Women's Work Opportunities, Choice of Job Type, Earnings and Fertility in Ghana : Evidence from 2005/06

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Abstract

Fertility decline may respond to the increasing productive opportunities available to women outside of their home, though self employment may be less of a deterrent to fertility than paid employment. The daily earnings women receive in paid employment or in self employment are related to women's time allocation and fertility in Ghana as of 2005/06. The demand for female labor at home is greater when local crops rely more on female labor. The demand for female labor in paid employment is greater when the composition of local industries employ a greater share of women. Schooling and urban residence are associated positively to women's earnings, especially in paid employment, which accounts for regional differences in fertility, and offers an explanation for the secular decline in fertility in Ghana from six to four births. Structural differences between female employment in paid work, self employment, and home production connect Ghanian development to fertility.

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1. Introduction

How do adult women choose the type of work they engage in, and how does that choice affect their labor productivity and fertility in a country such as Ghana? It has been observed that in high income countries a woman with preschool aged children is less likely to participate in the market labor force. Women may assign a higher value to their time in the home when they have young children to care for, increasing the reservation wage they require to enter the market labor force (Mincer, 1962 ; Heckman, 1974). But the direct association between female labor force participation and fertility is not necessarily a good indication of a "causal effect" of labor supply on fertility. The association between market work and fertility could operate in both directions, and the association could capture the influence of "omitted variables" that affect both fertility and participation choices, such as preferences or abilities. This association could also be misleading, if the effect of women's labor force participation on fertility were heterogeneous depending on the type of job for which the net cost of childbearing vary. One way to disentangle the causal effects is to specify conditions outside the control of the family and the individual woman that influence the type of work she finds more attractive, such that these exogenous environmental conditions affect earnings opportunities and net costs of fertility through their effects on women's choice of type of work.

The empirical strategy followed here is to identify the causal relationships from regional variation in the derived demand for women's labor, to women's choice of type of job, to daily rate of earnings, and finally to fertility. Part of this causal chain of relationships may be due to the differences in the earnings of women in these various types of employment, allowing for the "wage premiums" paid for women's productive characteristics, such as schooling and age, to differ by job type, as in the Roy (1951) framework of worker self selection across sectors of the labor market. The selection of women by job type may also be driven in part by women's heterogeneous preferences for different numbers of children, or other goods that substitute for or complement their number of children, such as child schooling and health. Increases in the market value of a woman's time increases the relative cost of having a child, assuming children are relatively labor intensive in the mother's time. The potential earned income constraint for the woman also increases with her earnings opportunities, which increases her demand for "normal goods", other things equal, and children could in this sense be a normal good. It is often conjectured that the negative relative price effect of women's value of time on the demand for children dominates any positive income effect on fertility (Mincer, 1963). This connection from the labor market demand for women's labor to their schooling, employment, and fertility has been recently inferred in a few low income countries, including an experiment in India (Jensen, 2012) and the location of garment factories in Bangladesh (Heath and Mobarak, 2012). A contribution of this paper is to assess how sources of regional derived demand for women's labor affect their productivity by job type and fertility in a sub-Saharan African country, Ghana.

Two environmental factors external to the household and individual are specified in Ghana to estimate the relationships between women's primary type of work, earnings, and fertility. The first factor is the local agro-climatic environment that affects a woman's productivity relative to a

man's productivity in growing specific agricultural crops and coordinated home production, and the second factor is the regional industrial composition of paid employment that affects the female labor-intensity of local paid employment opportunities. The productivity of women and men in different tasks may vary, and the location and nature of these tasks may also be more or less compatible with a woman's rearing of children and monitoring their labor linked often to her self employment, which can modify how these jobs affect the net opportunity costs and benefits of children for the mother, and potentially influence her fertility.

The paper proceeds as follows. The next section outlines a framework to guide the empirical investigation. The distinctions drawn among types of employment and how they are likely to influence fertility are discussed in Section 3. Section 4 describes the data from a household survey collected in Ghana in 2005/06 and how employment type are incorporated. Section 5 estimates the joint determination of job type and earnings of women and men. The relationship between women's productive environments and characteristics and their fertility is estimated in Section 6, and Section 7 concludes by noting some unresolved issues in assessing how the limited involvement of women in the modern economy could help to account for the slow pace of the fertility transition in parts of sub-Saharan Africa such a Ghana.

2. Women's Labor Supply and Fertility : An Empirical Framework

The unitary model of the family proposed by Becker (1981) implies a pooling of household member endowments and resource, and labor supply allocations are then coordinated to allow the household to behave as a single optimizing agent. This unitary approach to family behavior is more difficult to justify as an increasing fraction of women enter the market labor force, gender specialization between market and home production diminishes, and an increasing share of women reside apart from their husband. Nash bargaining models for marriage, household formation/dissolution, and intra-household resource allocations have been proposed, typically with empirical requirements that the resource endowments, claims on nonearned income, or assets can be assigned between husband and wife, and some of these claims on resources exist independently of the union (e.g. McElroy and Horney, 1981). Pareto efficiency is assumed in the rational "collective model" (Chiappori, 1992; Chiappori et al. 2002), and relies on "private" consumption goods to help estimate a sharing rule between spouses, or exogenous shocks to the relative supplies of potential marriage partners. To derive insights into the determinants or consequences of the gender inequalities in family endowments, consumption, and human capital investments, one can exploit the intra-household distribution of assets or nonearned income (Schultz, 1990a; Thomas, 1990; Pollak, 2011). Spouses may hold different preferences for numbers of children, and fertility and related choices they make could then be affected by the prior personal distribution of assets and endowments. Business assets of household members other than the woman, and the value of land she owns are treated here as exogenous determinants of a woman's choice of job type that might then influence her earnings and fertility.[1]

[1] However, the gender difference in ideal family size is relatively modest in Ghana according to survey evidence. Men and women age 15 -49 in the 2008 Ghana Demographic

All women age 15 to 49 who are not full time students are included in the population studied. The effect of employment opportunities could influence women's bargaining power in marriage or "threat point", with possible implications for women's fertility. The woman's value of owned land and family business assets are considered among the variables conditioning their labor supply and related demographic behavior. However, age at marriage and its duration, as well as the characteristics of a current partner (if any) are excluded from the model estimated here because they are endogenous adult choices, and fertility and duration of marriage conditional on age are jointly and simultaneously determined. I do not see any obvious way to disentangle the determinants of the timing of marriage and fertility with conventional household survey data from a single cross section; this is a limitations of this study but an unavoidable restriction. Consequently, the matching of couples in the marriage market and duration of marriage are topics for future research, although implicitly they are operating behind the facade of partial reduced form relationships examined here.

A Life Time Choice Framework for Women with Three Types of Employment

Assume that a woman makes choices over her adult lifetime that may affect her fertility, K, other forms of consumption, C, and home production, H, that affect her welfare, U. Home production is a residual category for women who are not primarily in self employment or paid employment, which includes also women in unpaid family work, household chores, child care, and leisure from which she may derive utility:

$$U = U(K, C, H). \qquad (1)$$

The woman's lifetime outcomes are the following : fertility measured by children ever born, K , whether the woman works primarily as self employed, S, or in paid employment, P . The endowment of time of all women is identical and is the sum of P, S, and H. The income constraint in this single period framework assumes that the cost or shadow price of children varies according to her choice of employment type. The woman income, I , is a sum of the wage W_j in the three alternative activities, $j = p, s, H$, weighted by the probability of working in that sector, the market return, r , on her exogenous assets, A , plus the average productivity of the labor of her children in family work, W_k:

$$I = (W_p P + W_s S + W_H H) + A r + W_k K$$

$$= C + K(M_k + Wp P(\delta_p - \rho_p) + W_s(\delta_s - \rho_s) + W_H H(\delta_H - \rho_H)). \qquad (2)$$

This income is divided between her consumption, where its price index is set to one, and the cost of children, of which the first component is market inputs, M_k , and a share of the time that the

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Health Survey report ideal family size, with men reporting on average 4.5 children, whereas women report 4.3, and the gap appears to be diminishing at younger ages (p.133, Table 7.4).

woman foregoes for her own child care, δ_j , depending on which types of employment she is engaged in, minus the child's wage or productivity in her employment type, ρ_j . If a mother and older children can work together in the same type of self employment, complementarity or more effective monitoring of own child labor is expected within the family than if she works in paid employment (Bhalotra and Heady, 2003).

The productive characteristics of the adult woman that are assumed exogenous and potentially relevant to her desired fertility includes her age in years, Y , in quadratic form, years of schooling completed at 4 levels (a spline in primary, middle, secondary, and tertiary) to discern nonlinear effects of schooling , E , and characteristics of her current residential area, such as the urban/rural distinction. However, those who migrate to an urban location are likely to be selected from the population because they particularly value urban amenities relevant to the work choice and childbearing. Therefore, in the empirical analysis a control is included only for those who were born in their current urban residential area (urban native = UN), a condition that is presumably less affected by their preferences and treated here as exogenous compared to those who migrated from their birthplace to an urban residence. Later a comparison is provided for the fertility of those urban residents who are born in their residential area, UN, and those who migrated to their current urban area (UM), who may be affected due to shorter period of exposure to urban amenities and who revealed preferences for urban amenities by their migration. Urban areas will tend to have different market prices, better public health and school services, agglomeration benefits, and features of the local labor market that often favor women's employment (Cf. Fafchamps and Shilpi, 2005). The distance to a family planning clinic or other health facilities in terms of miles is treated as a proxy for a monetary and time price of family planning services, P , which is expected to discourage use of birth control. There is also information in the survey on when the family planning clinic was established that she currently uses, on the basis of which an indicator is constructed to represent the share of her reproductive life (age-15/ 49-15) during which the woman could have benefitted from using this family planning clinic's services.[2] Unfortunately, the proximity of these services and the timing of exposure is not reported for women in urban areas in the Ghana Living Standards Survey from 2005 (GLSS 5), and I have therefore assumed these services are locally available in all urban areas throughout the woman's childbearing years.

