



***Gender and occupational choices in Africa:
the role of time poverty and associated risks***

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Abstract

Interventions to give African rural women better access to credit, land or other inputs have at times failed to encourage women to take up more profitable productive activities – the main constraint being the inability to mobilize sufficient labour resources to make these options worthwhile. The paper proposes a theoretical model that shows women’s choices may be critically constrained by the rigidities governing their time use. These are partly governed by social norms that regard certain tasks as being purely female. Policies that provide high return work opportunities for women but are oblivious to their overall time constraints, may actually deteriorate women’s living conditions. There is a need to make household production more visible when addressing the question of increased rural incomes or economic diversification.

1. Introduction

The motivation for this paper arises from the rather disconcerting realization that, despite the now 20 years old compelling and highly informative literature on the quite distinctive characteristics of African households, especially in West African settings,¹ the rapidly developing literature on household occupational choices and rural livelihood diversification has not taken sufficient stock of such understanding. In their attempt to systematize knowledge about the factors that may induce household to diversify into high return non-farm activities or specialize in remunerative intensive agriculture, many studies fail to pay due attention to local specificities and to the incredibly different situations of women, men and familial relationships across the world, and within Africa itself. In comparative studies, Africa is often represented by a handful of countries usually outside the western region, such as Uganda, Tanzania and South Africa.²

This paper is an attempt to redress this perceived distortion and bring back to the fore the topics that occupied so many pages of scholarly research during the late 1980s and 1990s: the limited resource pooling within household, the lack of full cooperation and the inefficiency in intra-family allocations, to name just a few. These elements are not the exceptions but often the norm in rural West African families. To the extent that these affect the processes of household decision-making and their associated outcomes, including household income portfolios, they need to be taken into account. Though this paper's contribution belongs to the theoretical realm, in that it proposes a model for analyzing household members' occupational choices, it is the product of a deep knowledge of the vast secondary literature regarding West African households as well as of the author's direct experience and work in few Francophone countries in the region.

Much attention has been recently devoted to the issue of rural livelihood diversification, to the analysis of its determinants and to the understanding of its implications for rural poverty and inequality. It is now widely recognized that diversification into non-farm occupations is a double edged sword: it can signal household ability to grasp new opportunities, but it can also be a last resort strategy for those households or individuals who are unable to specialize in more remunerative agriculture or livestock activities (World Bank 2008). This is so, since non-farm activities represent a wide mix, which include activities characterized by high and low returns, high and low risks, and high and low entry barriers. Some occupations may be sought to maximize income and acquire capital for further investment in agriculture; while others help diversify risks, by finding alternatives to agriculture and livestock (Reardon *et al* 1992; Dercon and Krishnan 1996).

Among the determinants of income portfolio choices, gender is recognized to be crucial. Evidence shows indeed that incentives for economic diversification may vary between men and women both in the same and different households (Abdulai and Delgado 1999; Desai *et al.* 2007). This fact raises crucial questions. Which specific aspects related to gender may affect occupational choices the most? Are observed

disparities due to constraints in access to productive assets, biases in the labor markets, differences in preferences and attitudes towards risk, or social norms governing gender roles in the household production spheres? These are important questions that would need to be addressed if we are to come up with policy recommendations that are appropriate to the given economic and social context.

Unfortunately, most models of household income diversification takes a very simplistic view of the household, one which maximizes a joint utility function, and where the main differences between female and male members are limited to different reservation and market wages. I argue that there is instead much to be gained by incorporating insights from feminist economics and the well-known research on non-unitary models of the household. Particularly in African context, and even more in the context of the West African family, which the paper aims to focus on, the hypotheses of pooled income and joint decision making have been shown to be highly inappropriate.

This paper aims to contribute to a better understanding of the implications of gender for household portfolio choices by proposing a theoretical model, which is a variant of the conjugal contract model by Carter and Katz (1997) where spouses do not pool their income and make some independent choices. This model can better accommodate the circumstance that the genders make asymmetric contributions to household production, a fact which is a fundamental, yet often disregarded, piece of the overall puzzle of gender determinants of occupational choices. In the presence of rigid and socially sanctioned gender roles, which are a reality in West African contexts, women may be affected by time poverty. In other words, they may be constrained in their choices not just by lack of productive assets (as typically emphasized in the literature) but also by the rigidities governing their use of time. This in turn can lead to women's inability to appropriately maximize their welfare and to inefficiencies in overall household choices of time allocation.

Since such rigidities have to do with both social norms regarding gender roles and the technology available to women to produce household goods, it should become clear that policy interventions in rural areas must try to change perceptions of gender roles and at the same time provide options that save women's time in household production. Within this perspective, policies that provide high return work opportunities for women, but are oblivious to their overall time constraints, may actually deteriorate women's living standards by placing excessive burdens on their time (examples are weeding-intensive cash crops and laborious processing activities). There is absolute need to make household production more visible when addressing, in both research and policy-making, issues regarding rural household income choices between on- and off-farm activities. The costs of foregoing this are very high, as decades of failed attempts to address women's distinctive needs in rural societies have now attested.

The paper is organized as follows. The next section reviews evidence on the relationship between gender and occupational choices, both at the empirical and

theoretical level and highlights the main gaps in knowledge. Section 3 presents a conjugal contract model for analyzing women's and men's different decisional problems. Section 4 shows the implications of socially enforced rigid gender roles regarding household production and the existence of uncertainty. Section 5 concludes by suggesting directions for future research.

