female headed households are clearly very disadvantaged.

Younger household heads receive a greater share of their income from wage employment as well as receiving higher per-capita wage income than do households with older heads. Results at the individual level confirm that younger (than 44 for males and 48 for females) adults are more likely to participate in wage employment. The latter receive more income in the form of transfer payments with younger households (heads) being more likely to make transfer payments than receiving them (the turning point for positive transfer payments is 47 years for the head).

Of interest are the returns to male and female adult (aged 15-65) labor. An increase of 10 percent in the proportion of adult males working raises the per-capita income by 70 LE but the same increase in the proportion of adult females working would only increase per-capita income by 35 LE. Returns to male and female labor are the same in agriculture but much higher for males in wage employment. In large part this is probably due to the fact that higher levels of education in the household are positively correlated with the proportion of males working: 0.16, 0.16 and 0.35 for the number of adults in the household who have $>= 4$ and < 7, $>= 7$ and < 10 and $>= 10$ years of schooling, respectively; but not so for the proportion of females working: -0.0002, -0.013 and 0.08 for the same categories, respectively. The proportion of males working is much more correlated in particular with the number of household members with high, technical high school and university education. Households with a higher proportion of females working also receive a larger share of their income from transfers. The latter results and the fact that female

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[18] Datt and Jolliffe (1999) argue that governorate fixed effects should be included as they capture price, agroclimatic and institutional differences and that this helps diminish the severity of omitted-variable bias. I do not include PSU level fixed effects (instead of governorate level effects) as this would make it impossible to identify the effects of the community-level variables.

headed households receive more in transfers is perhaps due to absent husbands/males who remit earnings from jobs held in urban areas or abroad. On the other hand households with younger heads and those with a larger proportion of males working receive less in transfers. Perhaps these households are less needy, or perhaps male adults in these households hold jobs locally.

Table 9: Determinants of employment in salaried (formal) wage employment by individuals

Variable	Coefficient	Males Robust Std. Error	Marginal Effect	Variable	Coefficient	Females Robust Std. Error	Marginal Effect
Constant	**-6.4773**	**0.491***	--	**Constant**	**-8.5508**	**1.456***	--
age	**0.2809**	**0.022***	**0.0676**	**age**	**0.2586**	**0.053***	**0.0011**
age squared	**-0.0032**	**0.0003***	**-0.0008**	**age squared**	**-0.0027**	**0.001***	**-0.00001**
elementary (0,1)	**0.5357**	**0.130***	**0.1551**	**elementary (0,1)**	**1.1574**	**0.391***	**0.0269**
preparatory (0,1)	**0.5303**	**0.174***	**0.1529**	**preparatory (0,1)**	**1.2457**	**0.435***	**0.0319**
high school (0,1)	-0.1111	0.279	-0.0253	**high school (0,1)**	**1.8109**	**0.592***	**0.1088**
technical (0,1)	**0.9612**	**0.119***	**0.2922**	**technical (0,1)**	**2.9286**	**0.402***	**0.3432**
higher institute (0,1)	**1.9573**	**0.299***	**0.6711**	**higher institute (0,1)**	**3.7069**	**0.546***	**0.7475**
university (0,1)	**1.0081**	**0.172***	**0.3345**	**university (0,1)**	**4.2521**	**0.519***	**0.8799**
other education (0,1)	**1.8170**	**0.502***	**0.6336**	**other education (0,1)**	**3.3720**	**0.705***	**0.6413**
household size	-0.0013	0.010	-0.0003	household size	0.0258	0.023	0.0001
prop of children under 10	-0.0319	0.224	-0.0077	prop of children under 10	-0.5958	0.458	-0.0026
landsize/capita	-0.6541	0.398	-0.1573	**landsize/capita**	**-3.0960**	**1.152***	**-0.0136**
landsize/capita squared	0.1296	0.131	0.0312	**landsize/capita squared**	**0.7841**	**0.321****	**0.0034**
hh owns enterprise (0,1)	**-0.4197**	**0.115***	**-0.0862**	**hh owns enterprise (0,1)**	**-0.5998**	**0.241****	**-0.0015**
credit_nonfarm (0,1)	**0.3128**	**0.103***	**0.0830**	credit_nonfarm (0,1)	-0.0992	0.219	-0.0004
credit_farm (0,1)	-0.0652	0.123	-0.0153	credit_farm (0,1)	0.0056	0.258	0.00003
hh head school years	**0.0241**	**0.009***	**0.0058**	hh head school years	0.0048	0.014	0.00002
livestock: cows/bullocks/buffaloes	**-0.1246**	**0.044***	**-0.0300**	livestock: cows/bullocks/buffaloes	-0.0418	0.098	-0.0002
livestock: goats/sheep	-0.0399	0.035	-0.0096	livestock: goats/sheep	-0.0619	0.080	-0.0003
livestock: donkey/mules	-0.0752	0.087	-0.0181	livestock: donkey/mules	-0.0717	0.201	-0.0003
livestock: chickens/ducks, etc	0.0002	0.002	0.0001	livestock: chickens/ducks, etc	-0.0008	0.004	-0.000004
not-earned income	**-0.0006**	**0.0002***	**-0.0002**	**not-earned income**	**-0.0002**	**0.0001*****	**-0.000001**
access to bus stop by foot	-0.0537	0.109	-0.0131	access to bus stop by foot	0.2400	0.249	0.0009
Number of observations	2071			Number of observations	2099		
Log pseudolikelihood	-769			Log pseudolikelihood	-170		
Wald Chi^2 (39)	493			Wald Chi^2 (38)	301		
Pseudo R^2	0.36			Pseudo R^2	0.59		