The local derived demand for female *wage labor* is assumed to be influenced by D, the sum of the national female share of wage labor in each industrial sector, weighted by the importance of the sector in the urban or rural survey areas in the ten regions (state) distinguished in the GLSS 5 (See Data Appendix). The share of females working in self employment is roughly six times as large as the share in paid employment (33 percent compared with 6 percent, respectively), and the majority of self employed women work in agriculture. The gender composition of *agricultural labor* engaged by crop differs substantially across the climatic-soil zones of Ghana,

[2] The lifetime exposure index is weighted by the age specific birth rate shares of the total fertility rate estimated from the 1988 Ghana Demographic Health Survey (GDHS) as summarized in the 2008 GDHS report.

with the production of food grains and vegetables being relatively female labor-intensive, whereas males provide most of the labor in the cultivation of tree crops such as cocoa, coconuts, and palm oil as well as sugar cane. The female labor-intensity of local crops, C, is constructed from survey information from each survey enumeration area (EA). The primary plots reported in the GLSS 5 for the EA, excluding the plot of the respondent, which is endogenous, are weighted by the harvest value of that plot, and by the national female to total labor-intensity of the crop as described in the Data Appendix. This local derived demand for female agricultural labor is expected to raise the marginal productivity of women in home production, and perhaps also female self employment.[3]

Reduced-form relationships can be specified between the outcome variables that are assumed to be chosen or produced in a coordinated manner by the woman and her household, O, that include K, S, P, H ,W_p , W_s , and all of the predetermined characteristics of the woman (age Y, education E) that are assumed not chosen by her, including the value of her land, L , and household business assets per adult, A , excluding her own business assets which are likely to be jointly determined with her choice of working in self employment, community amenities and prices, P , urban residence among natives , UN (and possibly UM) , and local indicators of the derived demand for women's labor in agriculture and paid employment, C and D, respectively :

$$O = O(Y, E, L, A, P, UN, UM, C, D) . \quad (2)$$

Daily earnings of workers in paid employment, W_p , are measures of market labor productivity, and are expected to be a function of Y, E, UN, UM, and D as an example of equation (2). Daily earnings in self employment could be a function also of L, A, and C, as well as Y, E, UN, UM and D. Survey reported paid earnings in the GLSS 5 is likely to be more accurate than self employment earnings, but this reliability of paid earnings is counterbalanced by the limited sample of women in paid employment, i.e. 430 , which is much smaller than the number of women in self employed, or 2622. Although men are more often reported than women in paid employment, 1124, there are nonetheless nearly as many men as women in self employment,

[3] C and D are arguably exogenous demand determinants of female productivity in family agricultural and paid employment, respectively. There is a complex institutional history behind the composition of crops grown in Ghana that has affected women's empowerment as family workers and self employed entrepreneurs, especially in the production of cocao, which is the major cash (export) crop in Ghana in the 20th century (Hill, 1963; Platteau, 1996; Takane, 2002; Quisumbing, et al. 2004; Austin, 2005), and more generally in sub Saharan Africa (Boserup, 1965, 1970; Jones, 1986; Jacoby, 1995). The dominant determinant of personal income in West Africa according to some studies of inter-generational mobility may have been ownership of land, which is often allocated communally by tribal (male) elders. However, schooling is emerging as a stronger predictor of income and consumption in recent West African surveys (Glick and Sahn, 1997; Quisumbing et al. 2004; Dumas and Lambert, 2010). In the GLSS 5 daily earnings of Ghanaian women is more closely related to their schooling than to their ownership of land.

2175, as in paid employment.

Paid and self employed earnings are only observed for those working primarily in that type of job in the last seven days, though earnings can be reported per month or even for annual periods. A reduced form equation for who is in job type S or P will be jointly estimated with the earnings for those working in each respective sector (Strauss and Thomas, 1995). Conditions are specified that are expected to increase the likelihood that women will work at home by raising their reservation wage for entry into paid employment. The exclusion restriction is that local cropping patterns summarized by C that is not expected to spill over and affect earnings in paid employment. A sample-selection corrected model can then be identified for the earnings function and choice of job (Heckman, 1979). The labor supply of women can also be described in terms of continuous variables (i.e. hours per week or year), rather than primarily in job categories (P , S or H).[4] To assess the effects of exogenous variables on women's type of work and fertility requires additional assumptions. [5]

3. Types of Labor Force Participation of Women and their Fertility

The process of economic development is often related to declines in fertility and a tendency for

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[4] A standard working assumption is that the marginal product of labor in self employment and in home production declines linearly with increased hours worked in S and H, respectively, due to other productive factors than own labor being relatively fixed in at least the short run. Self employment hours can be measured from the left margin to the right, and home production from the right margin to the left. The individual's wage in paid employment is typically assumed constant with respect to hours worked. If these declining marginal product schedules intersect the constant paid employment wage, an equilibrium allocation of the woman's time across the three types of work is determined, and the values of the marginal product of time in the three activities are equalized (Schultz, 1981, Fig. 4.1). Shifts in the height of the three marginal product schedules, due perhaps to differences in C, D, A, or L, might account for situations where the reservation wage in home production increases and crowds out time from P and S, or increased productivity in self employment crowds out H and P .

[5] For example, improved local health services may reduce child mortality and thereby reduce parent "replacement demand" for additional births, because parents primarily may want surviving children who can provide parents with family labor and old age support. Improved child health can also relieve woman of caring for sick children. This effect of improved child health is expected to raise her opportunities in paid employment by a greater amount than it would raise the employment opportunities of men, whose labor supply is less affected by the care of sick children. This hypothesis is confirmed using a panel survey of self employed and wage workers in Mexico (Gutierrez, 2011). The derived demand for female paid workers would also increase as fertility declined and the timing of births is more predictable, which should contribute to improvements in the health status of women and their capacity to invest their time in market oriented vocational training.

women to shift their time from unpaid work in the family, inclusive of child care, toward self employment, and eventually to wage employment. The occupations where women are concentrated are not necessarily the same in all regions or countries. Boserup (1970) advanced the idea that where agriculture is dependent on "plow technology", as in much of Asia, agriculture relies more heavily on male labor, whereas less intensive forms of shifting, slash-and-burn agriculture, as originally found in parts of Ghana, rely less on male labor except in the initial phase of clearing of forest land, which is followed by cultivation using "hoe technology" for which females often provide most of the labor (Boserup, 1975; Durand, 1975; Schultz, 1981, 1990b).

Studies do not typically disaggregate the labor force participation of women by types of activity– paid employment, self employment, family unpaid activity – and cultural traditions may also influence whether women in unpaid family work are construed as being in the labor force or not. Without distinguishing between self employment and paid employment, one may not assess accurately the opportunity cost of the mother's time foregone when she has children. If labor force participation is defined following UN practices to include socially recognized female unpaid family workers, a U-shaped relationship between female labor force participation rates and income per capita is evident across countries (Durand, 1975; Schultz, 1990b; Goldin, 1990, Mammen and Paxson, 2000). When participation is restricted to the sum of self employment and paid employment, a positive relationship may be evident between women's participation and development. When only paid employment is treated as the critical dimension of female labor supply, a significant positive association emerges with income or expenditure per adult at the household level, or with GNP per adult at the country level. Participation in paid employment is also inversely related to total fertility rates and positively related to women's schooling (Schultz, 1990b, 1997).

The second reason to not interpret the direct empirical association between female labor force participation and fertility as causal is that both outcomes are family choices, leading to possible reverse causation and joint determination. Environmental conditions may influence both women's labor supply over the life cycle and lifetime fertility. Omitting suitable controls for these conditions could lead to bias in estimating a causal effect running from women's time allocation to fertility. To infer the causal relationship, a variable is generally required that influences the labor force behavior of women and arguably does not otherwise affect fertility (in other words, an identifying "exclusion restriction"). Variables that increase the value of the marginal product of women working in agricultural production, such as C , raise women's home reservation wage and reduces their likelihood of working in paid employment, by encouraging them to work primarily as an unpaid family worker or self employed in agriculture or processing and trading agricultural commodities. On the other hand, the regional industrial composition of paid employment is expected to affect the female-intensity of paid employment and affect the regional wage for women in paid employment. Underlying demand conditions that encourage the location of firms in industries that employ a larger fraction of women are likely to improve opportunities for women to produce as self employed similar goods and services.

4. Data : Ghana Living Standards Survey of 2005 (GLSS 5)

The distribution of the population of Ghana by gender, age, and employment type is summarized in Table 1 tabulated from the GLSS 5 collected in 2005/2006.[6] Estimates are based on the sample of women between the ages of 15 and 49, who are not full time students, for whom fertility and other key explanatory variables are reported. Only 5.9 percent of these women are primarily in paid employment, whereas 33 percent are in self employment, with the remaining 61 percent in the residual job category called home production. Unpaid family workers are 27 percent, unemployed and searching for work are 3.7 percent, and the remaining "other" category represents 30 percent of the population. The share of women in paid employment increases with age after 25, but is still no more than 7-8 percent. The share of women reporting themselves as self employed increases substantially over the life cycle, from 11 to 52 percent, and men exhibit a similar life cycle pattern of increasing self employment. Men, as already noted, are more than three times as likely as women to be in paid employment between the ages of age 25 and 49.[7] The fraction of women who are unpaid family workers remains relatively stable across age groups, whereas for men the fraction declines with age as they establish their own households.

Disparities between public and private paid jobs are often interpreted as a labor market distortion in Africa and in some other low income countries (e.g. Glick and Sahn, 1997). However, Ghana has little of its labor force employed in parastatals or government operated companies, and even civil service public employees have from 1999 to 2005 diminished as a fraction of the labor force from 12 to 9 percent. The gap in wages between the public and private paid sector, after controlling for schooling, age, and gender, etc. is reported to be negative and stable over time in Ghana, whereas in other African countries public wages often exceed those in the private sector (Stampini, et al. 2011).

Most Ghanaians work in agriculture, and distinguishing between agricultural workers in home production or in self employment may not always be straightforward. Studies suggest there is to some "separation of purses" by wives and husbands in West Africa, and economic and demographic behavior of husband and wife should be interpreted as outcomes of a bargaining process, in which men and women retain some maneuverability in their economic lives, whether married or not (Jones, 1986; Udry, 1996; Goldstein and Udry, 2008).

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[6] The two sparsely populated northern regions of Ghana are slightly over-sampled in the 2005 GLSS, and variable means are correspondingly re-weighted. The sampling design is a two-stage cluster sample, with 580 clusters with about 15 households in each cluster, and the standard errors of the estimated coefficients of relationships are therefore adjusted for this clustering.

[7] According to the 1991/92 GLSS 3, among women age 15-49, those working in paid employment in the last 12 months were 7.5 percent, a slightly larger fraction than paid employees in the last seven days as reported in 2005/06 of 5.9 percent, whereas 30 percent of these women worked as self employed in 1991/92, is a smaller fraction than are reported as in 2005/06 of 33 percent (authors tabulations of the GLSS 3, or Table 4.5 of survey report).

Rural-Urban Differences in Incentives, Women's Behavior, and Migration

There are many hypotheses for why labor markets and fertility differs between rural and urban areas, though evaluating the importance of these various mechanisms is rare. Moreover, the identification of causal relationships is complicated due to migration between rural and urban areas. For example, it is often assumed that children are more costly to rear in urban than in rural areas, in part because the relative prices of food, housing, and other basic consumption items tend to be higher in urban than in rural areas. Public services that encourage parents to invest in the health and schooling of their children are generally more accessible and of higher quality in urban than rural areas. If parent view health and schooling of their children as substitutes for numbers of children, parents in urban areas would have an added incentive to seek a smaller family, other things equal (Becker and Lewis, 1974). The labor productivity of children compared to that of adults may also be higher in rural than in urban areas, allowing children to earn for their parents more of their keep in rural settings.

However, if migration occurs in response to parent heterogeneous preferences for numbers of children and child quality, parents who want unusually small families or higher than average child quality will be more likely to migrate from rural to urban areas, other things being equal. The resulting cross regional association between urban residence and fertility is then likely to overstate the "causal" effect of the urban prices and services and labor market opportunities on fertility in a population without rural-urban migration (Schultz , 1988). One consequence of this endogeneity of migration and differences in urban/rural public services motivating migration is the need to model factors affecting migration that have no other effect on fertility. Unfortunately, I do not see a basis from the survey to separately identify the behavioral effects of migration on women's labor force behavior and fertility. An alternative approach, as noted earlier, is to control for two groups residing in urban areas: those who were born where they currently reside or urban natives (UN) and urban in migrants who reside in an urban location other than their birthplace (UM) . Behavioral outcomes that vary between these native and migrant urban residents may shed some light on the importance of the selective migration bias.