2. Income diversification, gender and household production

This paper combines insights, and develops its arguments, from two main strands of literature: respectively, the writing on the determinants of rural occupational diversification and the literature on non-unitary household models, mostly subsumed within feminist household economics. The literature on occupational diversification, while investigating the role of gender factors, has to a large extent missed out on the crucial role played by household production in affecting the extent to which household members can allocate their time for the purpose of income maximization or risk diversification. The feminist strand within household economics has, on the other hand, paid great attention to the differential constraints affecting genders and to the role of household production, but has not investigated in detail the implications for rural income diversification patterns. The review of these strands of literature provided in this section will help to identify the main gaps in knowledge and to better position the original contribution of this paper.

Economic diversification within rural households is an increasingly important reality, even in Sub-Saharan Africa where the degree of economy wide diversification is the lowest in the world, reflecting the low levels of development and structural transformation in most countries. Based upon a survey of 27 case studies from all over Africa, for instance Reardon (1997) concludes that, though most rural households depend on agriculture and livestock activities, the average share of income from non-farm activities was about 45%. Non-farm activities mainly include wage- or self-employment in rural areas or migration (and remittances).

Although there is now a better understanding of both the determinants of household income diversification and its consequences for poverty and inequality, much less is known regarding the role and implications of gender-related factors. This is quite surprising, not only considering what we know about the stratification of roles by gender in African households, but also because the sporadic evidence at our disposal seems to suggest that these differences may be relevant. Households headed by women or with a larger proportion of female members seem to be more involved in agricultural production (to be less diversified). When devoted to off-farm activities, they focus more on self-employment rather than in the more remunerative activities, which are, in African contexts, non-agricultural wage employment (Davis *et al.* 2007). Not surprisingly, in households with a higher proportion of women the returns to off-farm activities are lower than in households with a higher share of adult men.

It is not unusual to find that non-farm activities have greater inequality-inducing effects among female-headed than male-headed households (see for instance Newman and Canagarajah, 2000). When provided opportunities, however, female-headed households gain considerably. Newman and Canagarajah (2000) show, for Ghana and Uganda, that poverty rates for female-headed households engaged in non-farm activities declined faster than poverty rates for all households. In other words, while constraints to profitable activities are greater for women, the returns from lifting these constraints may be considerable.

Within this general pattern, the specific way in which gender affects participation in various activities is context dependent and variable across space and time. For instance, in the study just cited, Newman and Canagarajah (2000) find that, while women in Ghana are more involved in non-farm activities than in farming, the reverse is true for Uganda, reflecting the well-known differential patterns of gender division of labor in West and East Africa. In a rural sample in Zimbabwe, women are less likely to work in off-farm employment, especially when they have small infants, but when they do, they work comparatively longer hours than men (Lanjouw and Lanjouw, 2001).

What lies behind these diverse patterns of occupational diversification? Can one unveil common issues and implications? Which particular gender factors may constrain the ability of some individuals to participate in certain activities, and what may be the impact for equity and efficiency? These are very crucial questions that require one to take into account the full spectrum of gender related factors.

The literature on household occupational choice diversification has unfortunately taken a very simplistic view of genders' different constraints and choices, even when analyzing the quite distinctive reality of African households. Empirical work has either dealt with individual-level data, which are clearly inappropriate for understanding the gender constraints arising from the household domain, or household level data under very strict assumption. In line with the household economics tradition *à la* Becker (Becker 1991), from which most household economic models derive, the household is taken as a cohesive and fully cooperative unit, which maximizes a joint utility function and achieves complete resource pooling (as, for instance, in Abdulai and Delgado 1999; Matshe and Young 2004). The only gender differences that are compatible with this type of models are women's and men's distinct comparative advantages and inequalities in the labor market, with women usually facing barriers to entry into certain sectors and lower wages.

Abdulai and Delgado (1999) model participation decisions in non-farm work by women and men in Northern Ghana as if it resulted from a joint spousal decisional process of how to allocate total household time. Their finding of a gender differentiated response to education (whereby an increase in years of schooling increases women's wage rate and labor supply by significantly more than that of men) fits in with their implicit hypothesis that women's constraints exist only in the outside productive sectors. Nowhere is there any reference to the fact that fundamental constraints may take place

within the household. The rather interesting result that wives' participation in non-farm work responds to decrease in husband's income, while that of men does not, is noted but not taken further. Yet, one would like to know which factors might explain the fact that the wife's non-farm work participation appears to be a residual variable in the logic of household collective time decisions. Is it possible that women and men's use and valuation of time are governed by a different logic?

I argue here that studies on occupational diversification have not taken seriously enough the issue of different time constraints across genders that originate from inequalities within households. 'Selfishness' is relegated to the market place, while the family is depicted as an oasis of 'altruism' (in the words of Becker). True, some authors do not fail to note that women tend everywhere to work inside the home where work participation does not depart from social customs (Feder and Lanjouw 2000). A review of studies by Bagachwa and Stewart (1992) from Sub-Saharan Africa also shows women dominating activities undertaken in the home, such as beer brewing in Botswana, Burkina Faso, Malawi and Zambia; fish processing in Senegal and Ghana; pottery in Malawi; rice husking in Tanzania and retailing and vending in general. However, when it comes to explicitly accounting for the determinants of unequal outcomes across genders, the finger is invariably pointed to inequality in assets and opportunities: women often lack relevant educational, financial and technical assets, which would enable them to access high-return economic activities.

