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DO ENDOWMENTS MATTER? EXPLORING THE GENDER DIMENSIONS OF POVERTY IN EGYPT

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This paper investigates the gender dimensions of poverty in Egypt and examines the factors that contribute to poverty for different household types. Furthermore, it decomposes the poverty differential between household types into a component due to endowments and another due to the return to these endowments. I use data from five Household Income, Expenditure and Consumption Surveys, that span a period of far reaching economic, social and political changes, from 1999 to 2013. Results suggest that female-headed households were poorer than male-headed households for all years under study in urban areas; and slightly less poor over part of the period in rural areas. This difference is greater for widowed mothers. Most of the poverty differentials between female-headed and male-headed households cannot be explained by differences in endowments in all years. In fact, if female-headed households had the same endowments as male-headed households in urban areas they would have been poorer than they already were.

JEL Codes: I3, O1, J7

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1. INTRODUCTION

According to official statistics, poverty in Egypt has been rising steadily over the last 15 years, from 16.7 percent in 1999/2000 to 26.2 percent in 2012/2013 (CAPMAS, 2013). Does this increasing poverty also have a gender dimension? How did female-headed households fare during this period of deteriorating social welfare? If female-headed households (FHH) are poorer, what are the underlying reasons behind their poverty? If they are poor because of less favorable endowments: income generating assets such as land, credit, physical and human capital, or technology, then policy interventions can focus on trying to provide them with more equal access to these assets, or more widespread opportunities to acquire them. If, however, their poverty is due to less favorable returns to these

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endowments (commonly known as the "treatment' or "discrimination" effect[1]), then policy should focus on achieving more equitable returns to assets for all groups in society. This should also be a policy priority even if female-headed households are not poorer, but still face less favorable "treatment" in society or the labor market that make the returns to their existing assets lower than their male-headed (MHH) counterparts.

This paper contributes to the literature by investigating whether there is a gender dimension to poverty in Egypt. Furthermore, I develop and estimate a model of the correlates of poverty for different household types, and then decompose the poverty differential into a portion that is due to differences in endowments, and another that is due to differences in the return to these endowments, in the spirit of the Oaxaca (1973) and Blinder (1973) decomposition that is common in the labor literature. I pay particular attention to the "route" to female-headedness: whether by choice (for example through divorce, or by remaining single) or by chance (widowhood) and differentiate between families with children and those without to gain greater insight into the implications of different household structures. To preview the main results of the paper, I find that FHH are poorer than MHH in urban areas in all years in the period under study, and in some years in rural areas. These differences vary by marital status, having children, and whether the head is married, divorced or widowed. Family characteristics, education level of the head and the head's sector of employment, are strongly associated with the probability of being poor, and their importance varies by household type. The poverty decompositions indicate that female-headed households would have been poorer if they had the same endowments as male-headed households in urban areas, but in rural areas there is potential for FHH to benefit by receiving the same distribution of endowments as MHH.

The remainder of this paper is organized as follows: the next section reviews the related literature. Section 3 discusses the data and its limitations including important issues related to the definition of a female-headed household, and the distinct types of households analyzed in this study. Section 6 discusses the empirical methodology, first elaborating on the measurement of poverty and then on the estimation of a gender specific welfare function. The results of this estimation are then discussed. Section 11 develops a model to explain the poverty rate differentials between different types of households based on their differential endowments and returns to these endowments and discusses results. Section 12 concludes and provides some brief policy recommendations.

[1] The terminology of "endowments" versus "discrimination" (sometimes also referred to as "treatment effect" or "return to endowment" in the paper), borrows from the labor economics literature that builds on the seminal work of Oaxaca (1973) and Blinder (1973), where similar decomposition methods are used to determine whether women's wages are lower than men's due to mean characteristics or due to labor market discrimination. No doubt that unequal endowments can also be interpreted as a result of discrimination in the sense of unequal access to resources, but in this paper the term "discrimination" is taken to mean lack of equal return to the same endowments. I thank an anonymous referee for pointing out the importance of clarifying this distinction in the paper.

2. Related Literature

There is little disagreement that women often have less access to income generating assets such as land (e.g. Deere and Leon, 2003), credit and other financial services (e.g. Demirguc-Kunt, Klapper, and Singer, 2013), physical and human capital, and technology (Chant, 2003, Klasen Lechtenfeld, and Povel, 2015, World Bank, 2011b, among many others). At the same time women typically face greater time constraints since they have to fulfill multiple roles within the household both in home production activities as well as domestic roles such as child care and housekeeping (Gammage, 1998; World Bank, 2011b; Morton Klugman et al., 2014). They face a wide, and sometimes increasing earnings gap with respect to men, sometimes due to "pure" discrimination in pay, as well as access to higher paying jobs[2], but often also due to their lower education levels, and restricted access to land and to credit (Buvinic and Gupta, 1997). The widespread support for the existence of gender inequalities in asset ownership and labor market rewards and the existence of these multiple challenges for women has often made it "deceptively easy" (Gammage, 1998) to assert that female-headed households also form a greater proportion of those below an acceptable benchmark standard of living.

There is no consensus on the *existence* of "feminization of poverty," however (Chant, 2010; Duflo, 2012; Klasen et al., 2015; Bradshaw et al., 2017). Out of 65 studies covering Africa, Asia, Latin America and the Caribbean, Buvinic and Gupta (1997) found that in 38 of these studies FHH were overrepresented among the poor, while 15 others found that their poverty was associated with certain characteristics of the female heads, or for some, but not all poverty indicators. Quisumbing, Haddad, and Pena (2001) examined the poverty status of females and FHH in 10 developing countries in Africa, Asia and Latin America and found that FHH were consistently poorer in only two of these countries. Medeiros and Costa (2008) used data from eight Latin American countries and several different definitions of feminization of poverty, as well as different equivalence scales, and concluded that there is no clear evidence of a "recent and widespread feminization of poverty in the Latin American countries studied". Other authors have also challenged this notion and argued that the evidence in favor is at best week. Chant (2003) surveys results from studies for Latin America, Asia and Africa that failed to find a consistently higher rate of FHH in poverty (for example Fuwa, 2000 on Panama, Gafar, 1998 on Guyana, GOG, 2000 on The Gambia, Kusakabe, 2002 on Cambodia). Milazzo and van de Walle (2015) study the prevalence of poverty among FHH in Sub-Saharan Africa, using data on over twenty countries spanning the period 1990 to 2012, a time of overall rapid economic growth. They find evidence that despite a growing share of FHH in the population during this period, FHH have largely seen faster poverty reduction than their MHH counterparts.

Several authors have argued that the nature of the "female-headedness," i.e. the particular route into this status -whether by widowhood, divorce or migration of the male spouse- combined with the specific cultural, social and demographic contexts within any one country, will have an impact on the position of these

[2] See AlAzzawi (2014) for a survey of the literature on wage discrimination and an in-depth analysis for Egypt.

women along the socio-economic ladder and hence closely affect their prospects for being poor (e.g. Quisumbing, et al., 2001; Klasen et al., 2015). Widowhood in particular is associated with higher poverty and higher persistence of poverty in several studies such as Appleton (1996) for Uganda, Dreze and Sinivasan (1997) for India, Horrell and Krishnan (2007) for Zimbabwe and van De Walle (2013) for Mali. The age of the female head, the number of other income earners in the household compared to the non-earner dependents, the marital status and whether the household receives "remittances" from non-resident family members will all matter for the poverty designation and the change in that designation over time.

A few studies have investigated the gender dimension of poverty in Egypt in the 1990s (Nassar, 1997; Datt et al., 1998; El-Laithy, 2001).The most recent of these El-Laithy (2001) used data from the 1999/2000 Household Income, Expenditure and Consumption Survey, and primarily focused on the relative poverty of females compared to males (not female-headed households). When studying individuals, she found that compared to males, poverty was 2.3 percentage points higher for females in urban areas and 4.8 percentage points higher in rural areas. When focusing on households as the unit of study, she found that female-headed households fared slightly better than those headed by males. She found that non-income indicators in which the difference between males and females were greatest, such as education, labor force participation and sector of employment, were the most important determinants of poverty.

There is a growing body of recent literature that documents the deteriorating status of women in Egypt in recent years. AlAzzawi (2010) and AlAzzawi and Said (2013), using panel data for 1998 and 2006 to analyze the degree of income and non-income mobility, found that females tend to be "stuck" in the lower end of the distribution more often than males, both in terms of income and job quality measures. Several labor market studies have also documented an increase in the gender pay gap (Kandil, 2009; AlAzzawi, 2014,), especially in manufacturing, as well as widespread occupational segregation (El-Hamidi and Said, 2008). This is combined with a continuous decline in female labour force participation (Hendy, 2015) over the last two decades. The 2014 Global Gender Gap Report published by the World Economic Forum ranked Egypt at 131 out of 142 countries surveyed in economic participation, and 129 overall (Hausman et al., 2014).[3]

A small number of studies have investigated the importance of endowments vs return to endowments in the poverty context. Rodgers (1994.) performed this analysis for the USA for 1980. She found that the differential return to endowments was more important in explaining the large and increasing poverty gap between single female-headed households and all other types of households during the period under study. Bibi and Chatti (2010) decomposed poverty in Tunisia by household type using data from 1990 and 2000. They found that endowments were initially more important in explaining the poverty differential, but by 2000 the differential return to endowments was more important.

[3] The survey ranks countries' gender gap performance in the areas of economic participation and opportunity, educational attainment, health and survival, and political empowerment.

3. Data and Limitations

This paper relies on data from five rounds of the Household Income, Expenditure and Consumption Surveys (HIECS). Surveys are available for 1999/2000, 2004/2005, 2008/2009 2010/2011 and most recently 2012/2013. These surveys provide a rich source of information on household expenditure, as well as various household and individual characteristics for the different household types.

3.1. *The Living Standards Indicator*

In this paper, as in almost all recent studies of poverty in Egypt (see for example World Bank, 2007; Marotta and Yemtsov, 2011; Marotta et al., 2011; World Bank 2011a; CAPMAS, 2013, among others). I rely on actual consumption expenditure as the measure of welfare. This includes all monetary expenditures on consumer goods and non-monetary expenditures, such as imputed rents, own production and in-kind transfers received by households. Food consumption includes food that the household has purchased, grown and received from other sources. Non-food consumption is the sum of expenditure on all non-food items, including expenditure on fuel, clothing, schooling, health and several miscellaneous items. It also includes transfer and credit expenditures (Marotta et al., 2011).

Expenditure is a better indicator of permanent income when households exercise consumption smoothing and use savings to augment unstable incomes (Deaton, 1997). This is common among the poor especially that their income might be highly variable due to seasonal, informal or unpredictable unemployment. They exercise consumption smoothing by accessing credit markets (even if these are inefficient and highly costly), family savings or in-kind contributions (Deaton and Zaidi, 2002). Moreover, expenditures can generally be more accurately captured, particularly among the poor, who have relatively constant and well-known expenditures on relatively few items, while their incomes can be very erratic and unpredictable (Deaton, 1997; Klasen, 2000; World Bank, 2011a).

Expenditure measures can however be subject to gender biases that results in more accurate reporting for FHH. In such households the female heads are both the main income earner as well as the one responsible for household purchases. In contrast wives in larger, married couple households might report expenditures less accurately due to the larger household size, and incomplete information about income and expenditures of all members, especially those of the male head. This would incorrectly imply higher expenditures in the FHH, while underreporting in the MHH might result in artificially higher rates of poverty for the MHH. This limitation implies that the differences between FHH and MHH reported in this paper are likely a lower bound on the true differential in poverty rates.[4]

Another important issue in poverty analysis is related to ensuring comparability of the households under study by accounting for differences in households' age

[4] For space considerations, I do not report poverty rates or differentials based on the income variable available in the HIECS surveys since compared to the data on consumption, income data in the survey is quite minimal in terms of the amount of information collected, and the level of detail. (Marotta *et al*., 2011). Moreover, using income as an additional welfare measure in an earlier companion paper (AlAzzawi, 2015) did not reveal large differences in poverty rates compared to using consumption.

and size composition, as well as economies of scale in consumption, which will ultimately affect its needs. One approach is to examine consumption at the individual level and determine whether it is adequate by comparing it to international standards on nutritional needs by age and gender. Unfortunately, the HIECS does not provide information on individual consumption, only a household aggregate and therefore this approach cannot be applied to the Egyptian data. Another approach is to calculate an "adult equivalent income (expenditure)" for each household which gives smaller weight to children than adults and takes economies of scale in consumption into consideration.[5] Clearly, the choice of equivalence scales is highly arbitrary. I constructed several different Adult Equivalent Expenditure (AEE) levels for each household based on this methodology, using different values for the weight of children (α) and degree of economies of scale (θ). The results were extremely sensitive to even small differences in the values of α and θ. Bibi and Chatti (2010) argue that estimating an econometric equivalence scale cannot be identified from household data and therefore advocate the use of the per capita income or expenditure as a reasonable indicator of the welfare level of each household member.[6] I follow this approach here, using the per capita expenditure for each household as an indicator of individual welfare for members of that household, to avoid making strong assumptions about equivalence scales that cannot be sufficiently justified.[7]

3.2. *Heterogeneity of "Female-Headed" Households, and complications in identifying them*

The heterogonous nature of FHH and the need to study different types of FHH separately has been discussed extensively in the literature on feminization of poverty (e.g. Kabeer, 1997; Quisumbing *et al*., 200l; Klasen et al., 2015; Beegle et al., 2016). Households in the sample under study for instance vary tremendously in their composition, ranging from the typical married couple with two income earners working hard to provide for a family, to the retiree who has already worked for many years and is now living with older children who might

[5] For example, Deaton and Paxson (1998) suggest the use of a parametric form of equivalence scale, where a child is assumed to require a fraction α of what an adult needs, and where the elasticity of needs with respect to adjusted household size is a constant θ. This gives rise to a formula of the form: Adult Equivalent Expenditure (AEE)=(Total Household Expenditure)/((adults+ α children)$^{\theta}$). The smaller the α, the smaller the relative weight of children. The higher the θ the smaller the degree of economies of scale assumed.