Table 2 cross tabulates the Ghana 2005 GLSS 5 sample by this information on their current residence as rural or urban (i.e. resident in a community of 5000 or more inhabitants is urban). Urbanites who reside in their birthplace represent 28 percent of males and 29 percent of the females, whereas 49 percent of males are living in a rural area where they were born, and 43 percent of females reside in their rural birthplace. The somewhat greater mobility of rural born women than men, despite the lower levels of female schooling, may be related to women moving more often upon marriage than men to the location of their spouse's family.

Comparisons by Gender and Type of Employment

The sample is divided into three job types for females in Table 3A and for males in Table 3B. Males on average have completed 6.22 years of schooling and females have only 4.46 years. This gender gap in schooling is evident at all four levels of schooling. No adjustments have been

attempted for the reforms of the school system in 1990, and junior (middle) and senior secondary school are assumed to be completed with three years each (World Bank, 2004). For women in paid employment, their average log daily earnings is 10.10 cedis, compared to 10.40 cedis for men, a 30 log points gender gap (35 percent). Self employed men earn less on average, 9.50 log cedis per day, whereas women earn 9.31, with the gender earnings gap among self employed being proportionately smaller, 19 log points. However, women in paid employment have nearly the same schooling as men, 9.37 and 9.42 years, respectively, although self employed men have 1.16 more years schooling than corresponding women. These empirical regularities in earnings suggest Ghanaian women have a harder time finding paid employment (e.g. formal sector) that is equivalent to that obtained by men, compared with self employment for which the women's labor market opportunities are more comparable to hose for men. Women working in home production, for whom there are no observed wages, have 1.32 fewer years of schooling than men. The regional (n=20) female intensity of paid employment is as expected positively associated with women working in paid employment, with the average index of female intensity in home production, self employment, and paid employment as .218, .222, and .229, respectively. The index of the female labor intensity of the agricultural crops grown in enumeration areas (n= 580 of which 320 are designated rural) is positively associated with women working more in home production, and the average among home workers, self employed, and paid employed is .399, .366, and .265 , respectively.[8]

Some variables are undefined for some individual observations in the survey, and to avoid eliminating these individuals unjustifiably from the estimation sample, a missing dummy variable is created to estimate an intercept difference for the group for which the variable is missing. For those reporting a value to the original variable, a zero is assigned to the missing dummy variable. The original variable when it is missing then set to zero. For example, the female labor intensive crop index is not defined in all enumeration areas, because this index is undefined if there are fewer than ten plots from the enumeration area (EA). This is more likely to occur if the EA is urban or suburban or one where a dominant agricultural activity is rearing livestock and not growing crops. Because nine out of ten women owned no land, the continuous variable for value of the owned land is supplemented by a dummy variable when owned land is not assigned a value. Similarly, the household business asset variable is zero for 19 percent of the women, and the same procedure was followed to better capture any nonlinear effects due to these skewed variables and for which a linear specification may not fit as well the data.

Women's Types of Employment and Job Amenities Related to their Fertility

The type of employment selected by women is analyzed by estimating a probit model for paid or

[8] Based on the GLSS 5, 26 percent of self employed women work at home, whereas only 6.5 percent of the self employed men work at home. Of the women who are paid employees, only 5.4 percent work from their home, and 2.4 percent of males in paid employment work from home.

self employment in which the error is assumed to be normally distributed. The productive effects of a woman's characteristics are allowed to vary by whether she works in paid or self employment (Roy, 1951). The identification strategy assumes the employment type choice is affected by specific identifying variables that are exogenous to the woman adult choices, though they do not affect her observed market earnings. The value of land owned by the woman, household business assets of her family, and her parent's economic endowments approximated by the mother and father's education (ME, FE), and whether her mother and father's occupation was in agriculture (MA, FA). For example, these variables could influence her reservation wage in home production, because they could enhance her home productivity and access to credit which could help her to establish her own or family self employed business.[9]

5. Determinants of Earnings and Employment Type: OLS and Heckman Estimates

Columns 3 and 6 of Table 4 report the ordinary least squares (OLS) estimates of the log daily earnings functions for women in paid employment and in self employment, neglecting any bias due to the selectivity of the samples of paid employees and self employed women. The Heckman (1979) estimates in Columns 1 and 2 correct for the potential sample selection bias with joint maximum likelihood methods for the Probit probability of being a paid employee, and the log linear daily earnings of paid employees. The parallel Heckman estimates for self employed women are reported in columns 4 and 5. Father's schooling increases the daughters likelihood of being self employed, but the parent characteristics appear individually insignificant in their partial association with the employment choices. However, combined with the asset and crop index variables these excluded variables are jointly significant in the probit selection equations, according to the joint Chi squared test , $p < .001$, in the estimation of the female (and subsequent male) Heckman models for either the paid or self employed workers.

The estimated correlation between the errors in the participation and earnings equations, or rho, is not significantly different from zero in the case of the paid employees, implying that women with unexplained greater likelihood of working as paid employees do not tend to have unexplained higher (or lower) earnings. Consequently, the Heckman joint estimation of the earnings function does not statistically differ from the single equation OLS estimates in column 3, for which the $R^2 = .48$, and the OLS estimates are therefore expected to be more efficient than the joint Heckman model estimates and they cannot be rejected as inconsistent.

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[9] To reduce the likelihood of reverse causality, household business assets exclude those of the woman herself that could signal her choice of self employment, and the remaining household business assets are divided by the number of household adults over the age of 14. Ownership of land may allow women to rent out or sharecrop their land, if she decides not to cultivate it herself, and excludes "use rights" to the land granted by community elders or extended family that might be reclaimed if she did not cultivate the land herself, and would thus be a less satisfactory form of collateral for her to use to obtain a business loan (Austin, 2005; Goldstein and Udry, 2008).

For the 33 percent of the women who are self employed, the exclusion restrictions are again jointly significant at the .001 level, and the estimated rho for self employment and earnings is significantly different from zero at only the 10 percent level. Rho is negative, suggesting that women with unexplained higher self employment earnings are less likely to be working as a self employed worker. The $R^2 = .13$ in the OLS estimates reported in column 6 . Again the coefficients of the earnings functions corrected for sample selection are essentially similar to the OLS estimates, implying the sample selection bias is relatively unimportant given the validity of the identification restrictions.

Estimates of Earnings Functions for Women and Men by Type of Employment

The log daily earnings OLS estimates for women in paid employment imply that a woman with one more year of primary schooling (0-6) is not paid more. Further schooling at the secondary level is significantly associated with higher earnings at the middle (junior secondary) school level, at the (senior) secondary, and tertiary school levels, by 8.8 log points per year, and 24 and 21 log points, respectively. Self employment Log earnings among the self employed women is estimated to increase significantly with each year of primary schooling by 5 log points, and by 6 to 7 log points at the middle school level, by 9 to 10 log points at the secondary school level, and by 43 log points at the tertiary level. For the small sample of tertiary educated female self employed workers, the high returns may be explained by a handful of university trained professions, such as doctors, lawyers, architects, etc. The profile of earnings by age for paid employees is not jointly significant in the estimated quadratic form, though it is for self employed with earnings peaking among those age 45 to 46. One finds parallel earnings returns to schooling for women in both the paid and self employed labor market which is not obviously attributed to the distortions present only in the formal paid labor market because they are evident for the self employed who are thought to work in a competitive labor market.

Having been born in an urban area and still living there is associated with self employed women reporting 31 log points more earnings, whereas paid employees residing in their urban birthplace earn 13 to 15 log points less. This unexpected pattern for urban native paid employees could be accounted for if they worked fewer hours per day than women who had migrated to the cities or worked in rural areas. However, this hypothesis cannot be tested empirically because the GLSS 5 survey did not ask all workers for hours worked.

The regional concentration of paid jobs in industries where women are relatively over-represented is associated with more women securing paid jobs as well as more self employment, and they earn significantly more per day in both types of jobs, confirming that the industrial composition of paid employment can affect women's wage opportunities in Ghana. Although the female paid job index has a small standard deviation across the sample of all women, the OLS estimates imply a standard deviation increase in this index (.0124 in Table 3A) is associated with a 10 log point higher paid wage, and those in self employment earn 23 log points more.

Female labor intensity of local crops reduces women's probability of working as self employed, where a standard deviation increase (.177 in Table 3A) is associated with 42 log points less daily earnings of women in self employment, and 1.7 percent less earnings in paid employment, though the latter effect on earnings of those in paid employment is not significant.

Table 5 reports estimates of the same model specification for men's daily log earnings functions by job type. Recall the proportion in paid employment among males is 19.7 percent, whereas 38 percent of males are self employed. The estimate of error correlations for rho is insignificantly different from zero in both job samples or men, indicating that the OLS and Heckman estimates of the earnings function do not differ significantly or are not biased by sample selection. The OLS estimates of the earnings function are thus preferred for men. The wage returns to schooling in paid employment increase for men from a significant 4 log points per year of primary schooling, to 7 log points at the middle level, to 11 and 19 log points at the senior secondary and tertiary level, respectively. Among the self employed, schooling returns are 5 log points at the middle level, and increase to 24 percent at the tertiary level. The age quadratic is jointly significant for both paid and self employed men.[10] Paid employees are paid 9 log points *less* if they are urban residents who remain living in their birthplace, whereas self employed urban native men receive 42 log points more earnings per day, analogous to the wage patterns for women. Lacking any land or business assets reduces male participation in self employment, and even female-labor intensive crops appear to be associated with fewer men entering self employment and paid employment, and correspondingly more men engaged in home production.

In summary, the schooling earnings returns in paid employment are small at the primary level, while most young adults in Ghana have by 2005 completed at least some middle or secondary school, and their marginal returns appear substantial and perhaps increasing over time (cf. Schultz, 2004). Wage returns tend to be on average somewhat greater for females than for males. The large returns from tertiary schooling among the paid employed women and men may reflect a small samples of professionals for whom earnings are typically relatively high, e.g. lawyers, doctors, and architects. But the robust returns to schooling for both self employed and paid employees by secondary school suggests that they are not due only to a distortion in the formal paid labor force associated with unions or corruption. Public sector employees are a relatively small share of the labor force in Ghana compared with much of Africa, and a fraction that has been declining since 1988 with the retrenchment of the public sector and trade liberalization. Excluding public sector workers from the estimation sample for paid employees does not

[10] Mincer (1974) interprets the life cycle profile of earnings and potential (post-schooling) experience (in other words age-schooling-6) as a reflection of the on the job accumulation of productive skills. This potential experience measure is less suitable for women than men, when women may not enter and remain in the market labor force after leaving school. The error in measuring women's experience by age or potential experience is greater than in measuring men's experience, and provides a plausible explanation for the smaller and less significant coefficients often estimated for the potential experience quadratic for women than for men in paid employment, as reported here in Ghana.

obviously alter wage levels or returns to schooling (World Bank, 2004, 2007; Stampini et al., 2012).