*, ** and *** denote statistical significance at the 1, 5 or 10 percent levels or better (same for table 10 and 11).

Table 10: Determinants of household income diversification for rural Egypt, 1997

Share of household income from:

	Wage Employment		Crop & Livestock		Transfers		Finance/Real Estate		HH Enterprise	
	Coefficient	Std. Error	Coefficient	Std. Error	Coefficient	Std. Error	Coefficient	Std. Error	Coefficient	Std. Error
hh head female	-0.5463	0.0575*	0.0015	0.0387	0.5088	0.0509*	0.0876	0.0908	-0.4916**	0.2107
hh size	0.0251	0.0065*	0.0006	0.0045	0.002	0.0066	-0.014	0.0114	0.0567*	0.0212
hh head age	0.0247	0.0088*	0.0164	0.0061*	-0.0472	0.0084*	-0.009	0.0141	-0.005	0.0277
hh head age squared	-0.0003	0.0001*	-0.0001	0.0001**	0.0005	0.0001*	0.0001	0.0001	0.00002	0.0003
landsize/capita	-1.1202	0.2142*	1.0117	0.1319*	-0.2461	0.1923	0.6083	0.4092	-2.9946***	1.7036
landsize/capita squared	0.2841	0.0670*	-0.2432	0.0434*	0.0892	0.0615	-0.305	0.2828	-0.6897	2.8746
prop males working in hh	0.7482	0.1362*	0.0751	0.0943	-0.6188	0.1339*	-0.606	0.2283*	0.5054	0.4417
prop females working in hh	0.0544	0.138	-0.0205	0.09	0.3153	0.1205*	-0.146	0.2016	0.2958	0.4663
prop. of children under 10	0.3107	0.1286**	0.0955	0.0904	-0.3356	0.1246*	-0.219	0.2142	0.0651	0.4332
hh owns enterprise (0,1)	-0.6453	0.0573*	-0.1852	0.0413*	-0.1888	0.0604*	0.1114	0.0927	..	..
Credit non-farming (0,1)	0.1299	0.0491*	-0.0732	0.0364**	-0.0436	0.0515	-0.064	0.0898	-0.1203	0.1727
Credit farming (0,1)	0.0406	0.0655	0.052	0.0452	-0.0432	0.0673	-0.146	0.1185	0.7617*	0.1928
livestock: cows/bullocks/buffaloes	-0.145	0.0284*	0.0866	0.0177*	-0.0188	0.0271	-0.024	0.042	-0.3327*	0.115
livestock: goats/sheep	0.0038	0.0145	0.0079	0.0083	-0.0049	0.0162	-0.015	0.0229	0.0643**	0.0307
livestock: donkeys/mules	-0.1861	0.0482*	0.2375	0.0328*	-0.1031	0.0500*	0.0326	0.0852	-0.2569	0.1771
livestock: chicken/ducks/geese, etc.	-0.0033	0.0011*	0.0056	0.0008*	-0.0004	0.0011	0.0056	0.0017*	0.0011	0.0036
elementary highest in hh	0.0158	0.0591	0.0195	0.0413	-0.0427	0.0579	-0.228	0.1112**	0.3142***	0.1846
preparatory highest in hh	0.0079	0.0655	-0.042	0.0469	-0.0165	0.0654	0.0398	0.1104	-0.0253	0.2143
high school highest in hh	-0.2321	0.0884*	0.0583	0.0596	-0.0235	0.0881	0.2891	0.1293**	-0.0564	0.2801
technical highest in hh	0.2565	0.0521*	-0.052	0.037	-0.1151	0.0526*	-0.029	0.0912	-0.0394	0.1721
higher institute highest in hh	0.1721	0.0940***	-0.0859	0.0719	-0.0884	0.1023	0.1323	0.1568	0.0907	0.3071
university highest in hh	0.213	0.0709*	-0.1565	0.0533*	-0.0394	0.0748	0.1457	0.1177	0.0641	0.239
access to electricity (0,1)	-0.0284	0.0744	0.0102	0.0521	0.0018	0.0725	0.2631	0.1539***	0.0704	0.2506
access to bus stop by foot	-0.056	0.0538	-0.0241	0.0381	0.0841	0.0564	-0.118	0.0931	-0.2194	0.1742
value of farm equip. excl. water pump	-3.63E-06	8.82E-06	-6.76E-06	4.83E-06	-6.39E-06	9.20E-06	2E-05	1.18E-05	0.00005**	0.00002
hh owns water pump (0,1)	-0.157	0.0692**	0.2199	0.0461*	0.0775	0.0694	-0.162	0.119	-0.055	0.2557
constant	-0.6287	0.3001**	-0.2914	0.2034	1.0995	0.2798*	-0.292	0.4722	-2.1099**	0.8533
# of observations	1112		1112		1112		1112		1112	
Log likelihood	-834		-629		-685		-378		-435	
LR Chi2 (42)	616		684		410		105		104	
Pseudo R2	0.27		0.35		0.23		0.12		0.11	
Left-censored obs	401		404		638		965		974	
Right-censored obs	164		99		61		6		23	