[6] This issue is likely to be less of a concern in the present study for two reasons: 1. throughout the analysis, I separately consider families with children age 14 and under, and those without. Hence the comparison groups are always similar with respect to the issue of smaller weight of children, once the total household size is accounted for by taking the per capita expenditure level. 2. Given that the share of food in consumption is typically higher than 65 percent for poor families, and there are limited economies of scale in food consumption in particular, accounting for economies of scale is not likely to affect the results significantly. Deaton and Paxson (1998) argue that as countries get richer, and larger fractions of household budgets are set aside for items such as rent and entertainment, economies of scale in consumption increase.

[7] Multidimensional aspects of poverty that go beyond monetary welfare are certainly also important to consider from the gender perspective, but are beyond the scope of this paper. I explore multidimensional gender poverty and vulnerability in a separate set of studies that are currently being completed.

be supporting her, to the middle-aged mother who lost her husband and is struggling to earn enough income in the labor market for the first time. Such distinctions are of course accompanied by very different challenges and opportunities and it is important to distinguish between the different types of households in any analysis of gender and poverty. I mention below some of the distinct household types that will be studied in the paper.

3.2.1. Household Types: Children

Families with children face very different obligations and challenges where poverty is concerned, compared to those without, especially when the gender dimension is taken into consideration. FHH for example, tend to have smaller households, but higher dependency ratios (Moghadam, 1998; World Bank, 2011b; Klasen et al., 2015). In the full sample under study, the average size of FHH is 3.2, while that of MHH is 4.8 (for all years). If the sample is split into families with children (14 and under) and those without, the average household sizes for families with children are 4.8 for FHH vs. 5.4 for MHH, while for families without children they are 2.3 and 3.5, respectively. Thus, FHH with children are more than twice as large, while MHH are only 50 percent larger, than their counterparts without children. These statistics are reported in Table A1 in the appendix. Out of all FHH, 63 percent have no children 14 and under, while the ratio is almost reversed for MHH: only 32 percent have no children. Indeed, the dependency ratios for the two groups are very different: for families without children, the dependency ratio for FHH is 0.14, while that for MHH is 0.17. For families with children, however, the dependency ratios are 1.29 for FHH and 0.92 for MHH-that is 40 percent higher for FHH than MHH, and more than 9 times higher than FHH without children. Furthermore, the average age of heads with children are much closer to each other at 43.3 and 42.3 years for FHH and MHH, respectively; while those for families without children are over twelve years older at 58.7 and 55.3 years of age, respectively. The full samples of FHH and MHH are therefore not a homogenous group: if I were to lump all FHH together the poverty profile of this "full sample" would really be that of elderly (average age 58.7), mostly widowed (85 percent) female-headed households, whose offspring are already grown, independent adults who might be contributing to household expenses from their own earnings. In particular, the current welfare of these female heads is likely to be a function of their lifetime earnings, or more likely those of a deceased or living spouse, and thus are not strictly comparable to the sample of heads (male or female) with children who rely on their own endowments and labor market earnings to support themselves and their families. This distinction is especially pertinent to the poverty differential decomposition analysis. If the full sample of female or male heads was treated as a single group this would unduly bias the results towards the elderly, widowed female heads who have no children, while the MHH sample would be that of much younger, working heads, that have children. To ensure consistency and completeness, I include all MHH and FHH in the sample, while performing the analysis separately for those with children, and those without.

3.2.2. Household Type: Route to Female Headship

Another important distinction that is particularly relevant in studying the gender dimensions of poverty, is the "route" by which the female became the household head: whether through widowhood or by choice (see Beegle et al., 2016, Bradhsaw et al., 2017, Klasen et al., 2015, Quisumbing, et al., 2001, among others, for a discussion).[8] Arguably, a female who seeks divorce (or to stay single) might have chosen to do so because she has strong prospects for supporting herself (and her family) on her own, in terms of higher personal income, better social status or a family support system that would allow her to enjoy an at least comparative standard of living after divorce. Ignoring such differences in the analysis masks the true differences between FHH that might be doing well and those who truly deserve some sort of government support (Kabeer, 1997, Milazzo and Van de Walle, 2015, van De Walle, 2013., among others). I therefore perform the analysis after also differentiating between MHH and FHH based on marital status: single (never married), married, divorced and widowed. Tables A2 and A3 in the appendix show the breakdown of sample sizes by number of households and number of individuals, respectively, who are in each household type and marital status. Most MHH are married, and this group has the largest number of individuals in the sample. By contrast, the largest number of FHH are widowed and they represent about 8% of all the individuals in the sample. The second largest group of FHH is married.

3.2.3. Female-Headed: "de jure" or "de facto"

Another important complication in this line of analysis rests on the complexity of the headship designation. It may not be as straight forward as the "de jure" head: the self-declared survey designation. The term "head" is a loaded term. It carries strong connotations about decision making power within the household that has traditionally been given to the oldest male member whether or not he is the main breadwinner of the household. This is certainly problematic in the case of Egypt especially, where the traditional patriarchal system may preclude the designation of the female as head in the presence of a disabled adult male or a son (regardless of age) for example, even if the woman is the main income earner in the household. Ideally, I would prefer to use an objective benchmark that assigns headship to the family member whose income contributes most to maintaining this family. For instance, Gammage (1998) found that using the *maintenance* criteria to define female-headed households (i.e. a household is FHH if females earn the majority of its income, regardless of the self-declared household head in the survey), resulted in markedly higher percentage of such female-maintained households (FMHs) in her sample, as well as higher incidence of poverty among them in El Salvador and Costa Rica. Unfortunately, the HIECSs does not provide information about individual income or earnings, only an aggregate for the household. This means that many self-declared MHH in the sample are really female-maintained households, i.e. "de facto" FHH, that our

[8] I would like to thank an anonymous referee for raising this point and suggesting I distinguish between households based on marital status.

data fails to capture. One piece of information that can provide some insights in this respect, although not a perfect indicator, is to consider whether the head lives in a couple or not.[9] Self-declared female heads that are married and live in a couple (relatively few in the sample) are likely to be truly female-maintained. I therefore further split the sample into married FHH and MHH living in couples, and those who are not. If married FHH living in a couple are poorer, this gives some preliminary evidence that female-maintenance is indeed worthy of attention by policy makers.[10]

3.2.4. Migrant Spouses and Remittances

A related complication in identifying FHH arises from the presence of households where one spouse works overseas and sends home remittances to support the family, which is quite common in Egypt. If the overseas spouse is the male, it is not clear how the household head question might be answered: the remaining spouse might designate herself as the household head in the absence of the husband, but in other cases she might not. This can underestimate poverty among "true" female-headed households, i.e. where the female head does not rely on others for support. In the surveys, remittances are the major source of income for 40 percent to 50 percent of FHH for all years. However, the survey lumps together those who receive remittances from domestic and overseas sources. This complicates matters as such remittances might be alimony or in-kind support. Unfortunately, the data does not allow any further breakdown of the income source category. Questions about the type of work of both the head and the spouse are asked in the survey and working overseas is one of the possible survey responses, however, none of the cases in the survey report this as the type of work, neither for the head nor the spouse. The data also does not provide any other information from which one can infer the amount of remittances from abroad and hence make an attempt to account for it. The poverty rates for FHH should therefore be regarded as a lower bound since some of the self-declared female heads are in fact temporary heads while the main income earner spouse is overseas.

4. Empirical Methodology

4.1. *Developing the Poverty Benchmark*

The first step in the analysis is to determine the poverty line that will be used to identify the poor. I use poverty lines from World Bank's Poverty Assessment Update (2007) where three different poverty lines based on the cost-of-basic-needs methodology were constructed, taking differences in consumption patterns and prices across regions, into account. The cost of actual diets consumed by Egyptians of different ages and classes, not a hypothetical one based on

[9] This only applies to households with married heads in the data. None of the single, divorced or widowed heads answered that they live in couples in all years.

[10] More than 99 percent of all married MHH in the sample lived in a couple in all years so performing the complete analysis on families with heads in couples vs. those not in couples would not have been meaningful.

caloric requirements, was used to calculate these poverty lines. The Food Poverty Line (FPL) was constructed to reflect the cost of the food bundle using the relative quantities observed in the diet of the poor (as proxied by the second quintile), and the prices they actually faced. Individuals and households whose consumption was below the FPL were considered "extreme poor" (World Bank 2007). The Poverty Line (PL) was constructed by allowing for expenditure on essential non-food items in addition to the FPL. Specifically, the share of non-food expenditure was set to equal that of households whose *total* expenditure is at the food poverty line. This is designed to capture the extent of "non-food essentials" since households would have to *give up* some of their basic food needs to afford these non-food items.[11] The Upper Poverty Line (UPL) was calculated by setting the non-food share to equal that of households whose *food* expenditure is equal to the food poverty line. For brevity, I follow recent poverty studies in Egypt and focus exclusively on poverty estimates based on PL.[12]

The PLs from World Bank (2007) are in 2004/2005 prices and had to be deflated to be used with the 1999/2000 HIECS, and inflated to be used with the 2008/2009, 2010/2011 and 2012/2013 surveys.[13] These CPI poverty line updates were carefully performed taking into consideration the sharp differences in the rate of change in prices of food and non-food items, on the one hand, and between rural and urban regions, on the other. Table 1 lists the values for the all items CPI and the Food and Beverages subcomponent for the years of interest. Inflation was relatively low in Egypt between 1999/2000 and 2004/2005, with the CPI for all items rising by about 32.5 percent over the 5-year period, on average for urban and rural areas. This amounted to an average annual rate of about 6.5 percent. The change in the Food CPI was also very similar, and prices rose less in rural areas.

By contrast, between 2004/2005 and 2008/2009 the CPI for all items rose 52.5 percent (urban and rural average) over the 4-year period. This amounted to an average annual rate of about 13.5 percent. Food prices rose much faster over this period and have continued to rise until the most recent year 2012/2013 at a faster

[11] There is an important discussion in the World Bank (2011a) most recent poverty assessment update for Egypt about the complexity and representativeness of this system of poverty lines and the methodology used to update it. The authors argue that the PL represents "the minimal defensible threshold of total consumption" since the FPL is just too low to sustain a person given that it does not allow for any non-food requirements. They also argue that the UPL is a much more consistent concept of basic needs since it reflects a subsistence minimum level of both food and non-food items, taking a more realistic view of human needs. The UPL is also barely at the $2 a day measure which is more justifiable for a country like Egypt. Results based on the PL are reported here, those based on the FPL and the UPL are available from the author upon request.

[12] The Central Agency for Public Mobilization and Statistics (CAPMAS) for example, completely ignores the Upper Poverty Line (UPL) that is available in some World Bank Publications (2007, 2011a) and relies exclusively on the FPL and PL in its publications on poverty. Furthermore, using FPL and UPL as additional poverty benchmarks in an earlier companion paper (AlAzzawi, 2015) lead to very similar conclusions about differences in poverty incidence, depth and severity by HH type, to those obtained using the PL.

[13] The World Bank published an updated version of the poverty assessment for Egypt in 2011, however the report does not provide details of the poverty lines calculated by region, only for all Egypt. The method followed here is very similar to their chosen method of updating the 2004/2005 poverty lines. When similar methodology is applied on the stated all Egypt 2008/2009 poverty line (in 2008/2009 prices) to update it to the respective survey year prices, the obtained poverty lines are almost identical to the poverty lines calculated for all Egypt using the methodology followed in this paper.

TABLE 1
CPI And Food And Beverages Cpi For Urban And Rural Areas, 1999/2000 To 2012/2013 Fiscal Annual Average. Jan 2010=100

	All Items CPI		Food CPI	
	Urban	Rural	Urban	Rural
1999/2000	44.7	43.95	34.2	35.15
2004/2005	59.2	58.55	50.1	50.15
2008/2009	89.4	90.3	84.3	87.2
2010/2011	110.9	111.8	120.3	118.9
2012/2013	128.8	132.1	145.4	144.6

Source: CAPMAS, CPI Bulletin, various issues.

rate than the all items CPI. Food prices had become very volatile during the 2007-2008 period. World food prices were rising dramatically due to sharp declines in supply after a series of droughts around the world, and the simultaneous rising demand from biofuels in the face of rising oil prices. World food prices fell in 2009 and 2010 but rose again in 2011 to even higher levels than 2007/2008 (FAO, 2014). Between 2004/2005 and 2012/2013, the CPI index for all items more than doubled with prices rising slightly faster in rural areas, while that for Food and Beverages almost tripled over the same period.

I therefore updated the poverty lines by using the Food CPI for the FPL and using the non-food CPI for the non-food components of the PL (as measured by the difference between the PL and FPL). This gave more justifiable poverty lines than would have resulted by simply using the all items CPI for all poverty lines. I chose to update the poverty lines rather than the income/ expenditure variables, but either method should give equivalent results. Table 2 summarizes the poverty lines by region, reflecting the differences in prices and consumption patterns across regions and over time.