Unfortunately, there is more to it. If constraints to productive access were the only or even main factor, then interventions that make available to rural women credit, land or other inputs could be expected to induce women to take up more profitable productive activities.³ This is true only in part, as demonstrated by a number of now classic cases demonstrating the crucial role played by intra-household conflicts over control of labor. The better known among these cases is probably that about the failure of irrigation schemes to favor rice cultivation along the Gambia river, because of the failure to anticipate women's unwillingness to work on rice fields controlled by their husband even when they could be paid a wage for it (Dey 1981; Carney and Watts 1991).

In her compelling analysis of the reasons why many agricultural projects in the 1980s and 1990s failed to increase women's agricultural productivity, Doss (2001) also convincingly demonstrates that the lack of labor availability was at times the most binding constraint. In many instances, women have taken up, but then abandoned, productivity enhancing crops and technologies due to their inability to mobilize sufficient labor resources to make them worthwhile.

In view of such evidence, I argue that the concepts of gender differentiated time constraints is essential to gain a fuller picture of the determinants of household diversification patterns and of the reasons for the observed differences between women's and men's occupational choices. While household production is an essential part of the household economy, yielding goods and services that all members enjoy, such as cooked

food, cleaning, fuel and water collection, child rearing and so on, women bear a disproportionate part of the costs involved in producing them. Time allocation studies invariably show women devoting a large part of their time to household work, regardless of their also being involved in many outside productive activities. This unequal burden is sustained by social norms that ascribe different rights and responsibilities to the genders. Gender roles appear to be, throughout African societies, quite rigid. Even when women are short of time, evidence shows that men rarely help with activities that are socially sanctioned as being female. Time allocation studies reveal that women, on average, work longer hours than men, give up their leisure time in order to fulfill their multiple roles, and, key aspect for the topic of this paper, at times forgo to undertake potentially remunerative occupations.

The concept of time poverty, which has been recently re-proposed in the gender literature (see Blackden and Wodon 2006a), is very fitting as it captures the notion that lack of sufficient time can translate into lower welfare, measured in terms of either higher physical strain and poorer health (not only for the woman but also for her children), or of lower income. The idea of time poverty makes household production more visible and attracts attention to the wider consequences of an unequal burden across genders (Blackden and Wodon 2006b: 5).

3. The basic model

Most models in the literature on rural occupational choices and household income diversification assume a unitary version of the household where joint utility is maximized. The main difference between the genders that is typically allowed is a disparity in the wage level men and women earn in off-farm employment (Abdulai and Delgado 1999; Matshe and Young 2004). As a consequence, these models give a very simplistic representation of the time allocation process within households, one in which household members allocate time only between on-farm and off-farm activities. There is mention neither of household production, nor of the different obligations that genders have towards it. Household work becomes invisible with the consequence that its crucial role in influencing decisions in other productive spheres is obliterated. This is quite surprising considering the enormous amount of research during the 1980s and 1990s on the distinctive characteristics of the household in African settings.⁴ Such body of work has effectively demonstrated the lack of applicability of the joint household model to African settings, emphasizing the limited extent of resource pooling, the low levels of cooperation between spouses' strategies, the reality of intra-household conflict, and the shifting balance of bargaining powers.

Within the African family context, however, there are so many different patterns and structures that it is impossible to generalize. Such diversity is due, on the one hand, to agro-climatic conditions that affect the range of feasible livelihoods and therefore the patterns of social organization; and, on the other hand, to historical, political and cultural

factors that have profoundly shaped the evolution of kinship, marital and generational relationships over time – among these factors, the influence of colonial policies and administration is often emphasized.

Since it is difficult to generalize about the African family, the analysis is here focused on the West African rural context, which, in its general form, best encapsulates the antithesis to the joint and unitary family model – and has therefore provided much of the empirical material for the rejection of the unitary model. For the interest of theory, a ‘generic’ rural West African family is analyzed below, that includes only some of the relevant features – while there exist countless typologies of rural West African families. The main features the model captures are that the spouses do not pool their income (evidence shows that they may have a limited knowledge of each other’s earnings, see Fapohunda); they contribute labor to the household common field from which the main staple is produced; and each has the possibility to cultivate an individual plot or devote some time to off-farm activities. Decision-making authority with respect to this other activity rests with that individual: the latter pays all expenses but also retains the income generated, or at least influences the way such income is allocated within the household (Udry 1996). Such a state of affairs is made possible by the fact that crops, tasks and activities are often differentiated by gender – though the extent to which there exist gender crops has been empirically confuted (Doss 2002). The separation between food crop and cash crop income means that even income generated by the same crop but under different people could be used differently and be managed by different household members (Duflo and Udry 2004).

In order to capture both autonomy and cooperation within the West African household, I develop a variant of the conjugal contract model developed by Carter and Catz (1997) and used, among others, by Smith and Chavas (1997) to explain constraints to commercialization of cotton agriculture in Burkina Faso. The main feature of the conjugal contract model is the lack of resource pooling and the existence of separate utility functions for adult household members. The interdependence aspect within household arises from the consumption of a household public good, which is jointly produced by all members. Household members do not need to coordinate in order to solve their decisional problem: each can maximize their individual function, subject to expectations about the others’ choices. In the conjugal contract model one can abstract from polygyny, since the focus is on the degree of autonomy or cooperation between two parties to a marital contract – a polygynous husband will therefore have as many ‘contracts’ as he has wives. The framework proposed below expands the basic conjugal contract model to allow for a sufficient number of activities for the analysis of occupational choices. The basic features are presented first, while the following section considers the implications deriving from differential gender time constraints and risk.