Table 6 A column 1 and 2 converts the probit coefficients for the female paid and self employment participation equations from the Heckman estimates in Table 4 into the marginal effects of the explanatory variables, evaluated at the sample means. Because the sample selection correction for the earnings function did not find a correlation in the errors of the earnings function and the individual job choice of P or S, an alternative multinomial logistic specification of the employment choice model is estimated where women may decide simultaneously whether to work in sector P , S , or H . The marginal effects for women are reported in columns 2, 4, and 5 in Table 6 A for the multinomial logistic model, evaluated at the sample means. When the marginal effects are statistically significant, the estimates of the Heckman and Logistic models marginal effects tend to be similar, which may be viewed as a robustness check on the adequacy of the Heckman framework in which a single choice of job type is analyzed, one at a time as in Tables 4 and 5.

As noted earlier with the earnings functions, primary schooling increases the likelihood of women working as self employed, but additional schooling beyond 6 years of primary education reduces their likelihood of working primarily in self employment. The probability of women being in paid employment, on the other hand, increases with all levels of schooling, and the magnitude of the marginal effect per year of schooling tends to increase at higher levels of schooling. The probability of self employment increases with age as does the wage, which has been attributed to accumulating working capital and experience (e.g. Schultz, 1981). Women who reside in an urban area that is their birthplace have a small advantage in obtaining a paid job (1.2 percentage points), and a larger increase in being self employed (4.0 percentage points). Most of these gains in paid and self employment probability are matched by gains in the daily earnings of women in these types of employment, except for urban natives who surprisingly earn less in paid employment than do other comparable workers.

Household business assets (per adult) excluding those of the woman and more valuable land are associated with more frequent paid employment, but are not related as expected to increased self employment. However, having no land or no household business assets reduces notably the likelihood that a woman is self employed, and missing household business assets increases the likelihood she will be in paid employment.

A standard deviation increase in the female labor intensity of crops reduces self employment by women by 15 percentage points (.181 *.87 from Tables 3A and 6A), but is unrelated to the probability of being in paid employment. A standard deviation increase in the female intensity of paid employment is associated with a marginal increase in paid employment by .84 percentage points (.0124*.681 according to Heckman estimates), whereas the effect on self employment is an increase of 6.5 percentage points (.0116*5.56). The regional concentration of industries that tend to employ more women in paid employment is associated with women earnings more (23 log points) in self employment (.0124*18.3) and 10.3 log points more (.0124* 8.3) in paid

employment. The female labor intensity of local agricultural crops is expected to raise the reservation wage for women in home production and thereby deter some who at the margin would otherwise enter self employment.

Table 6B reports for males the comparable marginal effects on choice of employment type estimated within the Heckman model in Table 5 and the parallel multinomial logistic model, evaluated at sample means. The labor supply effects of schooling for men on earnings tend to be of corresponding magnitudes as for women. The wage premiums for males tend to increase at higher levels of schooling as they did for women. For men wages are higher at later ages in self employment as they were for women, but for males paid employment earnings also increase with age, whereas they did not for females.

Levels and Inequality in Daily Earnings for Men and Women by Type of Employment

The average log daily earnings of women working in paid employment is reported in Table 7 as 10.10 (which is equivalent to the mean OLS estimate), and in self employment is 9.31, for a difference of 79 log points. For men the difference is even greater, with the mean log earnings in paid employment of 10.41 compared to self employment of 9.50, for a difference of 90 log points (Tables 7 or 3A ,3B). The Heckman earnings functions are estimated to control for potential bias due to the unrepresentativeness of the job-specific samples of earners (Tables 4 and 5), and can then be used to predict earnings for those not reporting earnings in the specified job category, as well as for those in home production for whom earnings is not observed. Thus, the selection corrected framework provides a counterfactual estimate of earning opportunities for all persons, regardless whether they report earnings in any specific job type or are primarily involved in home production.

The Heckman predicted paid log daily earnings for women working as self employed is 9.82, and the predicted paid wage for home production workers is 9.65. The Heckman predicted self employed earnings of women engaged in paid employment is 10.03, whereas those in home production are expected to have the opportunity to earn in self employment 9.15 . The earnings gap between types of employment is evidently larger when based on the earnings of self employed than based on estimates for paid employees, perhaps because hours worked per day is not standardized and is more variable in self employment.[11]

[11] It is not clear whether earnings reported from self or paid employment offers a better basis to evaluate earnings for the entire population. Earnings from paid employment may be more accurately reported than for self employment net earnings, because the self employed should deduct from their gross income the market value of productive inputs used other than the respondent's labor, including the labor of unpaid family workers and the rental value of owned land and business assets. Moreover, self employed estimates explain less of the sample variance in log earnings than for paid employees (Tables 4 and 5). On the other hand, the sample of paid employees is smaller than the sample of self employed, about one-sixth for women and one half the size for men, which is likely to yield less precise estimates for paid thana self employed.

The Heckman predicted log earnings for men in paid employment who are actually self employed would be 10.10, and the predicted paid earnings for men working in the home average 9.82. The rank order of predicted average earnings by job type is the same whether OLS or the Heckman estimation method is used, with workers in paid employment always receiving the highest earnings, and those who work primarily in the home being imputed the lowest earnings, though the gap by about a third for women and a half for men when the composition is controlled. According to these estimates, changes over time in the type of jobs held by the working age population could account for changes in average worker earnings or imputed productivity. However, the share of women working in paid employment does not appear to have increased in Ghana in the 14 years between the 1991 and 2005 GLSS, whereas it has increased for men, with men also shifting from the public to private sector jobs (Ackah, et al., 2009).

The estimated log earnings of men relative to women, according to the Heckman model fit to the paid employee sample is 15 log points higher (10.43-10.28), and within self employed sample the gap is 20 log points, but at a lower wage level (9.59-9.39). The Heckman predicted earnings gap between men and women in home production based on the sample of self employed is 18 log points (9.33-9.15), whereas the gender gap for home production workers based on Heckman paid employee sample is slightly smaller, 17 log points (9.82- 9.65). The predicted earnings gaps between all men and women age 15 to 49 is 27 log points, based on self employed sample and 30 log points, based on paid employees.

Another way to view the earnings estimated and imputed for observationally comparable workers in Table 7 is to note how overall average earnings would change if workers could shift between types of jobs, without affecting the existing earnings differentials by job type. Moving ten percent of the women age 15 to 49 from home production to self employment would be associated with a increase in average women's earnings of 2.6 log points, according to the OLS estimates based on self employed sample in Table 7. Using the sample of paid employees this reallocation of women would add 2.0 log points to average women's earnings. Reallocating ten percent of the women from self employment to paid employment is associated with a larger increment in average earnings by 6.1 log points for women based on the self employed sample, and 5.4 log points for the paid employee estimates. Moving women from home to paid employment would raise the average woman's earnings by the sum of the previous two steps, or 8.7 log points according to the self employment OLS estimates, and by 7.4 percent based on the paid employee samples. Men would appear to gain relatively more from shifting from home production to self employed than women, but men gain less than women if they could shift from self employment to paid employment. According to the series of independent cross sectional Ghana Living Standards Measurement Surveys since 1987/88 or 1990/91, women have not raised their share of paid employment, even though there has been aggregate economic growth. Women have managed to increase their years of schooling in this time period and reduced the gender gap in schooling (Schultz, 2012).

6. Fertility and Type of Employment and Wage Opportunities

Column 1 of Table 8 shows the partial association of children ever born per woman age 15 to 49, conditioned on the key exogenous explanatory variables : years of schooling, age (quadratic), urban native and urban migrants, the distance to a family planning clinic, and reproductive lifetime exposure to the clinic's services (Schultz, 2012). These variables account for 65 percent of the sample variation in fertility. Schooling is significantly related to lower fertility at all four levels of schooling. A year more primary schooling is associated with fertility reduction of .06, at the middle or secondary levels by .17, and at the tertiary level by .21 fewer births per year of schooling. Urban natives have on average half a birth less than rural residents (-.51), and urban residents who are migrants and no longer live in their birthplace have .65 fewer births. This difference in fertility between urban natives and urban migrants is significant at a 5 percent level, and is consistent with the hypothesis that those who migrate toward urban locations exhibit a preference for a smaller family size than do the native urban residents who have not moved from their birthplace. Women who live about 20 miles from a family planning clinic in 2005 compared to those who have a clinic in their town, and who have benefitted from this clinic in town throughout their childbearing period (exposure = 1.0) tend to have .57 fewer births (.19 +.38), and these two reinforcing family planning service variables are jointly significant at the 5 percent level in all regressions.

Column 2 in Table 8 adds as an explanatory variable the woman's OLS predicted self employment log earnings (from Table 4, column 6), according to which a doubling of self employed earnings is associated with a reduction in children ever born by .52 . Column 3 Table 8 replaces the self employed predicted earnings with the paid employee predicted earnings (from Table 4, column 3). A doubling of the paid employee earnings is associated with a reduction in fertility of .69. One should note that both of these job type specific earnings variables are predicted for individuals who are not part of the sample used in the earnings estimation, and rely on the exclusion from the fertility equation of the regional female intensity of local jobs, female intensity of local crops, or a missing crop variable. In the first stage regressions, these identifying labor demand shifting variables are jointly significant at the .001 level for both self employed earnings and paid employment earnings equations, satisfying conventional requirements for the predictive power of the instrumental variables to assure consistency.

Column 4 retains the more significant predicted self employment earnings, and adds the actual choices of the woman to be either self employed or in a paid job. Those women in paid employment have .29 fewer births on average, whereas those in self employment do not appear to have significantly different levels of fertility from the excluded category who work in home production. If the choices of women between self employment, paid employment, and home production are endogenous to the fertility decision, as argued in this paper, then instrumental variable (IV) methods may be needed to estimate the causal relationship between local job opportunities, job type choices, and fertility. The IV methods can also mitigate classical errors in measurement of job type as an explanatory variable, which could be exacerbated when

individuals engage in more than one type of job. [12] The first stage linear probability functions for working in self employment or paid employment are shown in columns 6 and 7, respectively. The identifying restrictions assume that the three local labor market variables and the value of land owned by the woman and whether this value is missing influence the choice of job type but do not otherwise influence fertility.[13] The power of the first stage identifying variables appears to be satisfactory; they are jointly statistically significant at the .001 confidence level in both columns 6 and 7. The second stage IV estimates in Column 5 of Table 8 suggest that the endogenous choice of working in self employment is associated with a woman having .99 more births than those working in home production, whereas the endogenous choice of working in paid employment is also positively related to fertility, but the related coefficient is not significantly different from zero.[14]

According to the IV estimates in column 5 of Table 8 fertility may be higher among self employed than home workers, when the variation in self employed is due only to local agro-climatic conditions affecting female labor intensity of crops, the composition of paid employment in the region, and women's ownership of land. One interpretation of these findings is that female self employment does not in itself contribute to a reduction in fertility when controls are included for the predicted earnings women received in these sectors. It is the opportunity value of earnings as self employed that appear to reduce fertility and not the predicted likelihood that women will participate in self employment given their earnings opportunities. The mechanisms that elevates fertility among those more likely to be self employed is presumed to be related to household productive opportunities but requires further study. These results offer a possible explanation for the findings of other studies that the relationships between overall labor force participation of women in Africa and their fertility is weak, especially in rural populations where self employment is more common (e.g. Baschieri, et al. 2009).