4.2. *Identifying the State and Structure of Female Poverty*

To identify the state and structure of poverty, I use the Foster-Greer-Thorbecke (FGT) class of poverty measures:

$$P_\alpha = \frac{1}{N}\sum_{i=1}^{H}\left(\frac{Y_p - Y_i}{Y_p}\right)^\alpha \tag{1}$$

TABLE 2
Annual Per Capita Poverty Line By Region, In Survey Year Prices.

Region	1999/2000	2004/2005	2008/2009	2010/2011	2012/2013
Metropolitan	1023.2	1453.4	2371.556	3263.49	3906.4
Lower Egypt Urban	988.8	1403	2286.821	3142.681	3760.5
Lower Egypt Rural	1023.6	1429.2	2398.447	3185.083	3844.4
Upper Egypt Urban	998.2	1416.3	2308.475	3172.4	3796.0
Upper Egypt Rural	1007.6	1408.3	2367.53	3148.267	3801.5

Source: Author's calculations based on poverty lines in World Bank (2007), deflated/inflated to survey year prices using the CPI and Food CPI, for urban and rural separately (see text for details.)

where N is the population, H, is the number of poor, Y_p is the poverty line, Y_i is the household's per capita expenditure of those who are poor, and $\alpha \geq 0$ is a parameter. If $\alpha = 0$, the index simplifies to the headcount index, if $\alpha = 1$, it simplifies to the normalized poverty gap, if $\alpha = 2$ it gives the severity of poverty measure. Each of these measures provides an important dimension into poverty's state and structure and comparing the difference between these measures for FHH and MHHs over time will provide insight into the dynamics of poverty in Egypt over this time period.

Table 3 presents results of the FGT poverty levels by household type and year for rural and urban households separately using PL as the poverty line. The top panel reports poverty rates for individual living in all households while the bottom panel reports those for individuals living in households with children under 15. Looking at the full sample, rural poverty was much higher than urban poverty for all years and household types. Poverty incidence, depth and severity was higher for individuals residing in MHH in both urban and rural areas for all years. However, this aggregated sample masks a great deal of the differences between MHH and FHH as discussed in the previous section. The bottom panel reports results for families with children 14 and younger. Poverty was higher (P_0), deeper (P_1) and

TABLE 3
Poverty Rates for Each Household Type by pl, 1999-2000 to 2012-2013

	Female-headed Households (Rural)			**Female-headed Households (Urban)**		
	P_0	P_1	P_2	P_0	P_1	P_2
99/00	0.164	0.027	0.007	0.040	0.007	0.002
04/05	0.136	0.024	0.007	0.051	0.010	0.003
08/09	0.232	0.050	0.017	0.088	0.017	0.006
10/11	0.225	0.044	0.013	0.088	0.017	0.005
12/13	0.187	0.039	0.013	0.073	0.011	0.003
	Male-headed Households (Rural)			**Male-headed Households (Urban)**		
	P_0	P_1	P_2	P_0	P_1	P_2
99/00	0.211	0.037	0.010	0.052	0.009	0.002
04/05	0.212	0.038	0.011	0.072	0.013	0.004
08/09	0.334	0.070	0.022	0.124	0.023	0.007
10/11	0.300	0.062	0.019	0.122	0.024	0.007
12/13	0.266	0.053	0.016	0.112	0.018	0.005
Families with children						
	Female-headed Households (Rural)			**Female-headed Households (Urban)**		
	P_0	P_1	P_2	P_0	P_1	P_2
99/00	0.283	0.046	0.011	0.095	0.016	0.004
04/05	0.266	0.050	0.015	0.139	0.027	0.008
08/09	0.381	0.081	0.026	0.224	0.048	0.017
10/11	0.404	0.080	0.025	0.202	0.037	0.010
12/13	0.316	0.071	0.024	0.173	0.031	0.009
	Male-headed Households (Rural)			**Male-headed Households (Urban)**		
	P_0	P_1	P_2	P_0	P_1	P_2
99/00	0.256	0.046	0.012	0.073	0.012	0.003
04/05	0.271	0.050	0.014	0.102	0.018	0.005
08/09	0.406	0.088	0.028	0.172	0.033	0.010
10/11	0.378	0.078	0.024	0.168	0.035	0.011
12/13	0.337	0.068	0.021	0.162	0.027	0.008

Source: Author's calculations based on poverty lines in World Bank (2007), and HIECS 1999−2012.

more severe (P_2) for urban FHH in all years. For rural areas, FHH were poorer in 1999/2000 and 2010/2011, while MHH were poorer in the other years. Similar trends emerge for the poverty gap and severity of poverty measures. Poverty increased considerably in 2008-2009, and again in 2010-2011 for both FHH and MHH in all regions, but has since fallen somewhat, although still not to pre-2008 levels.

The differences between the poverty rates for MHH and FHH are quite small in many cases. This raises the question of how statistically significant these differences are. Both the poverty line used in the analysis,[14] as well as the welfare metric, are built from a series of estimates of population characteristics from the sample survey data. This means that both are subject to sampling error which should be taken into consideration, especially when the goal is to determine whether one group is facing particularly higher poverty than others. To compute the sampling variance of the poverty estimates reported in this study I use the data based bootstrap simulation method (Efron, 1979; Efron and Tibshirani, 1993.). The bootstrap method is based on repeated samples(J times), drawn with replacement, of size K from the original sample data of size N, where K<N. The estimated poverty measures are then calculated for each bootstrap sample, repeating the process J times. The standard deviation of each poverty measure over the J replications is an estimator of the standard error of that poverty measure (Simler and Arndt, 2006). The bootstrap method has several advantages over the alternative analytical approach, most important of which is that for small sample sizes (which is the case for some of the subsamples presented next), the standard errors are more accurate. Second, the bootstrap automatically takes into account the natural bounds of the measure, unlike the analytical approach. The bootstrap method was also shown to provide the same accuracy as the delta method, at a much lower computational cost, when computing standard errors for complex poverty measures especially across groups such as gender and region (Alkire et al., 2015). Tables 4–8 present the bootstrapped poverty estimates and their standard errors for MHH and FHH households by marital status and year, separately for rural and urban households, together with their bootstrapped standard errors, based on J=50 replications. Tables 4 and 5 report these results for families with children 14 years and under. In both urban and rural areas, there does not seem to be one consistent trend in terms of one household type consistently facing higher poverty than the other. Poverty incidence was higher for widowed FHH for all years and regions (except rural 2008), and these differences were statistically significant except in 2012 for rural and 1999, for both rural and urban areas. For divorced household heads, also no single trend prevailed, but as Tables A2 and A3 in the appendix show, there were in some cases very few observations with divorced (or single) heads, and hence even with the

[14] See World Bank (2007) for a discussion of how the poverty line is constructed from minimum caloric requirements that are based on survey estimates of the population's age and sex distributions; how the expenditure patterns that determine the basic food and nonfood needs are also estimates, and hence subject to sampling error; as are the prices used to price the basic needs basket, which also come from surveys.

TABLE 4
FGT Poverty Estimates for Rural Families with Children Under 15; with Bootstrap Standard Errors

		1999			2004			2008			2010			2012		
		FHH	MHH	DIFF	FHH	MHH	DIFF	FHH	MHH	DIFF	FHH	MHH	DIFF	FHH	MHH	DIFF
MARRIED	P0	0.282***	0.304***	−0.022**	0.282***	0.321***	−0.039***	0.396***	0.461***	−0.065***	0.402***	0.438***	−0.036**	0.346***	0.384***	−0.038**
		(0.010)	(0.003)	(0.010)	(0.007)	(0.002)	(0.008)	(0.008)	(0.002)	(0.009)	(0.016)	(0.005)	(0.017)	(0.016)	(0.005)	(0.019)
	P1	0.043***	0.058***	−0.015***	0.050***	0.062***	−0.012***	0.086***	0.106***	−0.020***	0.082***	0.096***	−0.013***	0.075***	0.082***	−0.006
		(0.002)	(0.000)	(0.002)	(0.002)	(0.001)	(0.002)	(0.002)	(0.001)	(0.002)	(0.003)	(0.001)	(0.004)	(0.003)	(0.001)	(0.004)
	P2	0.009***	0.016***	−0.007***	0.015***	0.018***	−0.003***	0.029***	0.035***	−0.007***	0.027***	0.031***	−0.003	0.023***	0.026***	−0.004**
		(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.001)	(0.001)	(0.000)	(0.001)	(0.002)	(0.000)	(0.002)	(0.001)	(0.000)	(0.001)
DIVORCED	P0	0.403***	0.230***	0.173***	0.255***	0.401***	−0.146**	0.490***	0.452***	0.038	0.626***	0.756***	−0.13	0.224*	0.538***	−0.314
		(0.089)	(0.074)	(0.066)	(0.070)	(0.030)	(0.061)	(0.021)	(0.106)	(0.118)	(0.072)	(0.179)	(0.142)	(0.135)	(0.088)	(0.205)
	P1	0.064***	0.006***	0.058***	0.066***	0.007***	0.060***	0.137***	0.078***	0.059***	0.164***	0.027***	0.137***	0.140*	0.080***	0.06
		(0.016)	(0.002)	(0.015)	(0.016)	(0.001)	(0.016)	(0.010)	(0.027)	(0.022)	(0.027)	(0.006)	(0.024)	(0.084)	(0.010)	(0.092)
	P2	0.012***	0.000***	0.012***	0.021***	0.000***	0.021***	0.054***	0.016**	0.038***	0.051***	0.001***	0.050***	0.087*	0.012***	0.075
		(0.003)	(0.000)	(0.003)	(0.005)	(0.000)	(0.005)	(0.006)	(0.007)	(0.005)	(0.010)	(0.000)	(0.010)	(0.053)	(0.001)	(0.053)
WIDOWED	P0	0.368***	0.338***	0.031	0.378***	0.265***	0.112***	0.509***	0.546***	−0.037**	0.524***	0.230***	0.294***	0.392***	0.368***	0.025
		(0.012)	(0.018)	(0.022)	(0.012)	(0.020)	(0.027)	(0.008)	(0.016)	(0.016)	(0.021)	(0.032)	(0.028)	(0.021)	(0.035)	(0.049)
	P1	0.065***	0.059***	0.006	0.082***	0.043***	0.039***	0.115***	0.116***	−0.001	0.103***	0.017***	0.087***	0.101***	0.083***	0.018
		(0.003)	(0.002)	(0.004)	(0.003)	(0.002)	(0.005)	(0.002)	(0.007)	(0.008)	(0.005)	(0.001)	(0.004)	(0.006)	(0.013)	(0.018)
	P2	0.017***	0.015***	0.002*	0.027***	0.008***	0.019***	0.038***	0.038***	0	0.031***	0.002***	0.029***	0.040***	0.021***	0.019***
		(0.001)	(0.001)	(0.001)	(0.001)	(0.000)	(0.002)	(0.001)	(0.003)	(0.004)	(0.003)	(0.000)	(0.003)	(0.003)	(0.004)	(0.007)

Source: Author's calculations based on poverty lines in World Bank (2007), and HIECS 1999-2012. Observations are weighted by their sample weights times household size. Numbers in parentheses are bootstrap standard errors, with 50 replications. *** p<0.01, ** p<0.05, * p<0.1

TABLE 5
FGT Poverty Estimates for Urban Families with Children Under 15; with Bootstrap Standard Errors

		1999			2004			2008			2010			2012		
		FHH	MHH	DIFF	FHH	MHH	DIFF	FHH	MHH	DIFF	FHH	MHH	DIFF	FHH	MHH	DIFF
MARRIED	P0	0.067***	0.073***	−0.007	0.071***	0.102***	−0.032***	0.185***	0.209***	−0.024	0.268***	0.202***	0.066***	0.122***	0.192***	−0.070**
		(0.020)	(0.004)	(0.022)	(0.014)	(0.005)	(0.011)	(0.020)	(0.002)	(0.022)	(0.019)	(0.006)	(0.021)	(0.029)	(0.004)	(0.030)
	P1	0.008***	0.012***	−0.004***	0.013***	0.019***	−0.006***	0.040***	0.043***	−0.003	0.037***	0.044***	−0.007**	0.015***	0.034***	−0.019***
		(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.005)	(0.001)	(0.005)	(0.003)	(0.002)	(0.003)	(0.005)	(0.001)	(0.005)
	P2	0.002***	0.003***	−0.002***	0.004***	0.005***	−0.001**	0.014***	0.013***	0	0.010***	0.014***	−0.004***	0.003*	0.010***	−0.007***
		(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.001)	(0.003)	(0.000)	(0.003)	(0.001)	(0.001)	(0.001)	(0.002)	(0.000)	(0.002)
DIVORCED	P0	0.148***	0.174	−0.026	0.150***	NA	0.150***	0.218***	0.192***	0.025	0.312***	0.358***	−0.046	0.313***	NA	0.313***
		(0.047)	(0.123)	(0.138)	(0.034)		(0.034)	(0.027)	(0.027)	(0.042)	(0.049)	(0.123)	(0.134)	(0.050)		(0.050)
	P1	0.027***	0.022	0.006	0.038***	NA	0.038***	0.051***	0.047***	0.003	0.052***	0.070***	−0.018	0.103***	NA	0.103***
		(0.009)	(0.016)	(0.013)	(0.010)		(0.010)	(0.004)	(0.007)	(0.008)	(0.008)	(0.018)	(0.018)	(0.012)		(0.012)
	P2	0.009	0.003	0.006	0.013**	NA	0.013**	0.018***	0.015***	0.003	0.009***	0.020***	−0.011**	0.047***	NA	0.047***
		(0.006)	(0.002)	(0.004)	(0.006)		(0.006)	(0.002)	(0.003)	(0.004)	(0.002)	(0.005)	(0.004)	(0.008)		(0.008)
WIDOWED	P0	0.099***	0.064***	0.035	0.165***	0.064**	0.101***	0.320***	0.265***	0.055***	0.252***	0.108***	0.143***	0.230***	0.133***	0.097***
		(0.012)	(0.017)	(0.024)	(0.015)	(0.029)	(0.012)	(0.011)	(0.018)	(0.011)	(0.028)	(0.019)	(0.015)	(0.017)	(0.024)	(0.032)
	P1	0.017***	0.013***	0.004	0.031***	0.011	0.020***	0.070***	0.041***	0.029***	0.053***	0.037***	0.016***	0.038***	0.031**	0.007
		(0.003)	(0.005)	(0.006)	(0.004)	(0.008)	(0.001)	(0.004)	(0.004)	(0.004)	(0.008)	(0.006)	(0.004)	(0.005)	(0.014)	(0.019)
	P2	0.004***	0.003*	0.001	0.008***	0.003	0.005***	0.025***	0.009***	0.016***	0.015***	0.013***	0.002	0.009***	0.010*	−0.001
		(0.001)	(0.002)	(0.002)	(0.001)	(0.003)	(0.000)	(0.002)	(0.001)	(0.002)	(0.003)	(0.002)	(0.002)	(0.001)	(0.005)	(0.007)

