

Labor Market Conditions, Gender Disparities, and Demographic Dynamics in Poor Countries

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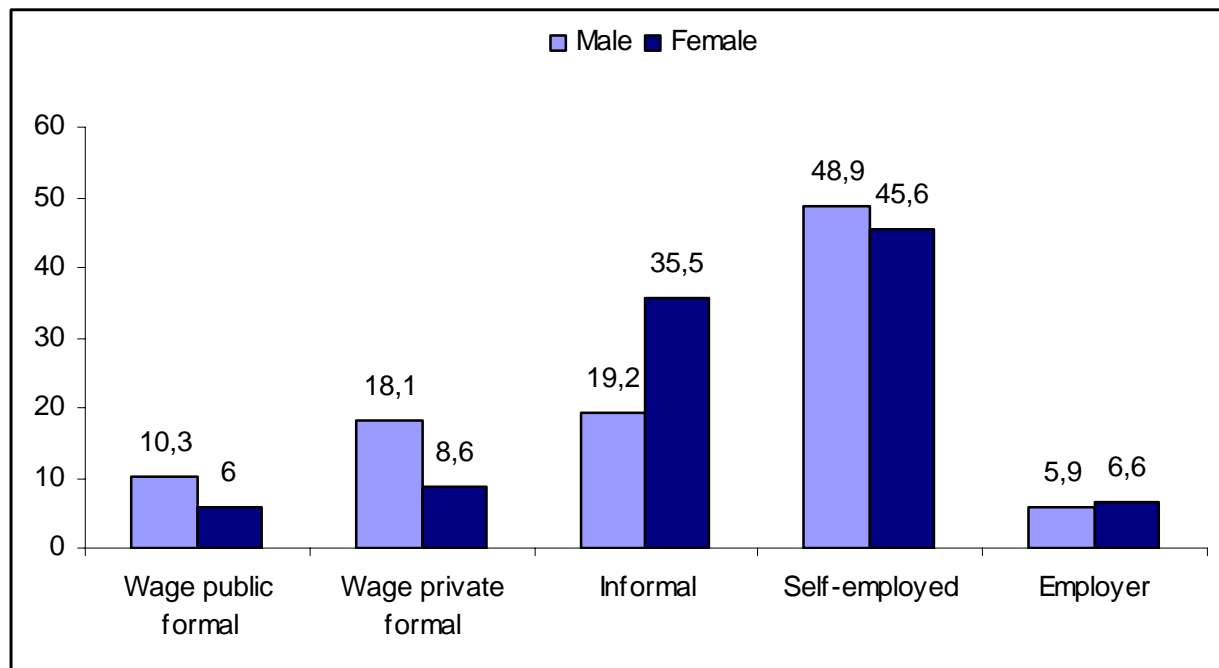
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- Gender disparities are large in sub-Saharan Africa
- Women more likely than men to be attached to informal activities; fewer have salaried jobs
- Large wage gap



- To the extent that most population live in rural areas attached to agriculture and only few have salaried jobs, gender disparities may be primarily associated to decisions and allocation of labor within the household
- Job opportunities may affect the opportunity cost to stay at home and the demographic dynamics by raising the opportunity cost of children more than household income
- Better labor market conditions may trigger changes in labor supply and fertility

- Within the household the male adult takes the leading role and is supposed to get the best job opportunities – say a paid job in the salaried sector of the economy
- Women's labor market participation depends on husbands decisions
- Men act as leaders in household decisions and women as followers
- Time allocation and fertility decisions have an intrinsic strategic and dynamic nature, which begs a hierarchical differential game framework, such as a Stackelberg differential game

The Model

- In the game both husbands and wives maximize an intertemporal utility function of family formation, constrained by the evolution of family size
- Due to its sequential nature, the wife as the follower chooses the optimal path of domestic time, and the husband takes the wife's allocation of domestic time into account in order to decide how to allocate his working time

Variables and Parameters

- The variables of the model are : z = number of children; y = wife's domestic time; x = husband's working time. Time is normalized to one, so $1-y$ = wife's working time and $1-x$ = husband's domestic time; μ = husband's shadow price of children, and φ = husband's shadow price of wife's domestic time
- There are 10 parameters in the model: a = male market wage rate, b = marginal product of wife's domestic time, c = female market wage rate, d = cost of children, A = husband's marginal utility of children, B = wife's marginal utility of children, m = husband's marginal utility of domestic time, n = wife's marginal utility of domestic time, r = husband's rate of time preference, and q = wife's rate of time preference

Wife's problem

$$\underset{y}{\text{Max}} \int_0^{\infty} [Bz + ny] e^{-\theta t} dt$$

$$\dot{z} = ax + by - cy^2 - \delta z$$

Solving it yields

$$\bullet \quad y = \frac{B(2cy - b)^2 - n(\theta + \delta)(2cy - b)}{2cn}$$

Husband's problem

$$\text{Max}_x \int_0^{\infty} [Az + 2m\sqrt{1-x}] e^{-rt} dt$$

$$\dot{z} = ax + by - cy^2 - \delta z$$

$$\dot{y} = \frac{B(2cy - b)^2 - n(\theta + \delta)(2cy - b)}{2cn}$$

The Steady State Equilibrium

Wife's domestic time

$$y^* = \frac{n(\theta + \delta)}{2cB} + \frac{b}{2c}$$

$$0 < y^* < 1 \Rightarrow 0 < \frac{n(\theta + \delta)}{2cB} + \frac{b}{2c} < 1 \Rightarrow n(\theta + \delta)B^{-1} + b < 2c$$