Table 11: Determinants of household per-capita income for rural Egypt, 1997

Variables	Income/capita		Wage Income/capita		Crop&Livestock/capita		Transfers/capita		Real Estate&Finance/capita		HH Enterprise/capita	
	Coefficient	Std. Error	Coefficient	Std. Error	Coefficient	Std. Error	Coefficient	Std. Error	Coefficient	Std. Error	Coefficient	Std. Error
hh head female	13.46	84.16	**-365.88**	**53.09***	56.67	60.25	**396.33**	**52.28***	60.02	115.75	**-577**	**226.2****
hh size	**-68.32**	**8.25***	-4.38	5.96	**-14.77**	**6.99****	**-13.81**	**6.92****	**-26.87**	**14.50*****	**43.8**	**22.4*****
hh age	-3.48	10.17	22.26	8.07*	14.66	9.59	**-43.89**	**8.65***	-15.33	17.8	4.5	29.7
hh age squared	0.07	0.1	-0.27	0.08*	-0.12	0.09	**0.49**	**0.08***	0.18	0.17	-0.08	0.3
landsize/capita	**1611.52**	**419.00***	**-700.79**	**193.93***	**2270.21**	**197.54***	-132.76	199.16	**1073.24**	**551.20*****	-1699.2	1735.5
landsize/capita squared	**-310.98**	**110.17***	**220.02**	**61.27***	**-492.91**	**65.76***	67.7	63.8	-566.91	421.96	-2494.9	3065.8
prop males working in hh	**701.66**	**201.38***	**1158.33**	**122.27***	**246.6**	**146.38****	**-432**	**137.20***	**-713.43**	**289.22****	554.8	469.8
prop females working in hh	**346.22**	**171.96****	201.41	127.74	**242.92**	**139.79****	**323.4**	**122.98***	-5.66	255.19	539.4	495.1
prop. of children under 10	-89.54	139.44	157.26	117.48	45.88	140.96	**-259.04**	**129.93****	-196.98	271.28	72.6	462.6
hh owns enterprise (0,1)	**251.4**	**89.56***	**-414.56**	**52.79***	-81.8	64.05	**-154.28**	**63.17****	156.22	117.16	..	..
Credit non-farming (0,1)	-40.21	49.14	**77.85**	**44.75*****	-66.38	56.62	-54.55	53.81	-71.07	113.94	-81.8	182.8
Credit farming (0,1)	-72.25	79.32	-10.27	60.37	-59.75	69.45	-36.3	70.39	-178.82	149.28	**840.7**	**199.6***
livestock: cows/bullocks/buffaloes	**100.75**	**35.32***	**-75.16**	**25.76***	**91.84**	**24.85***	3.18	27.39	-11.45	51.58	**-232.4**	**114.1****
livestock: goats/sheep	16.65	11.02	9.43	12.06	19.86	12.78	0.81	14.83	-21.68	30.65	**79.8**	**32.2****
livestock: donkeys/mules	30.72	85.77	**-116.86**	**44.77***	**244.33**	**50.27***	-83.92	52.16	70.19	106.45	**-412.7**	**187.6****
livestock: chickens/ducks/geese, etc.	**5.33**	**1.52***	-0.07	1	**10**	**1.18***	0.77	1.12	**7.66**	**2.07***	5.5	3.6