The two parties, a man and a woman, have each their own individual utility function defined over three arguments: subsistence goods (S) produced via a common production function; private goods (X) purchased with the income generated by

individual farm or non-farm activities; and household goods (H), whose production, though benefiting from both members' contributions, is the source for gender asymmetries, as detailed below.

The man's and woman's utility functions are, respectively:

$$\begin{aligned} U^M &= U(S^M, X^M, H) \\ U^F &= U(S^F, X^F, H) \end{aligned} \quad [1]$$

where superscripts M and F refer to male and female members.

Subsistence goods are produced jointly by men and women cultivating the household plot (L). The production function is:

$$\begin{aligned} S &= f(t_s^M, t_s^F, L) \\ f_i' &> 0 \\ f_i'' &< 0 \quad i = t, L \end{aligned} \quad [2]$$

where t_s^i ($i=M, F$) denotes the time that each spouse devotes to subsistence agriculture, and the derivatives of the production function f with respect to its arguments denote the usual case of diminishing marginal returns. Time inputs by each spouse are very imperfect substitutes reflecting the fact that men and women carry out different tasks on common fields. Each member gets a fixed share (not subject to bargaining) of subsistence goods according to local conventions: $S^M = \mu S$ and $S^F = \varphi S$. The sum of the shares μ and φ may be less than or equal to unity, according to whether other household members need to be also fed. The relative magnitude between the male and female share may clearly differ and be a manifestation of existing gender inequalities – although empirical evidence has been unable to identify gender discrimination in food access in African contexts, which has been found, for instance, in south Asian societies.

Private goods are purchased with the individual income earned through cash crops or off-farm activity (prices are normalized to unity for simplicity). A generic production function, g , can capture all types of remunerative activities. Such function has as inputs both own time (t_x) and assets (A), and can exhibit diminishing or constant marginal returns, according to the specific type of work:

$$\begin{aligned} X^M &= g(t_x^M, A^M) - R \\ X^F &= g(t_x^F, A^F) \\ g_i' &> 0 \\ g_i'' &\leq 0 \quad i = t, K \end{aligned} \quad [3]$$

Assets can be land in the case of agriculture, machinery and equipment (in the case of primary production processing) or financial capital (for trade and other businesses). Though access to capital may be more limited for women, evidence shows this is not the major obstacle and most married women carry out their own individual

economic activities. In fact, it is part of the marriage deal in rural areas that men assign a plot of land to their wives to enable them to grow their own crops. The first row in [3] takes also into account that the male consumption of private good is diminished by the cash transfer, R , he provides as contribution to household good production.

Household goods are the sphere where asymmetries between the genders are the most pronounced. While women contribute a share of their time to household production t_h , men contribute via a cash transfer R (which is used to purchase market inputs for household production). Therefore:

$$H = h(t_h^F, R) \quad \text{where } R < g(.) \quad [4]$$

The production function h is characterized by diminishing marginal returns ($h' > 0$ and $h'' < 0$) and the inputs are imperfect substitutes. The transfer cannot be greater than the husband's own cash income.

The most fundamental constraint to the maximization problem is the individual time constraint, which differs between men and women in view of the fact that only the latter devote time inputs to household production.⁵ The time constraints for husband and wife are respectively:

$$\begin{aligned} t_s^M + t_x^M &= T \\ t_h^F + t_s^F + t_x^F &= T \end{aligned} \quad [5]$$

where T is the maximum time available for work, and the choice between work and leisure has been suppressed for simplicity.

The conjugal contract is modeled as a two-stage game. In the first stage, players make autonomous choices regarding the time allocation between subsistence and income-generating activities. This implies maximizing one's individual utility function subject to the constraints and to the expectation of the choices made by the other. In the second stage, household members bargain over the terms of the household contract itself, the pair (t_h, R) . While the first phase is modeled as a Nash non-cooperative game, the second is a Nash cooperative bargaining game. Players work out their strategies by backward solution: they solve the second stage bargaining problem, and then use these solutions as parameters for the first stage non-cooperative solutions. However, we follow here the analysis starting from the first step.

The first-stage individual decisional problem consists of maximizing the utility function [1], subject to [2]-[5], the relevant non-negativity constraints, and given the expectation of the other's choices of variables. The Lagrangian functions are:

$$\begin{aligned}
 L^M &= U\{\mu f(t_s^M, t_s^F; L); g(T - t_s^M; A^M); h(t_h^F; R)\} + \lambda_1 t_s^M + \lambda_2 t_x^M + \lambda_3 (T - t_s^M - t_x^M) \\
 L^F &= U\{\varphi f(t_s^F, t_s^M; L); g(T - t_s^F - t_h^F; A^F); h(t_h^F; R)\} + \gamma_1 t_s^M + \gamma_2 t_x^F + \gamma_3 t_h^F + \gamma_4 (T - t_s^F - t_x^F - t_h^F) + \gamma_5 [g(\cdot) - R]
 \end{aligned}
 \tag{6}$$

For a given pair of variables defining the conjugal contract (t_h, R) , each individual decides the optimal time allocation between subsistence and remunerative activities, as a function of his/her own expectation about the optimal allocation chosen by the other spouse. The expected strategies of the other can be denoted simply as \hat{t}_s^i ($i=M, F$) since, once time for subsistence activities is chosen, t_x^{*i} is derived automatically from the time constraint. The reaction functions can be written as: $\Omega^M = \Omega(\hat{t}_s^F; \bar{t}_h^F, \bar{R})$ and $\Omega^F = \Omega(\hat{t}_s^M; \bar{t}_h^M, \bar{R})$. It should be noted that the optimal value of a player's strategy is a decreasing function of the other player's strategy, since own and spouse's time devoted to subsistence production are somewhat substitutes.