Source: Author's calculations based on poverty lines in World Bank (2007), and HIECS 1999-2012. Observations are weighted by their sample weights times household size. Numbers in parentheses are bootstrap standard errors, with 50 replications. *** p<0.01, ** p<0.05, * p<0.1

TABLE 6
FGT Poverty Estimates for Rural and Urban Families with Children Under 15; for Married Heads in Couples/not; with Bootstrap Standard Errors

		RURAL														
		1999			2004			2008			2010			2012		
		FHH	MHH	DIFF	FHH	MHH	DIFF	FHH	MHH	DIFF	FHH	MHH	DIFF	FHH	MHH	DIFF
Head Not Living in a Couple	P0	0.334***	0.321***	0.013	0.327***	0.269***	0.058***	0.459***	0.543***	−0.084***	0.475***	0.269***	0.206***	0.367***	0.460***	−0.093*
		(0.005)	(0.016)	(0.013)	(0.010)	(0.007)	(0.015)	(0.007)	(0.020)	(0.022)	(0.017)	(0.048)	(0.048)	(0.004)	(0.039)	(0.050)
	P1	0.056***	0.057***	−0.001	0.066***	0.041***	0.025***	0.102***	0.119***	−0.017***	0.096***	0.017***	0.079***	0.089***	0.081***	0.008
		(0.001)	(0.002)	(0.001)	(0.002)	(0.001)	(0.002)	(0.002)	(0.005)	(0.006)	(0.003)	(0.006)	(0.008)	(0.003)	(0.012)	(0.016)
	P2	0.014***	0.015***	−0.002***	0.021***	0.008***	0.013***	0.034***	0.038***	−0.004*	0.030***	0.002*	0.028***	0.032***	0.017***	0.015***
		(0.000)	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)	(0.002)	(0.002)	(0.001)	(0.001)	(0.002)	(0.002)	(0.004)	(0.005)
Head Living in a Couple	P0	1	0.304***	0.696***	0.331	0.321***	0.01	0.843***	0.461***	0.382***	NA	0.438***	−0.438***	NA	0.384***	−0.384***
		(0.000)	(0.002)	(0.002)	(0.302)	(0.002)	(0.301)	(0.048)	(0.002)	(0.049)		(0.008)	(0.008)		(0.003)	(0.003)
	P1	0.298	0.058***	0.240***	0.035	0.062***	−0.027	0.259***	0.106***	0.153***	NA	0.096***	−0.096***	NA	0.082***	−0.082***
		(0.000)	(0.000)	(0.000)	(0.032)	(0.001)	(0.031)	(0.049)	(0.000)	(0.049)		(0.002)	(0.002)		(0.001)	(0.001)
	P2	0.089	0.016***	0.073***	0.004	0.018***	−0.014***	0.107***	0.035***	0.072***	NA	0.031***	−0.031***	NA	0.026***	−0.026***
		(0.000)	(0.000)	(0.000)	(0.003)	(0.000)	(0.003)	(0.025)	(0.000)	(0.025)		(0.001)	(0.001)		(0.001)	(0.000)

Source: Author's calculations based on poverty lines in World Bank (2007), and HIECS 1999–2012. Observations are weighted by their sample weights times household size. Numbers in parentheses are bootstrap standard errors, with 50 replications. *** p<0.01, ** p<0.05, * p<0.1.

TABLE 7

FGT Poverty Estimates for Rural Families without Children Under 15; with Bootstrap Standard Errors

		1999			2004			2008			2010			2012		
		FHH	MHH	DIFF	FHH	MHH	DIFF	FHH	MHH	DIFF	FHH	MHH	DIFF	FHH	MHH	DIFF
SINGLE	P0	0.449***	0.041***	0.408***	NA	0.089***	−0.089***	0.047***	0.142***	−0.096**	0.098**	NA	0.098**	0.040*	0.228***	−0.189***
		(0.054)	(0.008)	(0.050)		(0.014)	(0.014)	(0.016)	(0.030)	(0.041)	(0.042)		(0.042)	(0.023)	(0.052)	(0.071)
	P1	0.154***	0.004***	0.150***	NA	0.010***	−0.010***	0.004***	0.029***	−0.024***	0.021**	NA	0.021**	0.003*	0.054***	−0.051***
		(0.022)	(0.001)	(0.022)		(0.001)	(0.001)	(0.001)	(0.005)	(0.006)	(0.009)		(0.009)	(0.002)	(0.013)	(0.014)
	P2	0.074***	0.001**	0.073***	NA	0.001***	−0.001***	0.000***	0.007***	−0.007***	0.004**	NA	0.004**	0.000*	0.014***	−0.013***
		(0.012)	(0.000)	(0.012)		(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.002)		(0.002)	(0.000)	(0.003)	(0.003)
MARRIED	P0	0.058**	0.070***	−0.012	0.073***	0.094***	−0.021**	0.072***	0.167***	−0.096***	NA	0.143***	−0.143***	0.062**	0.112***	−0.050*
		(0.024)	(0.004)	(0.025)	(0.008)	(0.004)	(0.010)	(0.007)	(0.002)	(0.006)		(0.008)	(0.008)	(0.027)	(0.005)	(0.030)
	P1	0.005**	0.009***	−0.003*	0.010***	0.013***	−0.003	0.022***	0.027***	−0.005*	NA	0.027***	−0.027***	0.005**	0.016***	−0.011***
		(0.002)	(0.001)	(0.002)	(0.003)	(0.001)	(0.003)	(0.002)	(0.001)	(0.003)		(0.003)	(0.003)	(0.002)	(0.001)	(0.003)
	P2	0.001**	0.002***	−0.001***	0.002***	0.003***	-0.001*	0.007***	0.007***	0	NA	0.008***	−0.008***	0.000**	0.004***	−0.004***
		(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.001)	(0.001)	(0.000)	(0.001)		(0.001)	(0.001)	(0.000)	(0.000)	(0.000)
DIVORCED	P0	0.133**	0.188*	−0.055	0.072***	0.085*	−0.013	0.282***	NA	0.282***	0.177***	0.333**	−0.157	0.375***	NA	0.375***
		(0.052)	(0.108)	(0.154)	(0.025)	(0.045)	(0.049)	(0.043)		(0.043)	(0.056)	(0.153)	(0.138)	(0.144)		(0.144)
	P1	0.008***	0.011*	−0.004	0.016***	0.018*	−0.002	0.076***	NA	0.076***	0.046***	0.039**	0.007	0.051**	NA	0.051**
		(0.002)	(0.006)	(0.007)	(0.005)	(0.010)	(0.010)	(0.013)		(0.013)	(0.015)	(0.018)	(0.017)	(0.022)		(0.022)
	P2	0.001**	0.001*	0	0.005***	0.004*	0.001	0.030***	NA	0.030***	0.012***	0.005**	0.007**	0.009**	NA	0.009**
		(0.000)	(0.000)	(0.000)	(0.002)	(0.002)	(0.002)	(0.006)		(0.006)	(0.004)	(0.002)	(0.003)	(0.004)		(0.004)
WIDOWED	P0	0.062***	0.076***	−0.014*	0.084***	0.105***	−0.021	0.136***	0.162***	−0.026	0.112***	0.070**	0.041	0.126***	0.113***	0.014*
		(0.007)	(0.006)	(0.008)	(0.007)	(0.038)	(0.037)	(0.006)	(0.018)	(0.024)	(0.012)	(0.028)	(0.038)	(0.009)	(0.006)	(0.007)
	P1	0.010***	0.009***	0.001	0.011***	0.018**	−0.007	0.032***	0.028***	0.005	0.020***	0.020**	0	0.022***	0.023***	−0.002
		(0.001)	(0.002)	(0.003)	(0.001)	(0.007)	(0.007)	(0.002)	(0.006)	(0.007)	(0.003)	(0.008)	(0.010)	(0.001)	(0.005)	(0.005)
	P2	0.002***	0.002**	0.001	0.003***	0.004**	−0.001	0.012***	0.008***	0.004	0.005***	0.006**	−0.001	0.006***	0.008***	−0.002
		(0.000)	(0.001)	(0.001)	(0.000)	(0.002)	(0.002)	(0.001)	(0.003)	(0.003)	(0.001)	(0.002)	(0.003)	(0.000)	(0.002)	(0.002)

Source: Author's calculations based on poverty lines in World Bank (2007), and HIECS 1999-2012. Observations are weighted by their sample weights times household size. Numbers in parentheses are bootstrap standard errors, with 50 replications. *** p<0.01, ** p<0.05, * p<0.1.

TABLE 8

FGT Poverty Estimates for Urban Families without Children Under 15; with Bootstrap Standard Errors

		1999			2004			2008			2010			2012		
		FHH	MHH	DIFF	FHH	MHH	DIFF	FHH	MHH	DIFF	FHH	MHH	DIFF	FHH	MHH	DIFF
SINGLE	P0	0.058***	0.014***	0.043*	NA	0.014**	−0.014**	NA	0.019**	−0.019**	NA	0.098***	−0.098***	NA	0.008	−0.008
		(0.022)	(0.002)	(0.022)		(0.007)	(0.007)		(0.008)	(0.008)		(0.029)	(0.029)		(0.007)	(0.007)
	P1	0.010**	0.002***	0.009**	NA	0.003**	−0.003**	NA	0.001**	−0.001**	NA	0.013***	−0.013***	NA	0.001	−0.001
		(0.004)	(0.000)	(0.004)		(0.001)	(0.001)		(0.000)	(0.000)		(0.005)	(0.005)		(0.000)	(0.000)
	P2	0.002**	0.000***	0.002**	NA	0.001**	−0.001**	NA	0.000***	−0.000***	NA	0.003***	−0.003***	NA	0	0
		(0.001)	(0.000)	(0.001)		(0.000)	(0.000)		(0.000)	(0.000)		(0.001)	(0.001)		(0.000)	(0.000)
MARRIED	P0	0.062***	0.023***	0.039***	0.016	0.044***	−0.028**	0.112***	0.061***	0.051***	0.062	0.067***	−0.005	0.112***	0.059***	0.053
		(0.007)	(0.001)	(0.008)	(0.013)	(0.002)	(0.013)	(0.019)	(0.002)	(0.019)	(0.041)	(0.003)	(0.041)	(0.041)	(0.006)	(0.046)
	P1	0.017***	0.004***	0.013***	0.002	0.006***	−0.004**	0.016***	0.010***	0.006**	0.007	0.010***	−0.003	0.016**	0.007***	0.008
		(0.002)	(0.000)	(0.002)	(0.002)	(0.000)	(0.002)	(0.002)	(0.000)	(0.003)	(0.005)	(0.001)	(0.005)	(0.008)	(0.001)	(0.008)
	P2	0.005***	0.001***	0.004***	0	0.001***	−0.001***	0.003***	0.003***	0.001	0.001	0.002***	−0.001**	0.003*	0.001***	0.001
		(0.001)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)	(0.000)	(0.002)
DIVORCED	P0	0.013	NA	0.013	0.077***	NA	0.077***	0.094**	0.054*	0.04	0.012	NA	0.012	0.099***	NA	0.099***
		(0.008)		(0.008)	(0.015)		(0.015)	(0.037)	(0.029)	(0.060)	(0.008)		(0.008)	(0.034)		(0.034)
	P1	0.002	NA	0.002	0.008***	NA	0.008***	0.024**	0.010*	0.015	0.001	NA	0.001	0.010***	NA	0.010***
		(0.001)		(0.001)	(0.001)		(0.001)	(0.011)	(0.005)	(0.015)	(0.000)		(0.000)	(0.003)		(0.003)
	P2	0	NA	0	0.001***	NA	0.001***	0.008*	0.002*	0.006	0	NA	0	0.001***	NA	0.001***
		(0.000)		(0.000)	(0.000)		(0.000)	(0.004)	(0.001)	(0.005)	(0.000)		(0.000)	(0.000)		(0.000)
WIDOWED	P0	0.018***	0.050***	−0.031***	0.040***	0.017**	0.023***	0.059***	0.020***	0.039***	0.060***	0.078***	−0.018	0.063***	NA	0.063***
		(0.002)	(0.006)	(0.007)	(0.005)	(0.007)	(0.006)	(0.006)	(0.006)	(0.003)	(0.008)	(0.025)	(0.019)	(0.012)		(0.012)
	P1	0.003***	0.007***	−0.004*	0.008***	0.005*	0.003	0.009***	0.008***	0.001	0.015***	0.013**	0.001	0.008***	NA	0.008***
		(0.000)	(0.002)	(0.002)	(0.002)	(0.003)	(0.002)	(0.001)	(0.002)	(0.002)	(0.002)	(0.006)	(0.005)	(0.002)		(0.002)
	P2	0.001***	0.002**	−0.001	0.002***	0.002	0	0.002***	0.004***	−0.001	0.005***	0.003*	0.002*	0.002***	NA	0.002***
		(0.000)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.000)		(0.000)