Future work should consider the joint determination of the schooling of the woman's children. Do women who are more likely to engage in self employment also less likely to send their children to school, perhaps because of the productivity of family labor in the woman's self

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[12] Labor market participation by primary job type is reported in the last seven days in the GLSS 5, whereas the respondent can report earnings for a longer periods, such as the year, which is more common for those working as self employed in agriculture.

[13] Removing the woman's land value variables from the set of over identifying variables, because land may influence directly the woman's demand for children, does not affect the IV estimates for fertility noticeably. These coefficients are marginal effects on the probabilities.

[14] Excluding the predicted self employment earnings variable, which remains significantly and negatively related to fertility(-.607), does not appreciably affect the other estimates, with the IV estimated effect of self employment continuing to have a positive and significant effect on fertility.

employment activities? Such a causal relationship between women's type of work and the school attainment of their children could reinforce development policies that would assist women exiting self employment and entering paid employment, especially in sub-Saharan Africa where the share of women in paid employment remains very low and is not growing with the overall economy. Institutions that extend subsidized credit to women to enter home-based self employment may benefit women, but have the unintended consequence of slowing the decline in fertility that is most clearly associated with women's increased schooling and value of their time. For example, geographic studies of micro-credit programs for women in Bangladesh has found the programs are related to somewhat higher fertility after several years among those offered the program(Pitt and Khandkar, 1999).

7. Conclusions and Unresolved Questions

The secular decline in fertility during the demographic transition may be a response to women having access to more productive work opportunities, which increase the potential earned income they can contribute to their family, but these opportunities for women also increase the value of earnings they must forego to have an additional child. To assess the impact on fertility of women's earnings opportunities and their participation in the labor market, a source of variation in the demand for women's labor from outside of the family is required. Some studies rely on demand for female labor in paid employment due to international trade liberalization which favors export industries that employ predominantly women, or public information on the availability of employment opportunities for women in new industries or regions (Schultz, 1985; Jensen, 2012; Heath and Mobarak, 2012). The effect on fertility of a woman's labor force participation may not be uniform across various types of jobs. If the economy draws more woman into paid employment that are located outside of her home, the employment effect reducing fertility is likely to be larger than the effect of derived demand for women's labor in self employment that can be more readily combined with home child care, as well as provide her with a means to employ the complementary labor of one's own children.

To assess the differential effect of the type of job women perform on their earnings, a sample selection model was first estimated for the joint participation and earnings of women, both for women in self employment, and then in paid employment. When a small fraction of women work in paid employment, it is plausible that women in paid employment are distinctive in terms of their skills and preferences, and they should not be assumed to be a representative sample of all women. The direct association (OLS) between paid employment or earnings in such employment and fertility is then likely to be biased from the causal effect. Nonetheless, even though only 1/16th of the women age 15 - 49 in Ghana in 2005 are primarily working in paid employment, reasonably identified Heckman estimates corrected for sample selection do not differ significantly from single equation OLS estimates of women's log earnings functions in paid employment. The sample selection correction is only moderately important from the OLS estimates for the larger sample of self employed women. In both the self employed and paid samples of women the first stage regressions satisfy the conventional power requirements. The identification of the sample selection model relies on the geographic agro-climatic distribution of

crops and the industrial composition of paid employment by locality that have the expected impacts on women's opportunity costs of childbearing, and women's labor supply among paid employment, self employment, and home production. The earnings premiums for schooling and age differ substantially between paid employees and self employed, providing further evidence that the changing distribution of schooling of women is contributing to women's choice of job type as well as ultimately fertility, and prior decisions to invest in the schooling of girls may well be driven by local crop conditions and relative prices of these crops and where industries that widely employ women are located. Once earnings of women in either paid employment or self employment are controlled, the partial correlation of female schooling and the decline in fertility is reduced substantially, suggesting the mechanism by which women's schooling is reducing fertility is through its effect on women's earnings in the labor market.

Primary schooling is associated with women earning more in self employment, and women with more years of primary schooling are correspondingly more likely to be self employed and less likely to be engaged primarily in home production (Tables 4 and 6A). However, additional years of women's schooling in junior and senior secondary schooling is related to increased participation in paid employment and offsetting decreased self employment. Secondary and tertiary levels of schooling are associated with women receiving substantially higher earnings per day in paid employment. Extending these estimates for Ghana in 2005 to the household demand determinants of fertility suggest the demand driven increasing self employment are less of a deterrent to childbearing than demand induced increases in paid employment. When controls are included for self employed earnings, the predicted probability of being self employed is actually associated with greater fertility than when women are more likely to be primarily engaged in paid employment or even in home production.

The majority of studies of women's participation in the labor force assume the choice of how women allocate their time among types of work is exogenous to fertility, or fertility and coresidential young children are exogenous to female labor supply (Mincer, 1962, Heckman, 1974; Goldin, 1980). But in retrospect these are implausible assumptions, and therefore when these studies find women working in paid employment is associated with a larger reduction in fertility than when they are working in self employment, it is difficult to interpret with confidence the empirical associations as causal. Causation could operate in both directions and other external factors could affect both fertility and women's labor supply choices.

A contribution of this study is to propose two indicators of the demand for female labor for analysis to isolate causal relationships from earnings to types of employment and fertility : (1) where the composition of local agricultural crops favor female-labor intensive crops, women are encouraged to work more often in home production allied to agriculture and less in self employment, and (2) in the regions with more derived demand for paid employment in industries that are female-labor intensive, this industrial structure of employment increases the earnings opportunities of women in both paid and allied self employment, and reduces their time in home production. Controlling for the external earnings effect of these demand factors, the endogenous choice of working in self employment is no longer significantly associated with lower fertility

compared with women who work primarily in home production (Table 8, column 8). Incorporating into the analysis of women's behavior the distinction between self and paid employment is a useful starting point in accounting for how women's productivity has influenced fertility in Ghana, and may help to explain the timing of the demographic transition in Ghana, and possibly in other parts of sub-Saharan Africa where women are productive workers, especially in the agricultural labor force, predominantly through their self employment (Boserup, 1970).

Different forms of market work may allow women to also work in their home and combine their work with child care, and realize more extensively the benefits of employing the labor of their children. Accurate measures of how specific types of employment affect women's caring for their children or efficiently monitoring their children in family coordinated work are not widely analyzed outcomes derived from in representative surveys. In this study only the crude classifications of job type among paid employment, self employed, and home production are analyzed.

Among the other salient determinants of fertility in the 2005 Ghana survey are the schooling of women, the proximity of their residence to a family planning clinic, and residing in an urban area. A woman's fertility is greater the further she lives from a family planning clinic, and is lower the longer this clinic's services have been available during the woman's reproductive lifetime. But as documented by the Ghana Demographic and Health Surveys from 1988 to 2008, Ghanaian women obtain birth control services and supplies from a variety of public, private and NGO health facilities, as well as local pharmacies and drug-chemical stores. The proximity of these alternative suppliers of birth control are often positively correlated with the proximity of family planning clinics, making it difficult to distinguish with confidence the distinct effects of these different providers on the adoption or use of contraceptives and on fertility. Moreover, where these facilities are located with respect to the rural population may have been in response to unobserved conditions affecting fertility, such as the local population's private demand for birth control (Schultz, 1988). Thus, the estimates reported here of the partial correlation of local availability and the timing of the introduction of family planning clinics represents only a partial description of supply sources for birth control, and are potentially biased by omitted demand and other correlated supply variables. Evaluations of the contribution of family planning and reproductive health programs is consequently difficult to infer in Ghana without an independent sources of variation in program access, which can then be shown to exert a significant effect on fertility, and perhaps on women's employment patterns as well.

Finally, urban residence is associated with women having on average about one half fewer children. The growing flows of women migrating from rural to urban areas, even after controlling for their education, makes it difficult to estimate how much of the lower urban fertility is due to the better urban public and private health and school services, or the relative cost of rearing children in urban areas, or the improved opportunities for women to work in the urban areas. Without detailed life cycle histories of geographic mobility with origin conditions affecting migration apart from fertility, it will be difficult to disentangle how rural and urban developments

have contributed to both rural-urban migration and the decline in fertility. The reported evidence of lower fertility among the urban migrants than urban born is consistent with the different preferences and motivations of those women moving toward the urban areas in Ghana, captured in their fertility outcomes.

Data Appendix

Two local measures of the derived demand for female labor are constructed from the GLSS 5 and are expected to explain variation in women's earnings opportunities by job type in Ghana and thus the type of employment women choose to engage in. Table A-1 shows that the labor force in paid employment is predominantly male (as is also evident in Table 1), with women occupying as their primary activity only 24 percent of these paid jobs in 2005-06. If a region of residence includes a disproportionate share of paid employment in industries for which the female share of employment is larger than the national average (i.e. 0.24), the regional "female paid job index" is above the national average. Note about two-thirds of the women in paid employment work in a handful of sectors: education and health, retail services and hotels, and manufacturing. Conversely, if a region's paid employment is concentrated in transportation and communications, or mining, utilities and construction, the regional demand for female paid employment is expected to be below average, as will be the female paid job index in that region. Regional paid labor markets are defined by the ten administrative regions of Ghana shown in Column 1 of Table A-2, which are subdivided between urban and rural areas within these regions (Cf. Schultz, 1985).

The second indicator of the demand for female labor is based on the different composition of crops grown in the various agro-climatic and soil environments of the 580 enumeration areas in the GLSS 5 (Cf. Lavy, 1985; Jacoby, 1995) . Primary plots of households and individuals are reported by crop and by the number of adult male and female workers engaged in cultivating this crop on the plot. The adult female shares of the labor engaged by crop are reported for the country as a whole, in column 4 of Table A-3. The female labor intensity of crops on these primary plots, weighted by the harvest value of the plot derived from reporting enumeration area averages is .458 (.378/(1-.174) from Table 3A). The relatively female-labor intensive crops include beans, cotton, ground nuts, maize, millet, rice, shea nut, and tobacco, whereas cocoa, coconut, and sugar cane are distinctly male labor-intensive crops in Ghana. The harvest monetary value weights for the plots are conceptually preferable to weights based on area planted where the value of crops per area differ widely (7357 vs. 4913). My assumption is that the harvest value of the crop is more highly correlated with the value of labor input to that crop plot, and moreover the survey report more often the harvest value of the primary plot (7357) than the area of the primary plot (4913)crop harvest value exceeds the number who report the area planted in that primary plot. Table A-2 reports this female labor intensity of crop composition by enumeration areas aggregated up to administrative region that are parallel to the female paid job index.