Let us now look at the first order conditions for the male and female maximization problems, in the hypothesis of interior solutions:

$$\begin{aligned}
 \frac{MU_X^M}{MU_S^M} = MRS_{S,X}^M = \mu \frac{\partial f / \partial t_s^M}{\partial g / \partial t_x^M} &\Rightarrow t_s^{*M} = \Omega^M(\hat{t}_s^F; \bar{R}, \bar{t}_h^F) & (a) \\
 \frac{MU_X^F}{MU_S^F} = MRS_{S,X}^F = \varphi \frac{\partial f / \partial t_s^F}{\partial g / \partial t_x^F} &\Rightarrow t_s^{*F} = \Omega^F(\hat{t}_s^M; \bar{R}, \bar{t}_h^M) & (b)
 \end{aligned}
 \tag{7}$$

The optimal value for male and female time allocation is, as predictable, found in correspondence of the equality between the marginal rate of substitution (MRS) between S and X goods and the ratio between the marginal costs, in terms of time inputs, of producing them, here weighted by the individual share of the subsistence good each member receives.

However, unlike in the joint household model, men and women's MRS and marginal cost ratio may now differ, even when there are no comparative advantages – here the g functions may well be equal. These may be due to different preferences or to the fact that members may enjoy different shares of the subsistence good. Women may attribute a greater weight in their preference to subsistence goods (because of norms inculcated through socialization or because they care more for children's nutrition). On the other hand, if the woman's share is lower than the man's, $\square < \square$, then the woman's MU_S is comparatively higher than for the man. This means she is devoting comparatively less time than men to subsistence activities, other things being equal.

If this game is played as Nash non-cooperative game, then the equilibrium is found where the two reactions functions meet, that is when expectations of each other's

move correspond to actual strategies. In order to see how this equilibrium changes according to the variables defining the spouses' contribution to the household public good, the second stage of the game needs to be analyzed.

In this second stage the spouses bargain over the amount of transfer the husband makes to household production (R) and the wife's time allocation to household production (t_h). The Nash-equilibrium of this cooperative game is one that maximizes the products of the gains from cooperation. Such gains are, for each spouse, the difference between the utility level correspondent to the cooperative solution, indicated by the value V , and the utility level obtained in the status quo, of non-cooperation:

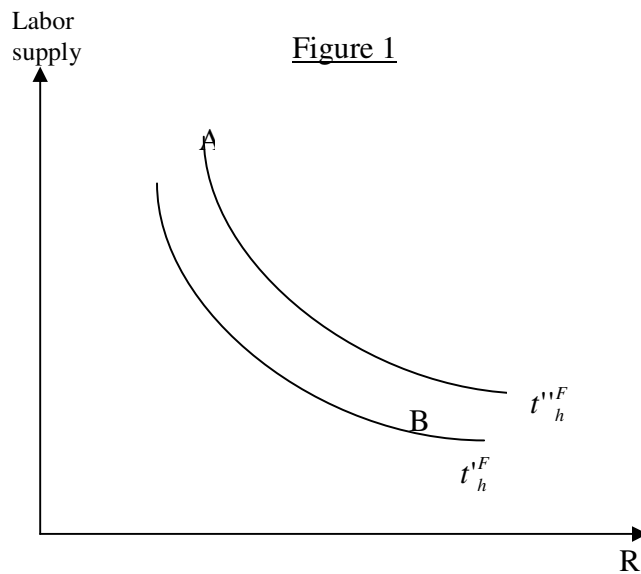
$$[V^M(t_h^{*F}, R^*, t_s^{*M}, t_s^{*F}) - \Theta^M] * [V^F(t_h^{*F}, R^*, t_s^{*M}, t_s^{*F}) - \Theta^F] \quad [8]$$

The status quo does not need to correspond to the case of divorce, as in the classical household bargaining models,⁶ but it can be represented by a non-cooperative outcome within marriage. In the present context, this could correspond to the case of no cooperation in production, and minimal spousal duties to each other. The wife devotes her time to household work but does not participate in subsistence production, while the husband makes no monetary transfer but has to carry out by himself the subsistence activity (and still give a minimum amount of S goods to his wife). It is evident that, in the non-cooperative case, the level of both S and H goods is quite low, given the high marginal productivities of any production factor near its zero value. For the same reason, starting from the case of non-cooperation, a positive transfer from the husband and a release of woman's time from household production may induce a considerable increase in subsistence production without jeopardizing by much the level obtained of household goods.

Stating the gains from cooperation does not amount, however, to identify the equilibrium. What will be the level of transfer that the two spouses will settle upon?

If a woman allocates time released from household production on both the subsistence and remunerative activity (given the normality of the arguments in the utility functions), then the relationship between the cash transfer and wife's time allocation to subsistence production is positive (see Figure 1). Since the transfer has the power of inducing his wife to supply more labor to subsistence production, which he cares for, the optimal transfer from the viewpoint of the husband cannot be too low, even when he does not care much about household goods. At the same time, the husband would like the wife to 'care' a lot for household production, and make her supply a higher amount of labor for any given level of husband's transfer. In terms of the figure 1, the husband tries to bargain for solutions on a higher t_h curve (t_h'' is preferable to t_h') and, on a given curve, to move towards the left, yet not excessively to avoid perverse incentives on female labor supply to subsistence production. In other words he has preferences for combinations such as A .