Source: Author's calculations based on poverty lines in World Bank (2007), and HIECS 1999-2012. Observations are weighted by their sample weights times household size. Numbers in parentheses are bootstrap standard errors, with 50 replications. *** p<0.01, ** p<0.05, * p<0.1.

bootstrapping the results at such a disaggregated level need to be interpreted with caution.[15]

For married household heads, individuals in MHH were significantly poorer than those in FHH. However, as discussed in the previous section, it is very likely that many of the self-declared MHH were actually female-maintained. This would overestimate poverty among married MHH and underestimate it among married FHH. One way to examine this further given the limitations of the data is to split those with married heads into those with heads living in a couple and those who did not. It is likely that female heads living in a couple (despite the presence of a spouse) are what I called "de facto" heads: they provide the main source of financial support in the family. If poverty is higher for these FHH than their MHH counterparts, this gives a rough indication of the importance of taking the maintenance criterion into consideration. As expected, the majority of married MHH lived in a couple while the majority of married FHH (who still declare a female head) did not. Results of splitting the married sample into those who lived in a couple, or not, are reported in Table 6. Among married heads not living in a couple, FHH were poorer than MHH in urban areas in all years and in 1999, 2004 and 2012 for rural areas. For heads living in a couple FHH were poorer than MHH for all years where data was available (there were no FHH in this category in 2010 and 2012 in rural areas) and the difference was significant in most years. These results indicate that splitting the sample of married heads in this way changes the conclusion considerably and points to the importance of a more accurate identification of "de facto" female headship, by for example, collecting information on individual income for each family member in the HIECS.

For completeness I also report poverty estimates and their bootstrap standard errors for families without children in Tables 7 and 8. Poverty incidence, depth and severity was much lower for families without children overall. FHH without children faced higher poverty estimates in about half of the cases for urban areas, but MHH faced higher poverty in most cases in rural areas.

4.3. *Estimating a Gender-specific Welfare Function*

The finding that female-headed households are not always poorer than male-headed ones, or not poorer by a great deal, can be misleading to policy makers and certainly does not imply that "all is well" as far as female-headed households are concerned. Different household types face distinct endowments, constraints and returns to assets. This might lead FHH to make choices that maximize their welfare based on these circumstances, and hence appear non-poor. For example, even though FHH are generally smaller in size than MHH, they have roughly the same number of earners in rural areas, and even more earners in urban.[16] If women face lower returns to their endowments, or lower endowments to start with, they might for example, decide to take an older child

[15] There were not enough observations for the "never married" (also referred to as "single" in the paper) group to perform the bootstrap for families with children, and therefore this category is omitted from Tables 4 and 5 .

[16] See tables A4 to A7 in the appendix that present the means and standard deviations of various household characteristics by household type. These are discussed below.

out of school at an early age to help augment family income (which will ultimately propagate poverty across generations). Such behavior will falsely lead to the impression that this FHH is non-poor (or less poor) when in fact the unfavorable treatment, combined with their lower endowments, make them much worse off than other households.

To understand the factors that contribute to the poverty differential between FHH and MHH households, I borrow from the Blinder (1973) and Oaxaca (1973.) technique, estimating separate welfare functions for FHH and MHH, and then decomposing the estimated poverty differentials into a portion that is due to differences in the observable characteristics (endowments) of these households, such as education, experience, sector of employment; and another that due to their facing unequal returns to these endowments in the labor market (commonly referred to as "discrimination" in the labor literature).

The first step is to estimate separate welfare functions for each household, based on its relevant set of demographic and productivity characteristics (endowments) related to its poverty status. One would expect poverty to be affected by family characteristics, such as household size, number of children, as well as characteristics of the household head that determine their income-earning potential such as education, age, employment status, occupation, and employment sector. I estimate a reduced form probit model in which the independent variables are those described below, and the dependent variable is a binary variable that takes the value of 1 if the household is poor by the Poverty Line (PL) for that year. The probit model is as follows:

$$\Pr(Y_{ij}=1)=\Phi(\beta_j, X_{ij}) \tag{2}$$

where:

$Y_{ij}=1$ if the ith household of type j is poor;

$Y_{ij}=0$ if the ith household of type j is not poor;

X_{ij} is a vector of measurable characteristics for the ith household of type j;

β_j is a vector of parameters for all households of type j;

Φ is the cumulative normal distribution

This requires the assumption that the measurable characteristics in X_{ij} are exogenous and sufficient to determine whether one household type is poorer than the other (Bibi and Chatti, 2010). If poverty is independent of household type, then the β_j in equation (2) will be identical for FHH and MHH. Otherwise, at least one element of β_j will be different and hence the differences in the levels of the explanatory variables are not enough to explain poverty for the different household types. In this case, family type itself is a determinant of poverty.

The measurable characteristics that are likely to affect the probability of being poor can be divided into two groups. The first group of variables focus on the households' demographic composition that will ultimately determine its needs, and the second on the households' earning ability. The household's demographic characteristics are captured by the number of children under 15, the number of adults over 65, the number of females in the household and total household size. These variables affect the household's consumption needs relative to its income, as well as the decision and ability to participate in the workforce, thereby affecting family

earning potential. The type of dwelling is a good indicator of non-monetary welfare and it is measured by number of rooms per capita. I also included dwelling type such as villa/apartment/single room, etc., but these were never significant in the regressions and were eliminated.[17]

I expect earning ability to depend on several factors, including the age of the household head and its square, the household head's education level, employment status, main activity status, occupation, sector and industry of employment. Education is measured by five categories: Illiterate, Read & Write, Primary and Lower Secondary, Secondary (which includes both General and Vocational Secondary), Post-Secondary and University & Above (combined into one category). Employment status is classified as employer, employee, self-employed and unpaid family worker. Main activity status is classified as employed, unemployed or out of the labor force. Occupation is classified as either white collar (which includes Legislators, Senior Officials and Managers, Professionals, Technicians and Associate Professionals, Clerks and Service workers) or blue collar (which includes Skilled Agricultural and Fishery workers, Craft and related trades workers, Plant and Machine Operators, and Assemblers, Elementary occupations and all others). Sector of employment is classified as either public (which includes government civil servants and workers in public sector companies) or private. Industry is classified as agriculture and mining, manufacturing or services. The region of residence is also controlled for since different regions within Egypt face different labor market conditions and different lifestyles, which ultimately affects households' needs. In the regressions the omitted variables are Post-Secondary and above, employer, employed, blue collar, private sector, services, the Metropolitan cities (Cairo, Alexandria, Port Said and Suez) in urban areas, and Lower Egypt in rural areas.[18]

4.4. *Results of the Estimated Probit Model*

Means and standard deviations of the measurable characteristics of households, by family type and year, are presented in the appendix in Tables A4 and A6 for rural regions, and A5 and A7 for urban regions, separately for families with children and those without. Female household heads tend to be older than male household heads, for all household types and regions, but the age gap was especially high between families with children and those without, as discussed above. In terms of household composition, MHH have a slightly higher number of children 14 and younger, but about the same number of adults 65 and older, and number of females, as FHH. MHH have larger households overall, but fewer

[17] I did not directly include marital status in the vector of explanatory variables to avoid potential endogeneity issues even though it was clear from the poverty estimates that marital status is important. To explore the impact of including variables that capture marital status, I experimented with including binary variables for widowed, divorced and never married in the probit regressions and found that they did not change any of the other results significantly and that the coefficient on widowed was always negative and significant for FHH in all years and samples. I also eliminated other potentially endogenous variables such as number of earners and household size since no suitable instruments were available in the data.

[18] Unpaid family worker, and out of the labor force were dropped from the regressions due to collinearity.

earners on average in both urban and rural areas. FHH tend to have higher number of rooms per capita.

While the educational level of household heads was increasing over time, female heads were still overrepresented among the illiterate and underrepresented at all other education levels. In rural areas, most female heads were self-employed; most male heads were employees. In urban areas the majority of both male and female heads who worked were employees, and in rural areas the majority of female heads were self-employed. The majority of female heads in both rural and urban regions were out of the labor force, a category that included housewives and working housewives, students and pensioners, while most male heads were employed in all years.

In rural regions, the majority of heads of both MHH and FHH were blue collar, private sector workers, mainly in agriculture and mining, and this share fell slightly over time. In urban areas the majority of heads of both MHH and FHH were white collar, private sector workers, mainly in services, and this share increased slightly over time. Most rural FHH were in Upper Egypt, while most rural MHH were in Lower Egypt. In urban regions, both FHH and MHH were concentrated in Metropolitan cities. In most years and classifications, FHH had lower per capita income and expenditure than MHH, except for urban regions in the last two survey years. Note however the relatively large standard deviations of these numbers indicating the wide range of incomes and expenditures that both FHH and MHH households faced over this period.

Tables 9a and 9b present the results of the probit regressions for FHH and MHH, in rural and urban households with children, respectively, and Table 10a and 10b report the same for families without children. The results are fairly typical with most coefficients having the expected results. For MHH, those with older heads were less likely to be poor. Households with more children and elderly were in general are more likely to be poor. The higher the number of females the higher the probability of poverty for MHH and rural FHH, however in urban areas having more females was often associated with a significant negative impact on the probability of being poor. This is expected since additional females could help take care of young children, which allows the head more free time to work. The number of rooms per capita was included as an indicator of non-monetary welfare and this had a negative and highly significant coefficient in all specifications, as expected.

Education variables have the expected sign in all specifications. The omitted category is Post-Secondary and above, and hence these coefficients show the effect of education attainment on poverty relative to those with a post-secondary or university degree and above. The less educated the household head was, the more likely the household was poor. Heads that were illiterate raised the probability of being poor the most compared to those with a post-secondary degree or higher. Compared to heads who were employers, being either an employee or self-employed raised the probability of being poor in all specifications, as expected. Being unemployed also raised the probability of being poor compared to being employed in all specifications.

Compared to household heads in blue collar occupations, white collar workers were less likely to be poor. Rural public-sector worker heads, whether in MHH or FHH, were less likely to be poor, while in urban areas being in the public sector