Husband's work time

$$x^* = 1 - \left(\frac{m(r + \delta)}{aA} \right)^2$$

$$0 < x^* < 1 \Rightarrow 0 < 1 - \left(\frac{m(r + \delta)}{aA} \right)^2 < 1 \Rightarrow \left(\frac{m(r + \delta)}{aA} \right)^2 < 1 \Rightarrow m(r + \delta) < aA$$

Number of children

$$z^* = \delta^{-1} \left\{ a \left[1 - \left(\frac{m(r + \delta)}{aA} \right)^2 \right] + b \left[\frac{n(\theta + \delta)}{2cB} + \frac{b}{2c} \right] - c \left[\frac{n(\theta + \delta)}{2cB} + \frac{b}{2c} \right]^2 \right\}$$

Comparative static analysis

	y^*	x^*	z^*	μ^*	φ^*
a	0	+	+	0	0
b	+	0	+	0	+
c	-	0	-	0	-
δ	+	-	-	-	-
A	0	+	+	+	+
B	-	0	+	0	-
m	0	-	-	0	0
n	+	0	-	0	+
θ	+	0	-	0	+
r	0	-	-	-	+

Econometric Specification

$$x^* = \alpha_0 + \alpha_1 a + \alpha_2 \delta + \alpha_3 r$$

$\alpha_1 > 0; \alpha_2 < 0; \alpha_3 < 0$

$$1 - y^* = \beta_0 + \beta_1 b + \beta_2 c + \beta_3 \delta + \beta_4 \theta$$

$\beta_1 < 0; \beta_2 > 0; \beta_3 < 0; \beta_4 < 0$

$$z^* = \gamma_0 + \gamma_1 a + \gamma_2 b + \gamma_3 c + \gamma_4 \delta + \gamma_5 \theta + \gamma_6 r$$

$\gamma_1 > 0; \gamma_2 > 0; \gamma_3 < 0; \gamma_4 < 0; \gamma_5 < 0; \gamma_6 < 0$

Data, methodology, and results

- Ghana Living Standard Survey Rounds 3 and 4
- Representative nationwide samples of more than 4,500 households containing over 20,000 persons
- Sub-sample: couples, 15-65 years old
- Annual earnings in main job
- Estimation method: OLS and SUR

Calculating the regional wage

1. Calculate the average annual earnings of main job for each of the 10 administrative regions
2. Calculate the regional average annual wage for women and men
3. Calculate the ratio: regional average annual wage by gender and literacy to the regional average annual wage
4. Assign the calculated annual wage ratio to each person according with her/his gender, region, and literacy

Descriptive statistics, GLSS4

Variable	Female	Male
Rural (%)	79.5% (0.40)	69.3% (0.46)
Age	35.7 (11.1)	42.3 (10.9)
Couples with children (0-15) (%)	88.5%	97%
# children (0-15)	2.26 (1.65)	2.35 (1.71)
# children born (alive or not)	4.09 (2.47)	-
Illiterate (%)	43.5% (0.49)	24.5% (0.43)
Employment status (%)		
Wage public	2.23	11.3
Wage private formal	0.55	6.6
Wage private informal	0.39	3.1
Self-empl. Agro, paid	28.73	47.1
Self-empl. Agro., unpaid	25.82	4
Self-empl. non agro.	24.6	16.6
Unemployed	0.48	1.7
Non active	17.2	9.5
Hours worked annual	1,264 (851)	1,525 (1,028)
Annual wage (cedis)	364,459 (833,505)	1,228,282 (1,967,033)

Main econometric results, GLSS4, SUR

Variable	Male Labor Supply Eq. (1)	Female Labor Supply Eq. (2)	Fertility Eq. (3)
Male Market wage	82.5 (10.8)		.004 (0.2)
Male Market wage sq.	-.95 (-4.2)		-.00004 (-0.1)
Cost of Children	-.001 (-1.9)	.01 (1.8)	-.00008 (-4.1)
Male Rate of Time Preference	10,826 (2.1)		-29.8 (-2.6)
Female Marginal Product of Domestic Time		-155.3 (-0.6)	.95 (1.5)
Female Market Wage		197.8 (8.1)	-.22 (-3.6)
Female Market Wage sq.		-9.3 (-5.1)	.01 (2.7)
Female Rate of Time Preference		-10,767 (-2.5)	-227 (-19.9)
Constant	1,039 (7.5)	1,483 (5.3)	11.7 (16.6)
Observations	690	690	690
Chi2	79.5 (0.00)	108.3 (0.00)	567.2 (0.00)

Conclusions

- Labor supply of males and females increases with wage and decreases with the cost of children and time preference
- The optimal number of children increases with male wage, and decreases with cost of children, husband's time preference, and female's wage and time preference
- Women care more about quality of children, since an increase in their opportunity cost leads to a reduction in fertility, while males care more about quantity, since an increase in their opportunity cost leads to an increase in the number of children
- Women are more sensitive to changes in the labor market conditions than males
- Growth policies that increase the demand for female labor increase female labor market participation rates and reduce gender disparities and family size