From the viewpoint of the wife, a high transfer from her spouse would help her release labor from household production, which will translate into higher supply of labor to both remunerative work and subsistence production. How much she devotes of this extra time for these two activities will depends on the marginal rate of productivities of her own time and on the rate of substitution between X and S goods. She would prefer unambiguously to move towards the bottom right part of the graph, to points such as B .



The following table summarizes the type of effects associated with moving from points like A to points such as B . Arrows pointed upwards/downwards signal an increase/decrease of the correspondent labor supply:

	F 's time for S	M 's time for S	F 's time for X	M 's time for X
Increase in R and decrease in t_h	↑	↓	↑	↑

The extent to which the parties manage to move towards their preferred allocation depends on their respective bargaining power, which in turn depends on their utility levels in the status quo. It is often assumed that the wife's bargaining power is inferior due to her disadvantages when operating on her own. However, it may also be possible in African settings that the husband finds the non-cooperative solution within marriage more costly than the wife, for instance because it is harder for him to fulfill alone the family subsistence duties than for his wife on her own to fulfill her household duties. If this is the case, then it is very possible to observe an amount of the transfer that is sufficiently high to induce women to cooperate. (In the long term, it is not uncommon for a husband to get around the problem of a powerful wife by getting a younger and more

compliant second wife, a state of affairs which clearly lower the bargaining power of the first wife.) It is not uncommon for women in the West African context to threaten lack of cooperation in the household sphere in order to obtain a certain deal from their husband, for instance in order to be paid for extra-work done on their husband's field or obtain part of the cash earned from a new crop to which women have contributed. Available weapons include the refusal to cook for their husband or to have sex. Such strategies are shown to be the most successful when implemented by several women at the same time.

4. Model extensions

Some of the constraints preventing women to act upon their preferred strategies and obtain better deals within marriages have to do with social norms that limit the freedom with which women can allocate time across activities. This in turn changes the nature of the bargaining problem and the associated solution. This section aims to extend the above basic framework to one where i) there are socially sanctioned constraints affecting time allocation decisions by women; and ii) there is uncertainty affecting the returns from remunerative activities.

4.1 Gender time constraints: the role of 'household production overhead'

This sub-section demonstrates the implications of distinct gender time constraints and time poverty for genders' different occupational choices; and the potential consequences in terms of inequality and inefficiency.

Gender differentiated time constraints may arise from the existence of socially sanctioned norms that prescribe certain tasks as being female; and from the limited possibility to substitute market inputs for time inputs. Social norms defining gender roles are certainly quite rigid in the West African case. While West African women enjoy, as it is well-known, a high degree of autonomy in many spheres of work and activity, at the same time they have specific obligations towards household production, which are compelling and at times very constraining. Such norms make it virtually impossible for male adult household members to take up tasks that are associated with female domain (I have never for instance encountered the case of a male family member washing clothes or dishes under the public eye!). Limited degree of substitutability between time and market inputs may also be due to poverty and/or sheer lack of appropriate village infrastructures. For instance, even if a household were able to afford a washing machine, or tap water, lack of infrastructures in rural areas would severely limit their use. Both these cases are consistent with the notion that a high transfer R to household production would not be meaningful, since its marginal productivity, once passed a minimum level, would be severely limited.

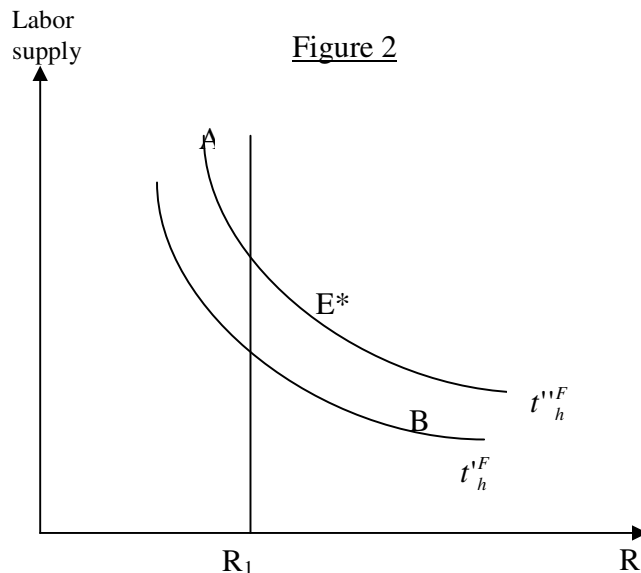
When time becomes the most important, if not only, input into household production, the concept of “household time over-head” becomes very useful. Introduced by Harvey and Taylor (2000), it is used to indicate the minimum amount of time that must be spent to produce the goods and services that are essential to the functioning of the household. The “household time overhead” is clearly a function of household size and composition and thus varies over time and space.

In the presence of socially sanctioned gender roles, or any other circumstance that limits the possibility of substituting market inputs for women’s labor, the household time overhead imposes new constraints for women’s use of time. For [4] becomes now:

$$H = h(t_h^F, R) \geq \underline{H} \Leftrightarrow t_h^F \geq \underline{t}_h^F \quad [4']$$

where the minimum amount of household goods to be produced, \underline{H} , translates, for a given R , into the corresponding requirements of women’s time, \underline{t}_h^F : the “household time overhead”.

This circumstance clearly diminishes the bargaining power of the wife and alters the equilibrium allocation to one that is closer to A than to B (see Figure 2). This is so, since beyond a minimum level, such as R_1 , there is no point to substitute the cash transfer for time inputs. Socially sanctioned gender roles in other words imply that the wife must supply more labor to household production for any given level of spousal transfer.