elementary highest in hh	46.92	60.2	32.31	54.45	-26.9	64.37	30.6	60.31	-160.95	138.83	232.9	196.5
preparatory highest in hh	95.47	67.81	14.46	59.93	-74.78	72.72	57.06	68.03	106.91	141.52	1.09	226.4
high school highest in hh	-7	110.48	**-242.82**	**80.21***	-15.43	92.17	32.36	91.07	**306.99**	**166.21*****	42.5	290.3
technical highest in hh	38.81	58.98	**244.22**	**47.11***	-69.11	57.57	-55.15	55.01	21.55	116.7	-92.1	182.3
higher institute highest in hh	90.99	99.98	**258.35**	**85.62***	-169.42	113.18	9.09	106.17	160.68	201.51	121.1	319
university highest in hh	**449.91**	**153.45***	**369.91**	**64.08***	-54.46	82.1	87.35	77.49	**328.07**	**147.61****	154.3	248.2
access to electricity (0,1)	**203.66**	**60.02***	73.47	69.08	123.04	82.66	114.7	76.59	**330.04**	**197.61*****	96.3	269.4
access to bus stop by foot	**221.21**	**53.28***	37.52	49.5	37.16	59.19	87.94	59	-61.74	117.92	-123.7	184.9
value of farm equip. excl. water pump	**0.02**	**0.01****	-0.01	0.01	0.01	0.01	-0.01	0.01	0.02	0.01	**0.07**	**0.02***
hh owns water pump (0,1)	147.04	92.03	-14.6	63.79	**297.94**	**69.57***	92.77	71.89	-218.41	150.4	-152.4	268.4
constant	-61.5	286.8	**-1171.02**	**281.82***	**-903.77**	**319.23***	**514.67**	**295.34*****	-635.45	609.46	**-2677.9**	**921.2***
# of observations	1112		1112		1112		1112		1112		1112	
$F_{(42,1104)}$	11.11		--		--				--		--	
Log likelihood			-5658		-5719		-3930		-1417		-1394	
LR Chi^2 (42)			532		632		328		106		100	
Pseudo R^2	0.31		0.05		0.05		0.04		0.04		0.04	
Left-censored obs	--		401		404		638		965		974	

Education: Education plays a key role in household wage income determination. The results for the individual employment equation also confirm that education is the most important factor in determining employment in formal wage employment, in terms of their marginal effects, of those variables that have a statistically significant effect. This is true for both males and females although for females it is technical and higher levels of education that are more important. Elementary and preparatory education are much more important for males, relative to females.[19] Results also show that the years of schooling of the head is positively related to the participation of a male household member only.