Table A-1

Employment by Job Type and Sector and Share of Females in Category in 2005

	Labor Force		Wage Employment		Self-Employment	
	Total	**Female (%)**	**Total**	**Female (%)**	**Total**	**Female (%)**
	(1)	(2)	(3)	(4)	(5)	(6)
Total All Sectors	12,602	47.7	2,205	24.3	6,406	47.6
(% Share Total)	(100)		(100)		(100)	
Agriculture and Fishing	7,071	43.4	223	22.0	3,483	29.8
	(56)		(1)		(54)	
Mines, Utilities, Construction	358	8.9	204	11.3	125	0.2
	(3)		(9.3)		(2.0)	
Manufacturing	1,421	60.2	271	22.5	863	67.5
	(11)		(12)		(13)	
Retail and Hotels	2,109	71.1	319	35.4	1,595	78.2
	(17)		(14)		(25)	
Transport and Communications	379	7.1	286	7.1	80	7.5
	(3.0)		(13)		(1.3)	
Finance and Real Estate	157	16.6	114	19.3	37	2.7
	(1.3)		(5.2)		(0.6)	
Public Administration	191	19.9	191	19.9	0	--
	(1.5)		(8.7)		(0)	
Education and Health	493	38.7	470	38.5	15	33.3
	(3.9)		(21)		(0.2)	
Community and Social Services	375	64.3	104	19.2	196	78.1
	(3.0)		(4.7)		(3.1)	
Private Household Services	48	52.1	27	33.3	12	75.0
	(0.4)		(1.2)		(0.2)	

Source: GLSS5, 2005. Author's Tabulation. Labor force includes in addition to paid and self employed the family unpaid workers and unemployed as reflected in Table 1.

Table A-2

Average Female Share of Labor by Locality in Paid Employment and Engaged in Household Agricultural Production in Primary Plots

	Expected Female Labor Share within Locality		
	Paid Employment Index	**Crops Index Weighted by Harvest Value**	**Crop Index Weighted by Planted Area**
Administrative Regions or States:	(1)	(2)	(3)
Western	.219	.410	.430
Central	.225	.429	.430
Greater Accra	.248	.460	.466
Volta	.217	.468	.469
Eastern	.217	.443	.435
Ashanti	.226	.436	.442
Brong-Ahafo	.218	.448	.446
Northern	.211	.482	.479
Upper East	207	.486	487
Upper West	.203	.490	.489
Total Number of Observations in Survey	9,197	7,357	4,912
All Ghana Average (standard deviation)	.221 (.0127)	.456 (.0355)	.461 (.0350)

Source: GLSS5, 2005. Author's tabulations for women age 15 to 49.

Table A-3
Adult Farm Workers by Gender Engaged in Production on Primary Plots by Crop

Crops	Number of Plots	Adult Workers Engaged		Share Females
		Males	Females	
	(1)	(2)	(3)	(4)
Beans	1,099	2,452	2,398	.500
Cassava	88	189	137	.419
Cacao	966	1,783	1,112	.384
Coconut	132	169	93	.355
Cotton	68	205	260	.559
Ground Nut	1,451	3,242	3,149	.492
Guinea Corn	1,019	2,375	2,339	.496
Maize	3,946	6,829	5,965	.467
Millet	1,029	2,599	2,352	.475
Rice	775	1,826	1,819	.501
Shea Nut	179	408	486	.544
Sugar Cane	34	50	29	.367
Tobacco	28	72	84	.538

Source: GLSS 5, 2005. Individual crops with at least 28 plot observations with the largest value of harvests. Palm oil is not reported among the crops in the GLSS 5, perhaps because of inter-cropping palm with ground crops of greater value. It is reported that palm oil is a crop that requires predominantly male labor as with Cacao (Austin, 2005).

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TABLE 8: CHILDREN EVER BORN ESTIMATES FOR ALL WOMEN AGE 15-49, 2005

	1	2	3	4	5	6	7
Estimation Method **Explanatory Variables**	**OLS**	**OLS**	**OLS**	**OLS**	**IV (*Endogenous)**	**First Stage Self-Employed**	**First Stage Paid Employee**
Primary	-0.0636	-0.0286	-0.0441	-0.0273	-0.0550	0.0138	0.0031
	[5.78]	*[2.37]*	*[3.76]*	*[2.29]*	*[2.67]*	*[3.75]*	*[2.06]*
Middle	-0.172	-0.139	-0.108	-0.139	-0.124	-0.0086	0.000
	[8.70]	*[6.94]*	*[3.94]*	*[6.98]*	*[5.27]*	*[1.45]*	*[0.02]*
Secondary	-0.167	-0.125	-0.0001	-0.107	-0.290	-0.0782	0.0704
	[8.27]	*[5.94]*	*[.01]*	*[4.76]*	*[1.05]*	*[12.0]*	*[10.3]*
Tertiary	-0.212	0.022	-0.0600	0.0438	-0.183	-0.0548	0.0839
	[5.98]	*[0.43]*	*[1.07]*	*[0.84]*	*[0.54]*	*[4.59]*	*[4.23]*
Age	0.249	0.288	0.276	0.292	0.191	0.0658	0.0082
	[16.9]	*[17.6]*	*[16.4]*	*[17.3]*	*[4.26]*	*[16.7]*	*[4.43]*
Age Squared (/100)	-0.0873	-0.131	-0.101	-0.135	-0.0236	-0.0793	-0.0094
	[3.49]	*[4.98]*	*[3.97]*	*[5.04]*	*[0.41]*	*[12.0]*	*[3.06]*
Urban Native (UN)	-0.507	-0.255	-0.548	-0.246	-0.370	0.0483	0.0351
	[8.50]	*[3.42]*	*[9.19]*	*[3.29]*	*[2.22]*	*[1.98]*	*[3.39]*
Urban Not Native (UM)	-0.649	-0.478	-0.567	-0.460	-0.719	0.0631	0.0595
	[9.28]	*[6.35]*	*[7.50]*	*[6.11]*	*[2.70]*	*[2.60]*	*[4.88]*
Female Job Index						3.40	0.755
						[3.82]	*[1.66]*
Female Crop Index						-0.572	0.128
						[1.90]	*[1.53]*
Crop Missing						-0.298	0.0402
						[2.21]	*[1.16]*
Miles to Family Planning Clinic	0.0093	0.0097	0.0098	0.0095	0.0123	-0.0008	-0.0005
	[2.31]	*[2.37]*	*[2.39]*	*[2.32]*	*[2.54]*	*[0.36]*	*[1.99]*
Exposure to Clinic	-0.379	-0.366	-0.384	-0.355	-0.694	0.275	0.0182
	[1.19]	*[1.15]*	*[1.20]*	*[1.11]*	*[1.81]*	*[2.59]*	*[0.54]*
Land Value						0.0000	-0.0006
						[0.06]	*[1.74]*
Land Missing						-0.356	0.0128
						[10.1]	*[1.65]*
Self Employed OLS and IV(*)				-0.0228	0.994*		
				[0.40]	*[3.37]*		

Paid Employee OLS and IV(*)				-0.285	3.57*		
				[3.22]	*[0.89]*		
Pred. Self Employed Earnings		-0.515		-0.512	-0.607		
		[6.21]		*[6.16]*	*[5.49]*		
Pred. Paid Employee Earnings			-0.685				
			[3.40]				
Constant	2.78	0.960	2.86	0.867	3.42	-1.286	0.394
	[7.71]	*[1.39]*	*[1.67]*	*[1.24]*	*[2.61]*	*[4.73]*	*[3.28]*
R^2	0.653	0.655	0.654	0.655	0.554	0.238	0.163
Sample Size	7578	7578	7578	7578	7578	7578	7578

Table 1: DISTRIBUTION OF POPULATION BY LABOR FORCE CLASSES IN GHANA IN 2005
BY GENDER, AGE, NUMBER SAMPLED (percent of age, gender group)

		15-24	25-34	35-49		15-49	
Male:		3483	2063	2462		8008	
	percentage	*[100]*	*[100]*	*[100]*		*[100]*	
	Paid Employee	181	537	632		1350	
		[5.2]	*[26]*	*[26]*		*[17]*	
	Self Employed	313	853	1247		2413	
		[9.0]	*[41]*	*[51]*		*[30]*	
	Home Production:	2989	673	583		4245	
		[86]	*[33]*	*[24]*		*[53]*	
	Unpaid Family Worker	871	286	266		1423	
		[25]	*[14]*	*[11]*		*[18]*	
	Unemployed - searching	143	112	58		313	
		[4.1]	*[5.4]*	*[2.4]*		*[3.9]*	
	Other - Family & Leisure	1975	275	259		2509	
		[57]	*[13]*	*[11]*		*[31]*	
Female:		3478	2588	2910		8976	
	percentage	*[100]*	*[100]*	*[100]*		*[100]*	
	Paid Employee	127	200	206		533	
		[3.7]	*[7.7]*	*[7.1]*		*[5.9]*	
	Self Employed	387	1067	1511		2965	
		[11]	*[41]*	*[52]*		*[33]*	
	Home Production:	2964	1321	1193		5478	
		[85]	*[51]*	*[41]*		*[61]*	
	Unpaid Family Worker	879	766	788		2433	
		[25]	*[30]*	*[27]*		*[27]*	
	Unemployed - searching	128	130	70		328	
		[3.7]	*[5.0]*	*[2.4]*		*[3.7]*	
	Other - Family & Leisure	1957	425	335		2717	
		[56]	*[16]*	*[12]*		*[30]*	

TABLE 2: DISTRIBUTION OF POPULATION BY MIGRANT CLASSES IN GHANA IN 2005
BY AGE AND GENDER, NUMBER SAMPLED (PERCENT OF AGE-GENDER GROUP)

		15-24	**25-34**	**35-49**		**15-49**
Male:		2923	1595	1900		6418
	percentage	*[100]*	*[100]*	*[100]*		*[100]*
	Current Urban Resident:	1054	615	684		2353
		[36]	*[39]*	*[36]*		*[37]*
	Urban- Non-Migrant	862	472	461		1795
		[30]	*[30]*	*[25]*		*[28]*
	Urban-Previous Urban	139	117	190		446
		[4.8]	*[7.3]*	*[10]*		*[7.0]*
	Urban - Previous Rural	53	26	33		112
		[1.8]	*[1.6]*	*[1.7]*		*[1.8]*
	Current Rural Resident:	1869	980	1216		4065
		[64]	*[61]*	*[64]*		*[63]*
	Rural - Non-Migrant	1613	722	831		3166
		[55]	*[45]*	*[44]*		*[49]*
	Rural - Previous Rural	128	113	192		433
		[4.4]	*[7.1]*	*[10]*		*[6.8]*
	Rural - Previous Urban	128	145	193		466
		[4.4]	*[9.1]*	*[10]*		*[7.3]*
Female:		2821	1941	2187		6949
	percentage	*[100]*	*[100]*	*[100]*		*[100]*
	Current Urban Resident:	1132	717	768		2617
		[40]	*[37]*	*[35]*		*[38]*
	Urban - Non-Migrant	939	539	513		1991
		[34]	*[28]*	*[24]*		*[29]*
	Urban - Previous Urban	145	144	193		482
		[5.1]	*[7.4]*	*[8.8]*		*[6.9]*
	Urban - Previous Rural	48	34	62		144
		[1.7]	*[1.8]*	*[2.8]*		*[2.1]*
	Current Rural Resident:	1689	1224	1419		4332
		[60]	*[63]*	*[65]*		*[62]*
	Rural - Non-Migrant	1340	745	862		2947
		[48]	*[39]*	*[40]*		*[43]*
	Rural - Previous Rural	189	282	311		782
		[6.8]	*[15]*	*[14]*		*[11]*
	Rural - Previous Urban	160	197	246		603
		[5.7]	*[10]*	*[11]*		*[8.7]*