This is equivalent to saying that, if the spouses in an unconstrained scenario would have set for a cooperative solution such as E^* , such an equilibrium allocation would not be attainable in the presence of rigid gender roles. The latter limit the wife's flexibility for allocating labor to subsistence or remunerative activities, and clearly negatively affect her welfare.

Moreover, these additional constraints could also diminish the husband's welfare. If the wife allocates her unconstrained time comparatively more towards her remunerative activities than towards subsistence production, then the husband would need to compensate for this by increasing his own time devoted to subsistence work – and we know this is inefficient due to the poor substitutability between husband and wife's work in staple production.

An important implication is that the household in question is not efficiently allocating the total time of its members. If the man could make a greater transfer to his wife, or even take up some of the female activities, the male-female combined welfare could increase. A Pareto-superior outcome would generate sufficient resources to compensate the costs of this reshuffling and make everyone better-off. It is, however, prevented by the rigidities of gender roles (“a man could never take up a female role, even if he wanted to” is often heard in rural West Africa) and by the consequent lack of cooperation within the household. This instance of inefficiency in time allocation is parallel to the one found in rural Burkina Faso with respect to the allocation of input between women's and men's plots belonging to the same household (Udry 1996).

The second related consequence is that women's occupational choices in these conditions may not always abide by the goal of welfare maximization. If there are constraints to one's ability to shift time among activities, then opportunities to undertake a new activity that is time intensive may simply be inaccessible. Similarly, the gain from specialization may be forgone. This fact would explain the often found evidence that it may be hard for many rural women to adhere to the notion of intensive agriculture. The latter require high levels of dedication to one activity that may be impossible for a woman to pursue in the long term. This is so because, even if the household time overhead may be low at one point, thanks to a favorable household size and composition, this is likely to revert over life-cycle stages. But if a woman takes up and abandons different activities over her life-cycle, it becomes harder to seize the benefits from long-term specialization.

There is a plausible counterargument to all of this. Evidence shows that African women can find ways out of this conundrum, by passing onto other household members (generally younger women or children) time intensive chores so to have the freedom to undertake other activities. Indeed, the extended nature of African households and the possibility to call onto others to receive help with household work are among the most noticeable features of African family systems. For instance, Serra (2009) shows the mechanisms by which urban women with a minimal socio-economic status are able to

undertake profitable working activities, while also assuring socially acceptable levels of household production, by fostering in children from poorer or rural relatives.

At the same time, one cannot fail to notice that such possibilities are not open to all women at all phases in their life time. They are contingent upon the presence and availability of other family members, which vary over time, space, socio-economic status and wider family contexts. Such forms of assistance exist but cannot be taken for granted, especially in rural areas, which the majority of young and unmarried family members try to escape from. The model presented in this section therefore retains its general validity, by showing how the solution to a woman's time allocation problem is sensitive to the non-negotiable portion of the responsibilities she holds towards other family members.

The notion of household time overhead sets limits to the trade-offs that are allowable. A limited ability to transfer time from one occupation to another is clearly in contrast with the neo-classical assumption that individuals equalize the marginal productivities of labor across their various activities. The notion of a household time over-head represents a conundrum for anti-poverty interventions that aim to provide labor opportunities in rural areas. As noted in Blackden and Wodon (2006b), such policy interventions may risk exacerbating existing gender inequalities by increasing women's labor burden and decreasing that of men's.

4.2 The role of uncertainty

Let us introduce uncertainty in terms of returns from the remunerative activities. Individuals now face the choice of whether to invest in a high return but high risk activity (such as cash crop for export or some long distance trade) or in a low return and low risk activity (such as growing crops for the local market, food processing and sale). Will women invest less than men in the high risk, and high return activities?

The answer will depend on the extent to which the probability of success is purely exogenous, in which case only differences in preferences matter (the answer would be 'yes' if women were more risk averse), or is sensible to constraints, and can be for instance positively affected by investing time and resources in the given enterprise. In particular, one can make the hypothesis that the probability of the activity's success is a positive function of the time one invests in it. If the latter is the case, as it appears plausible in many circumstances, then rigid gender roles that impose severe time constraints on women's time may prevent them from undertaking activities that may maximize their expected cash income. Women with only a limited amount of time to invest in their own remunerative activities would hesitate in the face of high risk alternatives. They may prefer to go for the low returns options. If the latter are really poor, they may even decide to invest more time in subsistence production.

On the other hand, men may react to risks affecting their remunerative activities in the opposite way: by allocating more time to such activities in order to increase chances of success, and subtracting it from subsistence production. This set of choices may reinforce the decline in female welfare, by either inducing women to allocate more of their own time to subsistence production as compensation, or to accept in any case a lower level of subsistence production.

Therefore, when uncertainty of a given type is introduced into a scenario where women's obligations towards household productions are constraining, the outcome may be an even more marked differentiation in gender roles. Men will devote more time to lucrative no-subsistence activities, while women will mainly devote themselves to household and subsistence production. It is important to note that this result can be obtained without assuming any difference between genders' endowments and assets. The only 'barriers to entry' into lucrative activities come here from within the household sphere. In the real world, unequal access to land, capital and inputs is clearly likely to compound the effects of gender differentiated time constraints.

Evidence of men specializing more than women in lucrative activities is generally interpreted in terms of women's greater risk aversion. The above discussion should make it clear that this is not necessarily the case. Women's strategies may appear to be more conservative than men's, even if their risk aversion is identical. This is so because time indivisibilities under uncertainty exacerbate the effects of rigid social norms regarding gender roles. If women cannot afford to leave unfulfilled some of their household obligations, then they will undertake only those activities that leave them enough time for household production. Whenever the most attractive work opportunities in terms of income are also the most time intensive, women are bound to loose out.