TABLE 9A
PROBIT REGRESSIONS FOR DETERMINANTS OF POVERTY FOR RURAL FAMILIES WITH CHILDREN

	Male-headed Households					Female-headed Households				
VARIABLES	1999	2004	2008	2010	2012	1999	2004	2008	2010	2012
Age head	−0.007*	−0.025***	−0.026***	0.006	−0.001	0.065***	−0.018	0.019**	−0.028	−0.052***
	(0.004)	(0.004)	(0.004)	(0.007)	(0.008)	(0.016)	(0.014)	(0.009)	(0.020)	(0.018)
Age head squared	0.000	0.000***	0.000***	−0.000*	−0.000	−0.001***	0.000	−0.000**	0.000	0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Child<15	0.130***	0.178***	0.134***	0.187***	0.165***	0.251***	0.101***	0.161***	0.185***	0.140***
	(0.006)	(0.006)	(0.006)	(0.012)	(0.012)	(0.023)	(0.025)	(0.018)	(0.039)	(0.039)
Adults>65	−0.016	0.002	0.053***	0.132***	0.092***	−0.058	0.112	−0.218***	0.562***	−0.083
	(0.019)	(0.024)	(0.017)	(0.033)	(0.035)	(0.085)	(0.110)	(0.061)	(0.160)	(0.136)
No. of females	0.031***	0.088***	0.032***	0.093***	0.036***	0.023	0.129***	0.010	0.011	−0.003
	(0.005)	(0.006)	(0.005)	(0.010)	(0.010)	(0.021)	(0.021)	(0.013)	(0.035)	(0.040)
Rooms per capita	−1.287***	−1.545***	−1.728***	−1.529***	−1.546***	−1.202***	−1.617***	−1.444***	−1.324***	−1.402***
	(0.036)	(0.036)	(0.031)	(0.057)	(0.063)	(0.104)	(0.114)	(0.074)	(0.159)	(0.152)
Illiterate	0.676***	0.637***	0.811***	0.728***	0.949***	4.308	−0.450**	0.602***	1.072***	4.391
	(0.035)	(0.032)	(0.029)	(0.052)	(0.052)	(70.152)	(0.229)	(0.143)	(0.321)	(139.899)
Read &Write	0.412***	0.482***	0.574***	0.567***	0.566***	4.298	−0.518**	0.425***	1.419***	4.039
	(0.034)	(0.032)	(0.030)	(0.054)	(0.055)	(70.152)	(0.244)	(0.156)	(0.344)	(139.899)
Prim.−Low Sec.	0.357***	0.383***	0.506***	0.320***	0.493***	4.065	−0.724***	0.557***	1.278***	4.333
	(0.041)	(0.038)	(0.032)	(0.056)	(0.056)	(70.152)	(0.254)	(0.161)	(0.362)	(139.899)
Secondary	0.143***	0.265***	0.395***	0.156***	0.424***	3.807	−0.947***	0.269*	0.323	3.601
	(0.036)	(0.031)	(0.027)	(0.046)	(0.045)	(70.152)	(0.240)	(0.148)	(0.320)	(139.899)
Employee	0.371***	0.467***	0.421***	0.443***	0.393***	0.380***	0.751***	0.236*	−0.449*	1.775***
	(0.022)	(0.021)	(0.020)	(0.037)	(0.038)	(0.145)	(0.188)	(0.136)	(0.230)	(0.309)
Self employed	0.086***	0.253***	0.263***	0.388***	0.397***	0.340***	0.333***	0.093*	0.345***	1.578***
	(0.029)	(0.028)	(0.026)	(0.049)	(0.050)	(0.064)	(0.066)	(0.056)	(0.125)	(0.204)
Unemployed	0.236	0.124	1.167***	1.344***	0.082		0.144	1.186***		
	(0.185)	(0.243)	(0.173)	(0.232)	(0.196)		(0.451)	(0.391)		
White collar	−0.096***	0.019	−0.094***	−0.129***	−0.004	−0.100	0.098	−0.496***	−1.135***	−1.824***
	(0.023)	(0.023)	(0.019)	(0.035)	(0.036)	(0.109)	(0.122)	(0.114)	(0.291)	(0.372)
Public Sector	−0.063**	−0.226***	−0.075***	−0.043	−0.136***		−1.462***	−0.233	1.025**	
	(0.026)	(0.025)	(0.021)	(0.039)	(0.039)		(0.325)	(0.212)	(0.457)	
Agric/Mining	0.092***	0.114***	0.178***	0.064*	0.274***	−0.308***	−0.258***	−0.137***	−0.294***	−1.515***
	(0.021)	(0.021)	(0.018)	(0.034)	(0.036)	(0.068)	(0.068)	(0.051)	(0.110)	(0.168)
Manufacturing	−0.302***	−0.241***	−0.054**	−0.066	−0.091**	−0.499*	−0.337*	0.411*	0.060	
	(0.029)	(0.028)	(0.025)	(0.042)	(0.045)	(0.278)	(0.183)	(0.241)	(0.307)	
Rural Upper	0.461***	0.433***	0.732***	0.557***	0.771***	0.338***	0.494***	0.671***	0.829***	1.060***
	(0.015)	(0.015)	(0.013)	(0.025)	(0.025)	(0.054)	(0.058)	(0.042)	(0.084)	(0.091)
Constant	−0.782***	−0.516***	0.125	−0.775***	−0.862***	−6.045	0.568	−0.722***	−0.060	−3.043
	(0.111)	(0.112)	(0.097)	(0.181)	(0.202)	(70.153)	(0.413)	(0.269)	(0.603)	(139.900)
Observations	39,088	42,153	45,935	13,657	13,452	3,287	3,423	5,262	1,448	1,461
Log Likelihood	−20407	−21107	−24244	−7150	−6755	−1763	−1675	−2787	−714.5	−661.0
Chi-Square(20)	8286	11403	14994	4467	4486	791.6	1008	1691	571.4	619.2
P-value	0	0	0	0	0	0	0	0	0	0
Pseudo R^2	0.169	0.213	0.236	0.238	0.249	0.183	0.231	0.233	0.286	0.319
Pr (poor |means)	0.286	0.291	0.456	0.428	0.356	0.319	0.274	0.441	0.432	0.277
Actual Prop Poor	0.305	0.320	0.463	0.436	0.384	0.336	0.327	0.460	0.474	0.367
% Correct Predns	73.73	75.76	73.97	74.43	76.11	73.56	76.34	73.05	74.24	79.81

Source: Author's calculations from HIECS data. Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

TABLE 9B

PROBIT REGRESSIONS FOR DETERMINANTS OF POVERTY FOR URBAN FAMILIES WITH CHILDREN

	Male-headed Households					Female-headed Households				
VARIABLES	1999	2004	2008	2010	2012	1999	2004	2008	2010	2012
Age head	−0.041***	−0.035***	−0.023***	−0.046***	−0.028**	−0.019	0.111***	−0.022	0.174***	−0.232***
	(0.007)	(0.007)	(0.006)	(0.011)	(0.012)	(0.021)	(0.030)	(0.025)	(0.041)	(0.050)
Age head squared	0.000***	0.000***	0.000***	0.001***	0.000**	0.000	−0.001***	0.000	−0.002***	0.002**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Child<15	0.164***	0.157***	0.177***	0.258***	0.188***	−0.030	0.213***	0.161***	0.601***	0.191**
	(0.008)	(0.010)	(0.009)	(0.018)	(0.018)	(0.033)	(0.042)	(0.033)	(0.068)	(0.088)
Adults>65	0.032	0.109**	0.001	−0.210***	−0.107*	0.195*	0.516***	0.114	0.393	−0.611***
	(0.032)	(0.043)	(0.031)	(0.060)	(0.062)	(0.111)	(0.147)	(0.122)	(0.250)	(0.205)
No. of females	0.089***	0.090***	0.061***	0.052***	0.035**	0.266***	−0.172***	0.034	−0.283***	−0.078
	(0.007)	(0.009)	(0.008)	(0.015)	(0.015)	(0.027)	(0.036)	(0.027)	(0.063)	(0.069)
Rooms per capita	−0.923***	−1.301***	−1.374***	−1.566***	−1.738***	−1.520***	−1.799***	−2.294***	−1.847***	−1.977***
	(0.050)	(0.057)	(0.049)	(0.091)	(0.103)	(0.158)	(0.195)	(0.173)	(0.238)	(0.389)
Illiterate	0.794***	0.690***	0.833***	0.815***	0.537***	5.489	1.568***	1.742***	0.452	1.170***
	(0.035)	(0.039)	(0.034)	(0.064)	(0.065)	(117.117)	(0.249)	(0.277)	(0.287)	(0.402)
Read &Write	0.567***	0.554***	0.605***	0.665***	0.424***	5.065	0.393	0.884***	0.931***	1.372***
	(0.034)	(0.038)	(0.036)	(0.067)	(0.069)	(117.117)	(0.277)	(0.295)	(0.324)	(0.424)
Prim.-Low Sec.	0.216***	0.325***	0.373***	0.387***	0.169**	4.940	0.991***	0.824***	1.310***	0.118
	(0.041)	(0.044)	(0.037)	(0.065)	(0.066)	(117.117)	(0.282)	(0.310)	(0.316)	(0.446)
Secondary	0.225***	0.232***	0.304***	0.361***	0.343***	4.711	0.880***	0.677**	0.809***	0.267
	(0.031)	(0.035)	(0.029)	(0.053)	(0.054)	(117.117)	(0.249)	(0.269)	(0.305)	(0.431)
Employee	0.182***	0.188***	0.382***	0.357***	0.143***	0.959***	−0.064	0.472***	1.307***	0.690***
	(0.031)	(0.033)	(0.029)	(0.053)	(0.052)	(0.196)	(0.221)	(0.146)	(0.282)	(0.238)
Self employed	0.152***	0.232***	0.253***	0.363***	−0.066	0.643***	0.124	−0.151	1.187***	0.829**
	(0.034)	(0.037)	(0.032)	(0.061)	(0.061)	(0.161)	(0.187)	(0.146)	(0.267)	(0.358)
Unemployed	0.833***	0.494***	0.393***	−0.029	0.110	1.469***		2.533***	2.202***	
	(0.202)	(0.141)	(0.151)	(0.162)	(0.171)	(0.407)		(0.783)	(0.588)	
White collar	0.012	0.048*	−0.156***	−0.070*	−0.318***	−0.885***	−0.095	0.324**	−0.724***	−0.084
	(0.023)	(0.026)	(0.023)	(0.042)	(0.041)	(0.173)	(0.176)	(0.151)	(0.239)	(0.309)
Public Sector	0.214***	0.149***	0.032	0.091**	−0.011	0.508**	0.337	−0.697***	−0.609*	−1.430***
	(0.028)	(0.030)	(0.026)	(0.046)	(0.049)	(0.221)	(0.217)	(0.215)	(0.333)	(0.451)
Agric/Mining	0.326***	0.371***	0.176***	−0.135*	0.063	0.184	−0.384**	0.165	−2.381***	
	(0.035)	(0.042)	(0.032)	(0.071)	(0.070)	(0.163)	(0.182)	(0.143)	(0.421)	
Manufacturing	−0.343***	−0.041	−0.280***	−0.173***	−0.094*	−0.352	0.242	0.292	−1.178***	0.368
	(0.028)	(0.029)	(0.028)	(0.047)	(0.048)	(0.220)	(0.231)	(0.346)	(0.396)	(0.474)
Urban Upper	0.309***	0.353***	0.466***	0.574***	0.091**	0.920***	0.104	0.953***	1.116***	0.432***
	(0.021)	(0.024)	(0.021)	(0.038)	(0.039)	(0.084)	(0.097)	(0.085)	(0.153)	(0.158)
Urban Lower	−0.214***	−0.175***	−0.103***	−0.084*	−0.374***	−0.034	−0.080	−0.216**	0.122	−0.543**
	(0.026)	(0.028)	(0.024)	(0.044)	(0.044)	(0.094)	(0.099)	(0.087)	(0.154)	(0.256)
Constant	−0.948***	−0.773***	−0.721***	−0.282	0.246	−5.896	−2.828***	−0.247	−5.004***	5.382***
	(0.168)	(0.183)	(0.156)	(0.271)	(0.315)	(117.118)	(0.764)	(0.669)	(1.042)	(1.398)
Observations	39,976	27,104	29,430	8,984	8,368	3,234	1,934	2,462	903	681
Log Likelihood	−11493	−9335	−12632	−3709	−3699	−891.5	−715.1	−963.0	−320.2	−240.7
Chi-Square(20)	5360	4314	6649	2193	1540	869.6	416.9	1037	403.3	270.4
P-value	0	0	0	0	0	0	0	0	0	0
Pseudo R^2	0.189	0.188	0.208	0.228	0.172	0.328	0.226	0.350	0.386	0.360
Pr (poor |means)	0.0738	0.105	0.181	0.168	0.175	0.0244	0.111	0.175	0.158	0.120
Actual Prop Poor	0.0972	0.129	0.210	0.202	0.191	0.129	0.163	0.284	0.265	0.215
% Correct Predns	89.68	86.25	80.74	81.48	78.70	89.30	82.32	79.73	88.82	85.02

Source: Author's calculations from HIECS data. Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

TABLE 10A

Probit Regressions for Determinants of Poverty for Rural Families without Children

	Male-headed Households					Female-headed Households				
VARIABLES	1999	2004	2008	2010	2012	1999	2004	2008	2010	2012
Age head	−0.016	−0.025***	0	−0.013	−0.112***	−0.068**	−0.031	−0.024	0.052	−0.012
	−0.011	−0.009	−0.01	−0.017	−0.018	−0.034	−0.026	−0.028	−0.052	−0.052
Age head squared	0	0.000**	0	0	0.001***	0.001**	0	0	0	0
	0	0	0	0	0	0	0	0	0	0
Adults>65	0.135***	0.140***	0.119***	−0.035	0.011	0.031	0.105	0.360***	−0.151	0.162
	−0.051	−0.045	−0.038	−0.068	−0.068	−0.17	−0.114	−0.111	−0.2	−0.21
No. of females	0.034	0.135***	0.203***	0.193***	0.237***	0.240***	0.149***	0.323***	0.326***	0.295***
	−0.025	−0.017	−0.018	−0.033	−0.036	−0.063	−0.038	−0.04	−0.079	−0.061
Rooms per capita	−0.611***	−0.919***	−1.138***	−0.801***	−1.005***	−0.295***	−0.702***	−1.161***	−0.294***	−0.641***
	−0.066	−0.054	−0.058	−0.086	−0.104	−0.076	−0.088	−0.102	−0.094	−0.128
Illiterate	1.528***	0.214**	0.774***	1.181***	0.941***	9.786	−0.582	5.413	2.135	3.741
	−0.265	−0.095	−0.091	−0.193	−0.199	−584.352	−0.509	−123.954	−130.767	−93.287
Read & Write	1.440***	0.064	0.555***	0.672***	0.536***		−0.906*	4.99		3.89
	−0.263	−0.094	−0.093	−0.196	−0.206		−0.526	−123.954		−93.288
Prim.−Low Sec.	1.154***	−0.227*	0.281***	0.463**	0.410*	9.974	0.247	5.261	2.759	
	−0.278	−0.116	−0.1	−0.209	−0.219	−584.352	−0.583	−123.955	−130.768	
Secondary	0.966***	−0.185*	−0.009	0.454**	0.424**	5.76	−1.157**			3.786
	−0.273	−0.105	−0.101	−0.208	−0.208	−484.056	−0.583			−93.287
Employee	0.284***	0.227***	0.078	0.024	−0.196*	−2.679	−3.194	−4.042	2.201***	0.282
	−0.072	−0.054	−0.055	−0.093	−0.111	−220.946	−74.135	−125.23	−0.335	−0.36
Self employed	0.104	0.142**	0.318***	0.283**	0.595***	0.959***	0.285**	0	0.704***	−0.243
	−0.093	−0.068	−0.06	−0.113	−0.112	−0.262	−0.119	−0.118	−0.233	−0.236
Unemployed	1.131***		0.237							
	−0.416		−0.269							
White collar	0.165**	−0.082	−0.181***	−0.281***	−0.455***	−5.257	−0.549**	−0.116	1.112***	0.708**
	−0.077	−0.061	−0.052	−0.103	−0.111	−101.887	−0.226	−0.155	−0.264	−0.321
Public Sector	−0.210**	−0.136*	0.146**	0.101	0.236*	14.092	2.765	4.976		
	−0.098	−0.073	−0.066	−0.118	−0.134	−407.866	−74.136	−125.231		
Agric/Mining	−0.234***	−0.086*	−0.125***	−0.125*	−0.267***	−1.070***	−0.478***	−0.352***	−0.818***	−0.202
	−0.06	−0.044	−0.04	−0.071	−0.081	−0.257	−0.114	−0.103	−0.233	−0.182
Manufacturing	−0.683***	−0.306***	−0.229***	−0.138	−0.598***				−1.136**	
	−0.147	−0.087	−0.084	−0.155	−0.196				−0.496	
Rural Upper	0.374***	0.410***	0.712***	0.356***	0.606***	0.417***	0.481***	0.846***	0.714***	0.410***
	−0.049	−0.036	−0.034	−0.064	−0.067	−0.106	−0.08	−0.08	−0.152	−0.136
Constant	−2.010***	−0.402	−1.137***	−1.205**	1.258**	−9.4	0.377	−5.314	−6.404	−3.815
	−0.386	−0.255	−0.277	−0.516	−0.517	−584.352	−0.906	−123.957	−130.777	−93.3
Observations	6,520	11,143	10,131	3,325	3,428	1,440	2,536	2,402	711	754
Log Likelihood	−1690	−3189	−3714	−1147	−951.1	−370.6	−639.2	−712.5	−218.5	−251.9
Chi-Square(20)	396.4	970	2001	499.7	635.7	136.5	268.7	594.1	147.8	147.1
P-value	0	0	0	0	0	0	0	0	0	0
Pseudo R^2	0.105	0.132	0.212	0.179	0.25	0.156	0.174	0.294	0.253	0.226
Pr (poor |means)	0.0593	0.0692	0.111	0.0998	0.062	0.0289	0.0455	0.0376	0.0824	0.0874
Actual Prop Poor	0.069	0.0939	0.166	0.139	0.114	0.0699	0.081	0.136	0.106	0.133
% Correct Predns	91.55	89.88	83.78	85.86	89.5	91.53	91.09	88.26	86.64	87.4

Source: Author's calculations from HIECS data. Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1.