TABLE 3A: MEANS AND STANDARD DEVIATIONS OF VARIABLES WITHIN FEMALE LABOR FORCE SUBSAMPLES, FOR AGES 15-49 IN 2005

	Total	Paid Employees	Self-Employed	Home Production
Sample Size	6924	430	2622	3872
Variables:				
Log Earnings per day	9.42	10.1	9.31	---
(standard deviation)	*[1.26]*	*[0.987]*	*[1.26]*	---
Years Primary School	3.10	5.12	3.36	2.69
	[2.86]	*[2.04]*	*[2.81]*	*[2.85]*
Years Middle School	1.09	2.31	1.13	0.927
	[1.40]	*[1.25]*	*[1.39]*	*[1.34]*
Years Secondary School	0.237	1.45	0.107	0.190
	[0.798]	*[1.48]*	*[0.547]*	*[0.718]*
Years Tertiary School	0.0412	0.488	0.0103	0.0124
	[0.373]	*[1.19]*	*[0.215]*	*[0.190]*
Total Years Schooling	4.46	9.37	4.60	3.82
	[4.48]	*[4.59]*	*[4.15]*	*[4.34]*
Age	31	31.9	34.3	28.6
	[9.35]	*[8.99]*	*[8.23]*	*[9.38]*
Age Squared (/100)	10.5	11.0	12.5	9.04
	[5.99]	*[5.98]*	*[5.66]*	*[5.82]*
Urban in Birthplace	0.192	0.374	0.198	0.168
Land Owned Value	0.735	0.119	1.52	0.271
(cedis 10^{-6})	*[9.80]*	*[0.825]*	*[15.3]*	*[3.54]*
Land Missing (1/0)	0.908	0.958	0.812	0.967
Household Business Assets	0.0799	0.233	0.162	0.0071
(cedis 10^{-6} adult)	*[2.42]*	*[4.82]*	*[3.40]*	*[0.183]*
Business Assets Missing (1/0)	0.809	0.972	0.617	0.921
Female - intensive crops index	0.378	0.265	0.366	0.399
	[0.177]	*[0.224]*	*[0.181]*	*[0.162]*
Crops missing (1/0)	0.174	0.414	0.192	0.136
Female Paid Job Index	0.220	0.229	0.222	0.218
	[0.0124]	*[0.0140]*	*[0.0116]*	*[0.0121]*
Mother's Years Schooling	1.84	4.18	1.63	1.71
	[3.64]	*[4.92]*	*[3.45]*	*[3.52]*
Father's Years Schooling	3.29	6.40	3.43	2.85
	[4.67]	*[5.16]*	*[4.67]*	*[4.48]*
Mother's Occupation Agriculture	0.540	0.293	0.571	0.547
(1/0)				
Father's Occupation Agriculture	0.618	0.349	0.638	0.634
(1/0)				

TABLE 3B: MEANS AND STANDARD DEVIATIONS OF VARIABLES WITHIN MALE LABOR FORCE SUBSAMPLES, FOR AGES 15-49 IN 2005

	Total	Paid Employees	Self-Employed	Home Production
Sample Size	5711.00	1124.00	2175.00	2412.00
Variables:				
Log Earnings per day	9.81	10.40	9.50	---
(standard deviation)	*[1.22]*	*[0.89]*	*[1.25]*	---
Years Primary School	4.00	5.41	3.97	3.37
	[2.71]	*[1.68]*	*[2.69]*	*[2.85]*
Years Middle School	1.60	2.44	1.50	1.30
	[1.46]	*[1.13]*	*[1.44]*	*[1.45]*
Years Secondary School	0.51	1.13	0.26	0.43
	[1.11]	*[1.44]*	*[0.829]*	*[1.05]*
Years Tertiary School	0.11	0.43	0.02	0.04
	[0.613]	*[1.17]*	*[0.251]*	*[0.361]*
Total Years Schooling	6.22	9.42	5.76	5.14
	[4.71]	*[3.96]*	*[4.28]*	*[4.75]*
Age	30.90	33.80	34.50	26.30
	[9.49]	*[8.30]*	*[8.32]*	*[9.07]*
Age Squared (/100)	10.40	12.10	12.50	7.73
	[6.07]	*[5.72]*	*[5.68]*	*[5.50]*
Urban in Birthplace	0.200	0.28	0.16	0.19
Land Owned Value	5.21	2.88	9.20	2.69
(cedis 10^5)	*[33.1]*	*[34.6]*	*[37.6]*	*[27.2]*
Land Missing (1/0)	0.75	0.890	0.58	0.83
Household Business Assets	0.01	0.00	0.02	0.00
(cedis 10^5 adult)	*[0.0972]*	*[0.0189]*	*[0.155]*	*[0.0204]*
Business Assets Missing (1/0)	0.90	0.97	0.78	0.97
Female - intensive crop index	0.37	0.26	0.40	0.39
	[0.181]	*[0.220]*	*[0.146]*	*[0.171]*
Crops missing (1/0)	0.19	0.41	0.11	0.16
Female Paid Job Index	0.220	0.23	0.220	0.22
	[0.0126]	*[0.0139]*	*[0.00096]*	*[0.0127]*
Mother's Years Schooling	1.99	3.03	1.41	2.02
	[3.49]	*[4.35]*	*[3.22]*	*[3.78]*
Father's Years Schooling	3.52	5.11	2.84	3.39
	[4.72]	*[5.01]*	*[4.36]*	*[4.73]*
Mother's Occupation Agriculture (1/0)	0.45	0.36	0.63	0.32
Father's Occupation Agriculture (1/0)	0.53	0.45	0.70	0.41

TABLE 4: LOG EARNINGS FUNCTION AND EMPLOYMENT CHOICE FOR WOMEN AGES 15-49: HECKMAN AND ORDINARY LEAST SQUARES
(z or t statistic in parentheses beneath estimated coefficients)

	PAID EMPLOYEES			SELF-EMPLOYED		
	HECKMAN		**OLS**	**HECKMAN**		**OLS**
	Probit	Earnings	Earnings	Probit	Earnings	Earnings
Explanatory variables in Probit and Ln Earnings Function	[1]	[2]	[3]	[4]	[5]	[6]
Years Primary Schooling	0.037	0.015	0.019	0.048	0.046	0.050
	[1.91]	*[0.53]*	*[0.64]*	*[4.67]*	*[3.53]*	*[3.89]*
Years Middle Schooling	0.081	0.079	0.089	-0.042	0.065	0.062
	[2.28]	*[1.54]*	*[1.76]*	*[2.03]*	*[2.49]*	*[2.38]*
Years Secondary Schooling	0.330	0.208	0.242	-0.244	0.109	0.091
	[11.8]	*[4.22]*	*[7.99]*	*[8.49]*	*[2.35]*	*[2.01]*
Years Tertiary Schooling	0.308	0.190	0.211	-0.225	0.434	0.426
	[6.17]	*[4.63]*	*[6.52]*	*[3.36]*	*[3.91]*	*[3.83]*
Age	0.063	0.030	0.037	0.187	0.058	0.073
	[2.75]	*[0.97]*	*[1.22]*	*[12.8]*	*[2.37]*	*[3.15]*
Age Squared (/100)	-0.070	-0.0093	-0.017	-0.236	-0.063	-0.081
	[1.99]	*[0.20]*	*[0.38]*	*[10.7]*	*[1.78]*	*[2.42]*
Urban in Birthplace	0.176	-0.154	-0.134	0.107	0.314	0.317
	[2.65]	*[2.01]*	*[1.82]*	*[2.25]*	*[5.33]*	*[5.38]*
Female Paid Job Index	10.7	8.31	9.49	15	18.3	19.2
	[3.47]	*[2.90]*	*[3.76]*	*[7.04]*	*[8.27]*	*[8.97]*
Land Owned Value (cedis 10^{-6})	-0.043			-0.0006		
	[1.54]			*[0.31]*		
Land Missing	-0.0167			-0.969		
	[0.11]			*[14.7]*		
Household Bus. Assets (cedis 10^{-6}/adults)	0.035			0.0004		
	[2.47]			*[0.05]*		
Business Assets Missing	1.12			-1.14		
	[8.26]			*[25]*		
Female-intensive Crops Index	-0.097			-2.35		
	[0.09]			*[3.87]*		

TABLE 4 CONTINUED:						
Crops Missing	-0.020			-1.22		
	[0.04]			*[4.55]*		
Mother's Schooling	-0.0115			-0.0093		
	[1.35]			*[1.49]*		
Father's Schooling	0.0016			0.0144		
	[0.21]			*[2.71]*		
Mother's Occupation Agriculture	-0.110			-0.031		
	[1.49]			*[0.71]*		
Father's Occupation Agriculture	-0.061			-0.013		
	[0.78]			*[0.26]*		
Constant	-6.51	6.94	6.25	-4.18	3.81	3.24
	[6.39]	*[6.48]*	*[8.84]*	*[6.29]*	*[5.62]*	*[5.52]*
Rho	-0.179			-0.095		
	[0.87]			*[1.67]*		
χ^2 (P = O)	0.75			2.79		
(P value)	*[0.39]*			*[0.095]*		
Sample Size	6924			6924		
Uncensored Observations	430		430	2622		2622
R2			0.482			0.132
χ^2 (10)	65.8			0.337		
(P value)	*[0.000]*			*[0.000]*		

TABLE 5: LOG EARNINGS FUNCTION AND EMPLOYMENT CHOICE FOR MEN AGE 15-49: HECKMAN AND ORDINARY LEAST SQUARES ESTIMATES
(Asymptotic t or t ratio in parentheses beneath estimated coefficients)

	PAID EMPLOYEES			SELF-EMPLOYED		
	HECKMAN		**OLS**	**HECKMAN**		**OLS**
	Probit	Earnings	Earnings	Probit	Earnings	Earnings
Explanatory variables in Probit and Ln Earnings Function	[1]	[2]	[3]	[4]	[5]	[6]
Years Primary Schooling	0.0646	0.038	0.039	0.045	0.015	0.020
	[3.95]	*[1.78]*	*[1.89]*	*[3.66]*	*[0.97]*	*[1.30]*
Years Middle Schooling	0.0854	0.066	0.067	-0.0612	0.056	0.051
	[3.10]	*[2.01]*	*[2.08]*	*[2.63]*	*[1.90]*	*[1.74]*
Years Secondary Schooling	0.0978	0.110	0.111	-0.126	0.055	0.042
	[4.72]	*[5.34]*	*[5.83]*	*[5.69]*	*[1.54]*	*[1.22]*
Years Tertiary Schooling	0.254	0.185	0.187	-0.251	0.269	0.241
	[7.10]	*[7.41]*	*[8.46]*	*[5.07]*	*[2.49]*	*[2.27]*
Age	0.216	0.0968	0.099	0.147	0.106	0.123
	[11.1]	*[3.53]*	*[4.30]*	*[9.34]*	*[3.95]*	*[5.21]*
Age Squared (/100)	-0.275	-0.115	-0.118	-0.187	-0.136	-0.158
	[9.42]	*[2.97]*	*[3.53]*	*[7.87]*	*[3.54]*	*[4.55]*
Urban in Birthplace	0.0352	-0.0938	-0.092	-0.024	0.425	0.420
	[0.65]	*[1.84]*	*[1.84]*	*[0.46]*	*[5.90]*	*[5.83]*
Female Paid Job Index	16.4	7.29	7.54	6.95	21.8	21.9
	[6.58]	*[3.11]*	*[4.56]*	*[2.83]*	*[7.68]*	*[7.69]*
Land Owned Value (cedis 10^{-6})	-0.0011			-0.0004		
	[1.52]			[0.62]		
Land Missing	0.525			-0.480		
	[8.10]			*[9.91]*		
Household Bus. Assets (cedis 10^{-6}/adults)	-0.433			0.493		
	[0.96]			*[1.61]*		
Business Assets Missing	1.13			-1.32		
	[10.9]			*[18.5]*		
Female-intensive Crops Index	-2.67			-3.23		
	[3.41]			*[4.73]*		