5. Concluding reflections

The underlying questions that motivate the analysis in this paper are the following. Why do rural men and women may pursue different income diversification strategies? Which are the sources of their observed different occupational choices? What is the role of constraints and risks associated with genders' asymmetries in the household sphere and with socially determined norms regarding time allocation?

The paper proposes a theoretical framework with the goal of shedding light on the complex linkages between, on the one hand, gender specific risk and time constraints and, on the other hand, occupational diversification outcomes across the genders. The model, in its simple version, shows that the existence of rigid gender role divisions governing household production may imply that a household fail to optimally allocate the time of all its members, and that women forgo potentially more remunerative options.

The argument is often made that, given the usually imperfect degree of income pooling within households, inefficiency in input or income allocation may lead to greater incidence of poverty among some household members (be they children or women or older people). The paper expands this notion to include the case of time poverty. If women are severely constrained in the use of their time, they may become time poor. The inability of households to pool time and allocate it efficiently may imply worst outcomes for those who are time poor.

When women's time allocation is, at least in part, governed by socially sanctioned norms and rigid gender roles, women may appear more conservative or risk averse when faced with occupational opportunities that are remunerative but also time intensive. When time is the scarcest resource, women may weigh costs and benefits from alternative options in different ways than men, even if their risk preferences, strictly speaking, are the same. Similarly, the existence of time indivisibilities may reduce the attractiveness of certain options, even when otherwise yielding high returns. Time poverty may thus interact with gender specific risks, resulting in women's anxiety to fulfill socially sanctioned roles, and may be thus overall responsible for women's failure to either diversify for the sake of risk reduction, or specialize into a particularly lucrative activity.

It is important to note that this unequal outcome between the genders is here generated neither by a difference in expected returns (different wages or productivities) nor by a different coefficient of risk aversion. The outcome is directly dependent on the unequal degree of responsibilities in the household domain and the genders' consequent different time constraints. Moreover, an extension of the simple model shows that indivisibilities in occupational time inputs requirements coupled with uncertainty of returns from activities can jointly explain several instances associated with lower welfare.

The model presented in this paper would predict both constraints to specialization in intensive agriculture and to diversification into more remunerative non-farm activities. In other words:

1. Even when removing barriers preventing women farmers from accessing land, inputs and other assets so to improve agricultural productivity, women may be unable to take advantage of those due to risk and time poverty considerations. Risk induces women to enter off-farm activities for pure diversification reasons even when returns are low. Both risks and time poverty prevent women farmers from adopting labor intensive agricultural activities, regardless of the returns.
2. Even when removing barriers preventing women to enter into more profitable off-farm employment, say through microcredit, women may be unable to take advantages of these if risk considerations and time poverty constraints are strong. Such constraints prevent women from wanting to specialize in risky or, respectively, time intensive activities even when expected income is higher.

A further important lesson in terms of policy is that determinants of inequality differ by gender. While inequality within men can be explained by inequality in assets, that among women is more complex as it depends on the interplay between the asset component and the degree to which they are able to negotiate norms governing household production. A shift of responsibilities for household production to other family members, including men, could in these cases improve women's well-being and overall household income.

However, these shifts are hard to come. Changes in perceptions about gender roles and about what men can and cannot do take a lot of time. No denial about that. Meanwhile, it is paramount that policy interventions aimed at ameliorating welfare in rural areas and providing employment opportunities become aware of the constraints originating from the household production sphere and affecting other productive activities. Poverty is not just about low levels of income but can include also the inability to make the best use of one's own time and adequately fulfill one's multiple responsibilities. When time poverty is rampant, attention should be placed on this dimension as a matter of priority. While the emphasis on productivity enhancing technologies in agriculture and beyond are welcome, it is also essential to invest in labor-saving technologies, especially targeted at women and their household tasks.

The model presented in this paper provokes further questions and poses challenges. Firstly, it is a very simple model that does not pretend to address the main features characterizing African households, both because the latter are very complex entities that incorporate many more realistic features and because households differ from one another in many crucial ways, including in how resources and decision-making power are distributed between the genders. Women may have more or less autonomy in the choice over how to allocate their own time, depending on their age, seniority and status within the household; on whether the husband is present or absent; on access to remittances or other cash income; on whether junior women or children are available to help with house chores; on access to infrastructures and markets, and so on and so forth. The model aims to shed light on the 'potential' crucial implications that norms governing genders' time allocation to household production may have for household efficiency and women's occupational choices. The challenge is of course to study in each particular context the extent to which such particular consideration matters empirically and how it may interact with other constraints and factors more commonly studied in the literature on occupational choices by genders.

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Notes

¹ The excellent collection put together by Guyer and Peters (1987) can be considered as a valid starting point for that literature and debate.

² The limited knowledge and experience of Franco-phone countries (which constitute the majority in West Africa) may be adduced as a reason, but it is not too convincing.

³ See also Reardon *et al* (2000) for an analysis of barriers to entry into profitable non-farm activities.

⁴ Guyer and Peters (1987), Folbre (1986), Fapohunda (1988), and Ekejiuba (1995) are some examples of the seminal work.

⁵ It should be noted that the production functions have been simplified by reducing the number of market inputs required. This is so in order to simplify notation and put in starker light the role of time inputs.

⁶ See Manser and Brown (1980) and McElroy and Horney (1981).