TABLE 10B

PROBIT REGRESSIONS FOR DETERMINANTS OF POVERTY FOR URBAN FAMILIES WITHOUT CHILDREN

	Male-headed Households					Female-headed Households				
VARIABLES	1999	2004	2008	2010	2012	1999	2004	2008	2010	2012
Age head	−0.117***	−0.032***	−0.049***	−0.046***	−0.052**	−0.060*	−0.048	−0.003	−0.003	−0.118**
	(0.010)	(0.012)	(0.011)	(0.017)	(0.021)	(0.031)	(0.035)	(0.036)	(0.075)	(0.049)
Age head squared	0.001***	0.000	0.000***	0.000**	0.000**	0.000	0.000	−0.000	−0.000	0.001**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)
Adults>65	−0.032	0.060	0.115**	−0.063	−0.019	0.963***	0.351**	0.163	0.113	0.150
	(0.053)	(0.058)	(0.049)	(0.086)	(0.087)	(0.142)	(0.149)	(0.122)	(0.186)	(0.191)
No. of females	0.027	0.115***	0.085***	0.050	0.120***	−0.165***	0.162***	0.323***	−0.246***	0.369***
	(0.020)	(0.020)	(0.018)	(0.034)	(0.037)	(0.063)	(0.046)	(0.039)	(0.075)	(0.081)
Rooms per capita	−0.657***	−0.572***	−0.554***	−0.806***	−0.777***	−0.702***	−0.556***	−0.331***	−0.811***	−0.258**
	(0.064)	(0.062)	(0.054)	(0.101)	(0.112)	(0.118)	(0.103)	(0.075)	(0.159)	(0.114)
Illiterate	0.683***	0.950***	0.888***	0.551***	1.118***	5.164	4.264	4.776	4.379	4.657
	(0.084)	(0.076)	(0.067)	(0.108)	(0.132)	(173.225)	(161.178)	(142.547)	(140.440)	(192.238)
Read & Write	0.496***	0.475***	0.644***	0.199*	0.963***	5.035	4.521	4.578	4.049	4.304
	(0.081)	(0.079)	(0.069)	(0.121)	(0.137)	(173.225)	(161.178)	(142.547)	(140.440)	(192.238)
Prim.−Low Sec.	0.458***	0.545***	0.286***	0.286**	0.518***	5.093	3.502	4.640	4.213	4.297
	(0.090)	(0.089)	(0.075)	(0.118)	(0.142)	(173.225)	(161.178)	(142.547)	(140.440)	(192.238)
Secondary	−0.069	0.135*	0.228***	0.408***	0.536***	4.909	3.442	4.570	3.553	4.140
	(0.093)	(0.082)	(0.066)	(0.107)	(0.123)	(173.225)	(161.178)	(142.547)	(140.440)	(192.238)
Employee	0.143*	−0.209***	0.164***	−0.291***	0.054	−5.516	−0.418	0.288		−4.506
	(0.078)	(0.066)	(0.056)	(0.105)	(0.106)	(333.675)	(0.321)	(0.276)		(374.473)
Self employed	0.408***	−0.292***	0.202***	0.578***	−0.051	−0.966**	−0.230	0.194	0.401	0.612
	(0.077)	(0.081)	(0.066)	(0.102)	(0.124)	(0.380)	(0.292)	(0.252)	(0.359)	(0.571)
Unemployed		0.128		−0.624*						
		(0.273)		(0.378)						
White collar	−0.196***	0.012	−0.028	−0.134*	0.247***	1.066***	0.337	−0.385*		−1.384**
	(0.058)	(0.052)	(0.046)	(0.078)	(0.089)	(0.279)	(0.275)	(0.208)		(0.579)
Public Sector	0.419***	0.395***	0.153**	0.253**	0.388***	4.021	−0.341	−0.083		5.091
	(0.077)	(0.072)	(0.060)	(0.115)	(0.114)	(333.675)	(0.349)	(0.309)		(374.473)
Agric/Mining	−0.336**	0.015	0.182***	0.381***	−0.496**		0.479	−0.208	0.550	−0.017
	(0.132)	(0.079)	(0.070)	(0.130)	(0.221)		(0.314)	(0.258)	(0.433)	(0.737)
Manufacturing	−0.263***	−0.420***	−0.335***	0.063	−0.174		0.863**			
	(0.073)	(0.078)	(0.065)	(0.106)	(0.120)		(0.340)			
Urban Upper	0.229***	0.250***	0.068	0.295***	0.153*	0.176	0.214**	0.469***	−0.171	0.005
	(0.049)	(0.048)	(0.044)	(0.073)	(0.079)	(0.134)	(0.104)	(0.089)	(0.156)	(0.159)
Urban Lower	−0.287***	−0.101*	−0.513***	−0.273***	−0.493***	0.053	−0.022	−0.415***	−0.694***	−0.457**
	(0.067)	(0.055)	(0.053)	(0.084)	(0.101)	(0.136)	(0.116)	(0.121)	(0.262)	(0.182)
Constant	1.048***	−0.627*	0.116	0.203	−0.423	−3.580	−3.990	−6.096	−3.897	−2.605
	(0.277)	(0.328)	(0.293)	(0.466)	(0.602)	(173.226)	(161.180)	(142.551)	(140.456)	(192.244)
Observations	15,717	12,194	11,006	3,952	3,400	3,505	3,045	2,902	803	964
Log Likelihood	−1905	−2145	−2808	−1008	−775.3	−319.0	−482.5	−614.0	−200.3	−220.9
Chi-Square(20)	690.1	723.4	843.8	338.9	305.7	154.8	218.8	349.9	88.58	138.0
P-value	0	0	0	0	0	0	0	0	0	0
Pseudo R^2	0.153	0.144	0.131	0.144	0.165	0.195	0.185	0.222	0.181	0.238
Pr (poor |means)	0.0157	0.0300	0.0585	0.0567	0.0419	0.00195	0.00774	0.0161	0.0251	0.0127
Actual Prop Poor	0.0236	0.0409	0.0581	0.0688	0.0540	0.0215	0.0401	0.0639	0.0548	0.0680
% Correct Predns	96.73	94.76	91.49	91.09	92.24	97.60	95.14	92.87	90.54	91.29

Source: Author's calculations from HIECS data. Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1.

TABLE 11

DECOMPOSITION OF POVERTY DIFFERENTIAL BETWEEN FEMALE-HEADED AND MALE-HEADED HOUSEHOLDS (WITH CHILDREN), IN RURAL REGIONS BETWEEN 1999 AND 2012

	1999	2004	2008	2010	2012
Predicted Poverty rate, FHH	0.353	0.333	0.463	0.465	0.365
Predicted Poverty rate, MHH	0.322	0.333	0.467	0.445	0.390
Predicted FHH-MHH poverty gap	0.0313	0.000783	−0.00441	0.0199	−0.0256
Predicted Gap in percentage points	3.13	0.0783	−0.441	1.99	−2.56
Contribution from FHH-MHH differences in:					
Age	0.003***	0.008***	0.002**	−0.002	0.009***
	−13.28	−13.25	−3.24	(−1.26)	−5.07
HH composition	−0.019***	−0.030***	−0.002*	−0.005***	−0.002
	(−23.96)	(−27.90)	(−2.09)	(−3.93)	(−1.51)
Rooms per capita	−0.018***	−0.021***	−0.031***	−0.027***	−0.036***
	(−36.37)	(−44.29)	(−71.70)	(−31.36)	(−33.40)
Education	0.045***	0.039***	0.049***	0.056***	0.048***
	−34.26	−29.53	−40.61	−22.72	−23.31
Employment Status	−0.023***	−0.029***	−0.036***	−0.029***	−0.035***
	(−10.73)	(−13.71)	(−19.71)	(−8.75)	(−9.12)
Occupation	−0.005**	0.005***	0.011***	0.007***	0.015***
	(−3.25)	−3.43	−8.53	−3.35	−6.11
Sector	0.014***	0.007***	0.006***	0.004***	0.001
	−19.57	−9.62	−14.34	−5.18	−1.15
Region	0.013***	0.022***	0.027***	0.020***	0.029***
	−37.38	−40.06	−65.29	−28.79	−34.16
Gap Explained by All Variables	**0.0115**	**0.00159**	**0.0256**	**0.0229**	**0.0296**
N	113267	103609	109763	34069	32732
If FHH had the same endowments as MHH they would have been poorer by:					
(in percentage points)	1.98	−0.0807	−3.001	−0.3	−5.52

Source: Author's calculations from HIECS data. Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1. The following variables were grouped together in the decomposition: age: age and age squared, HH composition: number of children under 15, number of adults over 65, number of females, Education represents the education categories.

TABLE 12

DECOMPOSITION OF POVERTY DIFFERENTIAL BETWEEN FEMALE-HEADED AND MALE-HEADED HOUSEHOLDS (WITH CHILDREN), IN URBAN REGIONS BETWEEN 1999 AND 2012

	1999	2004	2008	2010	2012
Predicted Poverty rate, FHH	0.143	0.183	0.29	0.265	0.239
Predicted Poverty rate, MHH	0.114	0.151	0.232	0.226	0.226
Predicted FHH-MHH poverty gap	0.029	0.0321	0.0572	0.0383	0.0133
Predicted Gap in percentage points	2.9	3.21	5.72	3.83	1.33
Contribution from FHH-MHH differences in:					
Age	−0.003***	−0.002*	−0.009***	−0.008***	−0.002
	(−4.72)	(−2.27)	(−9.99)	(−4.12)	(−1.31)
HH composition	−0.004***	−0.003**	0.002***	−0.000	−0.019***
	(−6.15)	(−3.14)	(3.63)	(−0.26)	(−10.19)
Rooms per capita	−0.000	−0.005***	−0.003***	−0.009***	−0.022***
	(−0.57)	(−27.58)	(−16.84)	(−22.84)	(−28.57)
Education	0.043***	0.029***	0.056***	0.059***	0.049***
	(35.72)	(29.32)	(42.05)	(23.34)	(22.78)
Employment Status	−0.027***	−0.032***	−0.041***	−0.036***	−0.030***
	(−17.65)	(−20.83)	(−22.94)	(−10.97)	(−9.06)
Occupation	−0.003*	0.003**	0.011***	0.009***	0.013***
	(−2.53)	(3.25)	(10.01)	(4.76)	(6.68)
Sector	0.009***	0.005***	0.006***	0.005***	0.004**
	(23.19)	(12.86)	(11.43)	(5.27)	(3.28)
Region	−0.003***	−0.002***	−0.005***	−0.004***	0.010***
	(−9.84)	(−5.86)	(−17.87)	(−9.26)	(11.96)
Gap Explained by All Variables	**0.0113**	**−0.00569**	**0.0182**	**0.0157**	**0.00186**
N	113267	103609	109763	34069	32732
If FHH had the same endowments as MHH they would have been poorer by: (in percentage points)	1.77	3.78	3.9	2.26	1.14

Source: Author's calculations from HIECS data. Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1. The following variables were grouped together in the decomposition: age: age and age squared, HH composition: number of children under 15, number of adults over 65, number of females, Education represents the education categories.

increased the probability of being poor for MHH, in all years and for FHH when significant in 2008 and 2012. Compared to working in the services industry, working in agriculture and mining, and manufacturing, for FHH was associated with lower probability of being poor, whenever it was significant, while for MHH agriculture was associated with higher probability of poverty, while manufacturing was associated with strong negative probability of poverty. Finally, in rural regions, both FHH and MHH were more likely to be poor if they lived in Upper Egypt, compared to the omitted category Lower Egypt. In urban areas, Metropolitan cities (Cairo, Alexandria, Port Said and Suez) was the omitted category and once again living in Upper Egypt raised a household's probability of being poor for both FHH and MHH, compared to Metropolitan.