At the household level there are relatively high returns to technical, higher institute and university level education (244, 258 and 370 LE, respectively). The coefficient on high school education is unexpected. There is also a positive effect of education (high school and university) on income from real estate/financial assets although this is likely to indicate that wealthier households are more likely to obtain higher education. The overall impact of education on income is positive and large at 450LE for university education only. The increase in the share of income from wage employment is similar for technical, higher institute and university education, but returns increase with higher levels of education. The latter, unexpected, result is also reported by Wahba (2000)[20] who finds that the lowest returns to education are to the first few years of schooling while the highest returns are to university education. Education is negatively correlated with the share of agricultural income only for University level education. A number of other studies (Corral and Reardon (2001), Yúnez and Taylor (2001) and de Janvry and Sadoulet (2001)) found that more educated households earn more overall income but not more farm income. This is not true for the case of Egypt. More education means more overall income but not necessarily less agricultural income. This is true for those households were the highest level of education achieved is technical high school and university education. The category high school clearly has rather few observations and may be influenced by one or two observations in the tails. University education raises wage income but these households are also relatively land rich and earn much more, per-capita, from crop & livestock than other households (as grouped by education).

Table 12: Income and other selected variables by highest level of education by household
(in brackets: share in total income)

Income by source (per-capita)	Highest level of education achieved by anyone in the household						
	None	Elementary	Preparatory	High	Technical	Higher Institute	University
Total income	736	746	794	915	833	936	1368
Wage employment	227 (0.38)	232 (0.38)	265 (0.41)	148 (0.22)	403 (0.50)	539 (0.59)	609 (0.55)
Crop & Livestock	226 (0.25)	238 (0.29)	246 (0.29)	437 (0.41)	247 (0.28)	143 (0.17)	416 (0.25)
Transfer payments	161 (0.25)	155 (0.19)	161 (0.19)	213 (0.18)	94 (0.12)	117 (0.12)	132 (0.09)
Real estate and financial assets	55 (0.04)	41 (0.02)	51 (0.02)	78 (0.07)	34 (0.01)	19 (0.03)	108 (0.02)
Household enterprise activity	68 (0.06)	80 (0.11)	72 (0.07)	39 (0.06)	55 (0.06)	118 (0.08)	104 (0.07
Other selected variables							
Land (feddan/household)	0.39	0.47	0.53	1.58	0.60	0.46	1.39
Land (feddan/capita)	0.03	0.03	0.03	0.13	0.04	0.05	0.14
Proportion of males (15-65) working	0.20	0.21	0.26	0.36	0.31	0.31	0.34
Proportion of females (15-65) working	0.30	0.26	0.27	0.28	0.31	0.35	0.30
Not-earned-income (LE)	213	195	205	288	126	134	239
# of observations	283	198	145	35	333	44	105

With regard to education also Datt and Jolliffe (2005), using the same data set, find that education variables are strong determinants of living standards, in both rural and urban areas. They find some substitutability between education and land ownership. Furthermore their results show that parental education has a strong positive effect on household welfare in rural and urban areas. An increase in parental education to primary level decreases the incidence of poverty by 23 percent. Also, one additional year of education would increase consumption by 5 percent and reduce the proportion of poor by 1 percent. Likewise El-Laithy, Lokshin and Banerji (2003) find that education was the factor that most affected a households chances of being non-poor.

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[19] Results (not reported here) from the pooled sample (same regressors), with a dummy for gender added, show that everything else being equal males have a 13 percent higher probability of employment.
[20] Using the Egyptian Labour Force Sample Survey (LFSS) of 1988.

Finally, of relevance are results reported by Datt, Jolliffe and Sharma (1998), using the EIHS data, that financial reasons were key to not attending school (given as the reason by 53% by the rural poor). The second most important reason, 36 percent, was 'no desire'.