TABLE 5 CONTINUED:						
Crops Missing	-1.04			-1.90		
	[3.01]			*[6.31]*		
Mother's Schooling	-0.0046			0.0004		
	[0.66]			*[0.06]*		
Father's Schooling	-0.0004			0.0037		
	[0.07]			*[0.64]*		
Mother's Occupation Agriculture	-0.173			0.305		
	[3.19]			*[6.67]*		
Father's Occupation Agriculture	0.0275			0.237		
	[0.49]			*[4.92]*		
Constant	-9.17	6.33	6.21	-1.66	2.60	2.18
	[11.6]	*[6.51]*	*[12.2]*	*[2.28]*	*[3.35]*	*[3.06]*
Rho	-0.0211			-0.0936		
	[0.15]			[1.27]		
χ^2 (P = O)	0.02			1.78		
(P value)	[0.88]			[0.18]		
Sample Size	5711			5711		
Uncensored Observations	1124		1124	2175		2175
R2			0.290			0.107
χ^2 (10)	139			244		
(P value)	[0.000]			[0.000]		

TABLE 6A: FEMALE ESTIMATED MARGINAL EFFECTS OF EXPLANATORY VARIABLES ON PARTICIPATION BY JOB TYPES BASED ON HECKMAN MODEL (TABLE 4) AND MULTINOMICAL LOGISTIC

	PAID EMPLOYMENT		SELF EMPLOYMENT		HOME
	HECKMAN	**LOGISTIC**	**HECKMAN**	**LOGISTIC**	**LOGISTIC**
Explanatory variables	**[1]**	**[2]**	**[3]**	**[4]**	**[5]**
Years Primary Schooling	0.002	0.003	0.018	0.019	-0.022
Years Middle Schooling	0.005	0.005	-0.016	-0.014	0.009
Years Secondary Schooling	0.021	0.019	-0.091	-0.067	0.048
Years Tertiary Schooling	0.097	0.016	-0.083	-0.021	0.006
Age	0.004	0.004	0.069	0.076	-0.080
Age Squared (/100)	-0.004	-0.004	-0.087	-0.095	0.099
Urban Native	0.012	0.010	0.040	0.046	-0.057
Land Value	-0.003	-0.003	-.000	0.000	0.003
Land Missing	-0.001	-0.011	-0.372	-0.406	0.416
Household Business Assets	0.002	0.005	0.000	0.030	-0.034
Business Assets Missing	0.042	0.065	-0.431	-0.430	0.366
Female-intensive Crops Index	-0.006	0.029	-0.872	-0.915	0.886
Crops Missing	0.001	0.013	-0.350	-0.479	0.465
Female Paid Jobs Index	0.681	0.520	5.560	6.290	-6.810
Mother's Schooling	-0.001	-0.001	-0.003	-0.004	0.004
Father's Schooling	0.000	0.000	0.005	0.006	-0.006
Mother's Occupation Agriculture	-0.007	-0.007	-0.011	-0.009	0.022
Father's Occupation Agriculture	-0.004	-0.046	-0.005	-0.014	0.014
Dependent Variable Mean	0.062	0.062	0.379	0.379	0.559

TABLE 6B: MALE ESTIMATED MARGINAL EFFECTS OF EXPLANATORY VARIABLES ON PARTICIPATION BY JOB TYPES BASED ON HECKMAN MODEL (TABLE 4) AND MULTINOMICAL LOGISTIC

	PAID EMPLOYMENT		SELF EMPLOYMENT		HOME
	HECKMAN	**LOGISTIC**	**HECKMAN**	**LOGISTIC**	**LOGISTIC**
Explanatory variables	**[1]**	**[2]**	**[3]**	**[4]**	**[5]**
Years Primary Schooling	0.014	0.017	0.017	0.017	-0.034
Years Middle Schooling	0.018	0.020	-0.023	-0.019	-0.001
Years Secondary Schooling	0.021	0.021	-0.047	-0.049	0.026
Years Tertiary Schooling	0.054	0.056	-0.093	-0.071	0.015
Age	0.045	0.044	0.054	0.058	-0.102
Age Squared (/100)	-0.058	-0.056	-0.069	-0.073	0.129
Urban Native	0.008	0.005	0.009	0.016	0.011
Land Value	-0.000	-0.000	-0.000	0.000	0.001
Land Missing	0.096	0.103	-0.183	-0.182	0.079
Household Business Assets	-0.092	-0.056	0.183	0.205	-0.149
Business Assets Missing	0.140	0.212	-0.486	-0.535	0.323
Female-intensive Crops Index	-0.564	-0.678	-1.20	-1.44	2.12
Crops Missing	-0.151	-0.268	0.461	0.831	1.10
Female Paid Jobs Index	3.48	3.47	2.57	4.72	-8.19
Mother's Schooling	-0.000	-0.001	-0.000	0.001	0.002
Father's Schooling	-0.001	-0.001	0.001	0.000	0.000
Mother's Occupation Agriculture	-0.036	-0.031	0.113	0.122	-0.091
Father's Occupation Agriculture	0.006	0.005	0.087	0.093	-0.098
Dependent Variable Mean	0.197	0.197	0.381	0.381	0.422

TABLE 7: AVERAGE LOG DAILY EARNINGS AND ESTIMATED EARNINGS BY GENDER AND EMPLOYMENT TYPE

	PAID EMPLOYEES	SELF-EMPLOYED	HOME PRODUCERS	ALL PERSONS
Estimation Sample and Specification				
Females Age 15-49 - sample size	430	2622	3872	6924
Paid Employee:				
OLS Regression	10.10	9.56	9.36	9.48
Heckman Model	10.28	9.82	9.65	9.75
Self-Employed:				
OLS Regression	9.92	9.31	9.05	9.20
Heckman Model	10.03	9.39	9.15	9.30
Males Age 15-49 - sample size	1124	2175	2412	5711
Paid Employee:				
OLS Regression	10.41	10.07	9.80	10.02
Heckman Model	10.43	10.10	9.82	10.05
Self-Employed:				
OLS Regression	9.95	9.50	9.21	9.47
Heckman Model	10.05	9.59	9.33	9.57

(actual observed mean)

TABLE 8: CHILDREN EVER BORN ESTIMATES FOR ALL WOMEN AGE 15-49, 2005

	1	2	3	4	5	6	7
Estimation Method **Explanatory Variables**	**OLS**	**OLS**	**OLS**	**OLS**	**IV (*Endogenous)**	**First Stage Self-Employed**	**First Stage Paid Employee**
Primary	-0.0636	-0.0286	-0.0441	-0.0273	-0.0550	0.0138	0.0031
	[5.78]	*[2.37]*	*[3.76]*	*[2.29]*	*[2.67]*	*[3.75]*	*[2.06]*
Middle	-0.172	-0.139	-0.108	-0.139	-0.124	-0.0086	0.000
	[8.70]	*[6.94]*	*[3.94]*	*[6.98]*	*[5.27]*	*[1.45]*	*[0.02]*
Secondary	-0.167	-0.125	-0.0001	-0.107	-0.290	-0.0782	0.0704
	[8.27]	*[5.94]*	*[.01]*	*[4.76]*	*[1.05]*	*[12.0]*	*[10.3]*
Tertiary	-0.212	0.022	-0.0600	0.0438	-0.183	-0.0548	0.0839
	[5.98]	*[0.43]*	*[1.07]*	*[0.84]*	*[0.54]*	*[4.59]*	*[4.23]*
Age	0.249	0.288	0.276	0.292	0.191	0.0658	0.0082
	[16.9]	*[17.6]*	*[16.4]*	*[17.3]*	*[4.26]*	*[16.7]*	*[4.43]*
Age Squared (/100)	-0.0873	-0.131	-0.101	-0.135	-0.0236	-0.0793	-0.0094
	[3.49]	*[4.98]*	*[3.97]*	*[5.04]*	*[0.41]*	*[12.0]*	*[3.06]*
Urban Native	-0.507	-0.255	-0.548	-0.246	-0.370	0.0483	0.0351
	[8.50]	*[3.42]*	*[9.19]*	*[3.29]*	*[2.22]*	*[1.98]*	*[3.39]*
Urban Not Native	-0.649	-0.478	-0.567	-0.460	-0.719	0.0631	0.0595
	[9.28]	*[6.35]*	*[7.50]*	*[6.11]*	*[2.70]*	*[2.60]*	*[4.88]*
Female Job Index						3.40	0.755
						[3.82]	*[1.66]*
Female Crop Index						-0.572	0.128
						[1.90]	*[1.53]*
Crop Missing						-0.298	0.0402
						[2.21]	*[1.16]*
Miles to Family Planning Clinic	0.0093	0.0097	0.0098	0.0095	0.0123	-0.0008	-0.0005
	[2.31]	*[2.37]*	*[2.39]*	*[2.32]*	*[2.54]*	*[0.36]*	*[1.99]*
Exposure to Clinic	-0.379	-0.366	-0.384	-0.355	-0.694	0.275	0.0182
	[1.19]	*[1.15]*	*[1.20]*	*[1.11]*	*[1.81]*	*[2.59]*	*[0.54]*
Land Value						0.0000	-0.0006
						[0.06]	*[1.74]*
Land Missing						-0.356	0.0128
						[10.1]	*[1.65]*
Self Employed OLS and IV				-0.0228	0.994*		
				[0.40]	*[3.37]*		

Paid Employee OLS and IV				-0.285	3.57*		
				[3.22]	*[0.89]*		
Pred. Self Employed Earnings		-0.515		-0.512	-0.607		
		[6.21]		*[6.16]*	*[5.49]*		
Pred. Paid Employee Earnings			-0.685				
			[3.40]				
Constant	2.78	0.960	2.86	0.867	3.42	-1.286	0.394
	[7.71]	*[1.39]*	*[1.67]*	*[1.24]*	*[2.61]*	*[4.73]*	*[3.28]*
R^2	0.653	0.655	0.654	0.655	0.554	0.238	0.163
Sample Size	7578	7578	7578	7578	7578	7578	7578