Expected poverty rates, when the exogenous variables equal their mean values for each household type, are provided in the third line from the bottom in Tables 9a,b and 10a,b. In 2008, for example, an urban female-headed household with the mean characteristics (values for the exogenous variables) had a 17.5 percent probability of being poor, a male-headed household had an 18.1 percent probability of being poor. To put this in perspective, the actual proportions of poor were 28.4 percent and 21 percent, respectively. The difference between actual proportion poor and predicted probability given the mean characteristics is always larger for female-headed households, indicating that the FHH would have been expected to be less poor given their endowments. The last row of the table gives the percent of correct predictions that the model makes.[19] The percent of correct predictions ranges from a high of 98 percent to a low of 73 percent implying that the model fits the data relatively well. To illustrate, in 2008, the equation for urban FHH and MHH (families with children) correctly predicts about 80 percent of the cases, while those for rural correctly predict about 74 percent of the cases.

5. Explaining Poverty Rate Differentials: Endowments Or Discrimination?

The results of the previous section showed that the exogenous variables explained the probability of being poor reasonably well but that there were significant differences in coefficient magnitudes, and in some cases signs, between family types. Recall that the means of the household characteristics' variables also varied by family type. To understand the degree to which poverty of a given family type depends on its characteristics (the endowment effect), and that to which it depends on the treatment of the household head in a different way due to gender (the treatment or discrimination effect), I perform the standard Oaxaca-Blinder decomposition. In the linear regression framework, the decomposition of the female-male gap in any variable Y, can be expressed as:

$$\bar{Y}_f - \bar{Y}_m = \left[\left(\bar{X}_f - \bar{X}_m\right)\hat{\beta}_f\right] + \left[\bar{X}_m\left(\hat{\beta}_f - \hat{\beta}_m\right)\right] \tag{3}$$

[19] Following convention, an observation is classified as having a predicted positive outcome if its predicted probability is > 0.5.

where $\bar{X}_j$ is the vector of average values of the independent variables and $\hat{\beta}_j$ is a vector of coefficient estimates for group j. In the poverty context, however, a non-linear probit model was estimated. As a result, the observed headcount measure of poverty (which is equal to the proportion of cases where Y=1 in the sample), does not necessarily equal the predicted probability of Y=1 when the probit function is evaluated at the means of the characteristics$\bar{X}_j$, i.e.$\Phi(\bar{X}_j\hat{\beta})$. Instead it is equal to the average predicted probability of being poor over all the households in group j: $\sum_{i=1}^{N_j} \frac{F(X_i^j\hat{\beta}^j)}{N^j}$ (Cameron and Trivedi, 2005: 474).

Following Fairlie (2006) the decomposition for a nonlinear probit function $Y=F(X\hat{\beta})=\Phi(X\hat{\beta})$, where Φ (.) stands for the standard normal distribution function, between two groups [female-headed (f) and male-headed (m) households], is written as:

$$\bar{Y}_f-\bar{Y}_m=\left[\sum_{i=1}^{N_f}\frac{F(X_i^f\hat{\beta}^f)}{N^f}-\sum_{i=1}^{N_m}\frac{F(X_i^m\hat{\beta}^f)}{N^m}\right]+\left[\sum_{i=1}^{N_m}\frac{F(X_i^m\hat{\beta}^f)}{N^m}-\sum_{i=1}^{N_m}\frac{F(X_i^m\hat{\beta}^m)}{N^m}\right] \tag{4}$$

In both equations (3) and (4) the poverty differential computed at mean levels of the exogenous variables is decomposed into a portion that is due to differences in distributions of X, or the endowment effect (the first term on the right hand side), and a second term that measures the portion of the difference that is due to differences in returns to these endowments (the coefficients on the exogenous variables) as well as unmeasurable or unobserved endowments, commonly known as the treatment or discrimination effect.

In equation (4) the female coefficient estimates $\hat{\beta}_f$ are used as the weights for the first term and the male distribution of the independent variables $\bar{X}_m$ are used as the weights in the second term. It is equally plausible to interchange these and use the male coefficient estimates $\hat{\beta}_m$ as the weights for the first term and the female distribution of the independent variables $\bar{X}_f$ as the weights in the second term. Indeed, each of these methods usually provides different estimates as discussed by Neumark (1988) and Oaxaca and Ransom (1994). There is often no a priori reason to prefer one set of weights over the other and they therefore suggest using coefficients from a pooled regression over both groups to weight the first term. I follow this approach here for two reasons: it makes the results more straightforward to interpret. Coefficients from the FHH and MHH regressions sometimes give different conclusions about the size and significance of specific independent variables in different years, especially given the widespread economic and social changes that took place over this long period of time. This can become difficult to interpret, especially that it is equally plausible to argue that one or the other group should be used as the reference (i.e. the one assumed not to face discriminatory treatment, or the one facing positive discrimination). Another practical reason is that the sample size for FHH is not equal to that of MHH. As expected, FHH make about 10% of the sample in each of the five cross sections. These sample sizes themselves vary

over time and are especially small in the last few surveys.[20] By using the coefficients from the pooled regression, I avoid the problem of imprecisely estimated coefficients given this smaller sample size for FHH, especially in the latter years. Table A8 in the appendix reports the results of these pooled regressions. A dummy variable for FHH is included to capture all systematic differences between the two groups as suggested by Neumark (1988). The pooled estimates are similar to the results obtained earlier from the separate FHH/MHH regressions and will not be discussed further.

The left-hand side of equation (4) is straightforward to obtain by simply calculating the average of the predicted probability of being poor for each of the two groups and taking the difference.[21] The first term on the right-hand side of equation (4) provides an estimate of the contribution of gender differences in the complete set of independent variables to the poverty gap between FHH and MHH. Unlike the linear case however, obtaining the contribution of group differences in specific variables to the poverty gap requires additional manipulation, since the independent contribution of any variable depends on the value of the other(s) (Fairlie, 2016). Assume that the sample sizes of the two groups are identical, $N_f=N_m$ and that there exists a one-to one matching of FHH and MHH observations, and that X includes only two variables: X_1 and X_2. Using coefficient estimates from a pooled probit regression, $\hat{\beta}^*$, and following Fairlie (2016), the independent contribution of X_1 to the poverty gap between FHH and MHH can be expressed as:

$$\frac{1}{N^m}\sum_{i=1}^{N^m} F(X_{1i}^f\hat{\beta}_1^* + X_{2i}^f\hat{\beta}_2^*) - F(X_{1i}^m\hat{\beta}_1^* + X_{2i}^f\hat{\beta}_2^*). \tag{5}$$

Similarly, the contribution of X_2 can be expressed as:

$$\frac{1}{N^m}\sum_{i=1}^{N^m} F(X_{1i}^m\hat{\beta}_1^* + X_{2i}^f\hat{\beta}_2^*) - F(X_{1i}^m\hat{\beta}_1^* + X_{2i}^m\hat{\beta}_2^*). \tag{6}$$

The contribution from gender differences in household headship to the poverty gap is calculated as the change in average predicted probabilities resulting from sequentially switching FHH characteristics with MHH characteristics one variable (or set of variables) at a time. I must therefore first match the FHH distribution of X_1 with the MHH distribution of X_1. I draw a random subsample of MHH with a sample size equal to N_f and randomly match it to the FHH sample. Each observation in the MHH is thus uniquely matched to an observation in the

[20] After the 2008 survey the CAPMAS started administering the HIECS every 2 years rather than every 5 as was traditionally the case. To reduce costs CAPMAS decided to reduce the sample size of the survey, and therefore both MHH and FHH samples are much smaller for the last two surveys than the first three.

[21] Note that the equality in equation (4) does not hold exactly for the probit model, in which F is defined as the cumulative distribution function from the standard normal distribution, but holds very closely as an empirical regularity (Cameron and Trivedi, 2005, p. 474).

FHH sample allowing for the sequential switching of the FHH to the MHH characteristics one variable at a time.[22]

This process of randomly matching the MHH to the FHH samples implies that the decomposition estimates will depend on the randomly chosen subsample of MHH. To ensure that the estimates reflect the entire MHH sample, I draw a large number of random MHH subsamples and then calculate the mean value of these estimates from all these subsamples. In the decomposition results reported below, I use 1000 random subsamples of MHH to calculate these means.

Table 11 presents the decomposition results for rural regions, and Table 12 for urban regions, by year, for families with children. The first two rows in the tables report the average of the predicted probability of being poor for FHH and MHH, respectively. The difference, or the predicted poverty gap, between FHH and MHH in the next row, is the quantity I seek to decompose into a portion due to differences in endowments and another due to differences in the return to endowments. The contribution of differences, between FHH and MHH, in specific variables or groups of variables, to the total poverty gap is presented next. Results vary by year and region, but some important patterns emerge. For rural areas (where FHH were predicted to be poorer than MHH in 2 out of the survey years, and at the same poverty level in one survey year), education, employment status, occupation, number of rooms per capita, and region of residence, were consistently significant in explaining differences in poverty rates between the two groups. For urban areas (where FHH were predicted to be poorer than MHH in all years) education, employment status, occupation, sector and region of residence were consistently significant in explaining differences in poverty rates between the two groups.

A positive coefficient on any of these variables or groups of variables gives the degree to which giving FHH the same distribution of X as the MHH, would have *reduced* the poverty gap. For example, in Table 12 in 2004, if FHH had the same education as MHH this would have reduced the poverty differential between them by 2.9 percentage points, which is about 90 percent of the total differential. A negative coefficient on the other hand gives the degree to which giving FHH the same distribution of X as the MHH, would have *increased* the poverty gap. Referencing the same table and year, if FHH had the same household composition as MHH, this would have increased the poverty differential by 0.3 percentage points, which is about 10 percent of the total differential.

The total contribution of all included variables is in bold at the bottom of each table. For all years, in urban and rural areas, the differential explained by all variables is a small fraction of the total poverty differential between MHH and FHH. This suggests that even if FHH had the same distributions of endowments as MHH, they would still be poorer since the impact of the lower returns to their endowments is much larger than the impact of the difference in endowments on the poverty differential. Counterfactuals are presented in the bottom row of Tables

[22] Since the independent contribution of X_1 and X_2 depend on the value of the other variable, the order of switching the distributions (i.e. choice of a variable as X_1 or X_2), matters. In the estimation below, the order of switching the variables is randomized (along with the 1000 replications for drawing the subsamples of MHH as explained next) to ensure that the results are not sensitive to the ordering of the variables as suggested by Fairlie (2016).

11 and 12. In 2004 for example, urban FHH would have been poorer by almost 3.8 percentage points than urban MHH if they had the same endowments (this is almost double the predicted poverty differential with their own endowment levels). In rural areas, where the predicted probability of being poor is higher for MHH, giving FHH the same distribution of endowments as MHH would have given FHH an even bigger advantage over MHH. For brevity, I do not present the decompositions for all the other potential pairs of household types since almost the same conclusions were obtained (these are available from the author upon request). For demonstration, Table A9 in the appendix shows the decomposition for widowed FHH and MHH, which had a particularly high poverty differential as results in section 4 demonstrated. The decomposition again implied that the FHH-MHH differential was largely due to differences in returns to endowments. This discrepancy in returns for widowed FHH was even more prominent in explaining the poverty differential as suggested by the very high counterfactual poverty differential (in the last row) if FHH had the same distribution of endowments as MHH.

6. Summary and Conclusion

This study has analyzed the gender dimensions of poverty in Egypt and estimated a model to determine the probability of poverty by household type. Furthermore, the estimated poverty differential was then decomposed into a component due to the endowments of the household, and another due to the returns to these endowments.

Results suggest that FHH were poorer than MHH in urban areas, and in some years in rural areas. Widowed and divorced FHH, as well as FHH living in a couple and still declaring themselves household head, had much higher incidence, depth and severity of poverty. The estimated welfare model's results are fairly typical implying that household demographic composition as well as characteristics of the household head, in particular education and the nature of their employment, have an important impact on the probability of being poor. Coefficients from the MHH and FHH welfare functions did exhibit some important distinctions by region, year and household type.

Results of the decomposition analysis suggest that most of the poverty differential between FHH and MHH cannot be explained by observed differences in endowments. In fact, in all years, if FHH had the same endowments as MHH they would have been poorer than they actually were, and in urban areas poorer than MHH. This is especially pronounced for widowed FHH. These results suggest the need for a broad policy effort to both raise FHH's endowment levels, especially in terms of education and access to better jobs (in terms of sector of employment, occupation, industry, etc.), as well as reduce the FHH-MHH gap in the return to endowments in the economy and the labor market.

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Supporting Information

Additional supporting information may be found in the online version of this article at the publisher's web site:

Appendix

Table A1: Sample Statistics for Families with Children 14 and under and those without, by Gender of the Head

Table A2: Number of Households by Household Type, Marital Status and Year

Table A3: Number of Individuals by Household Type, Marital Status and Year

Table A4: Means and Standard Deviations of Variables by Family Type and Year; Rural Families with Children

Table A5: Means and Standard Deviations of Variables by Family Type and Year; Urban Families with Children

Table A6: Means and Standard Deviations of Variables by Family Type and Year; Rural Families without Children

Table A7: Means and Standard Deviations of Variables by Family Type and Year; Urban Families without Children

Table A8: Probit Regressions for determinants of poverty Pooled Sample, Families with Children, by Region (1999-2012)

Table A9: Decomposition of Poverty Differential between Widowed FHH and MHH with children, by region