Household assets, credit and community variables: Agricultural activities are very much influenced by landownership and, to a lesser extent, livestock ownership (in particular donkeys/mules) as well as ownership of water-pump(s). Land-ownership reduces wage employment at the household and individual level (females) as well as household enterprise activities, indicating a trade-off between agricultural on the one hand and wage and enterprise activities on the other. Landownership has a positive, non-linear, impact on agricultural income. At the mean (for households owning land) an additional 0.5 feddan (not feddan/capita) would raise per-capita income by approximately 153 LE. Livestock, in particular donkeys/mules and to a lesser extent cows/bullocks/buffalos, add strongly to agricultural income. However, ownership of cows/bullocks/buffalos and donkeys/mules implies a lower share of income from wage employment and hence there appears to be trade-off between livestock ownership and participation in wage employment. The negative effect of keeping cows/bullocks/buffalos also shows up in the individual wage employment equation (for males). Considering the cost of acquisition small animals appear to be a promising income booster. One additional small animal unit adds about 10 LE, which compares to 92 LE for cows/bullocks/buffalos (and 244 LE for donkeys/mules). The figures for return to unit cost are: 1.96 LE for small animals, 0.06 LE for cows/bullocks/buffalos and 1.3 for donkeys/mules. We also find that water pumps are a key agricultural implement which has a large positive impact on agricultural income.

The availability of credit is positively correlated to the degree to which income is derived from wage employment, both at the household and individual level (for males). This may be due to households holding salaried jobs having more access to credit or that households needed to engage in wage employment above what they normally would do in response to having taken up credit. Households that obtained credit for farm related purchases are more likely to receive enterprise related income – and at a much higher level. Most household enterprises are engaged in retail trade followed by manufacturing (food, beverages, tobacco, textiles, apparel, leather and wood, furniture). A closer look at the credit data shows that 217 households (included rural and urban households) obtained credit for farm related business (purchasing of inputs, equipment, etc.) and of these 48 used these loans for household enterprise business (mostly related to retail and agricultural activities). I note though that in the actual sample used for estimation the subset of households that obtained credit for farming purposes and used the loan for enterprise business was just over 10 percent.

With regard to community level variables we find that access to a bus stop by foot increases overall per-capita household income by 221 LE. The variable capturing access to electricity would appear to be indicative more of household wealth rather than of increasing household income opportunities.

9. CONCLUSION

Our results are very much in line with the findings reported by El-Laithy, Lokshin and Banerji (2003) who find that "the poor tend to live in large families, have low levels of education, work in an informal sector and be concentrated in low-paying unskilled activities." More specifically results show that: 1) Agricultural income from crop - not livestock - production increases income inequality. This is due to the fact that land is unequally distributed and also influenced by the positive correlation between land (wealth) and education, in particular university education. An emphasis on wage employment and livestock production will reduce income inequality (or be neutral). 2) Human-capital is relatively scarce and appears to be more concentrated in the land-rich households. 3) The poorest households rely on casual employment (25.9%), livestock (17.3%) and transfers (20.1%) for 63.3 percent of their income. Formal wage employment increases in importance for the better-off households. 4) Related to the previous point is the fact that the better-off households have a higher proportion of public sector jobs and these public sector jobs are substantially better paid than private sector jobs. 5) Female headed households are particularly disadvantaged. 6) There is considerable gender bias, in favour of males, in employment in wage employment. In good part this is due to access to education being biased towards

males. 7) Returns to male labor are about twice those of females and this is partly due to males being more likely to have received formal education. 8) Education is the key factor in determining wage employment and returns. Moreover the returns to education increase with more education. 9) More educated households earn more overall income as well as more farm income. 10) Household income earning activities are very much influenced by landownership and an additional ½ feddan is found to raise per-capita income by about 153 Egyptian pounds. 11) The returns-to-cost ratio is particularly advantageous for small animals (chiefly poultry) which are an important source of income for poorer households.

The findings reported in this paper show that key economic activities for the poor are: i) casual wage labor income, and; ii) livestock rearing, in particular poultry and other small animals. Agricultural policies that can address these two areas will have the strongest impact on poverty reduction. A longer-term strategy would also focus on enhancing formal sector employment – through increased access to education for men and women - as returns in this sector are higher and it is a crucial sector with regard to helping households move out of poverty.

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