



Noncooperative decision making in the household: Evidence from Malawi

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ABSTRACT

This paper proposes a novel test of productive efficiency in the household that also allows a test of noncooperative decision making. I extend the collective model (Chiappori 1988, 1997) to allow labor choices to affect future bargaining power by raising the value of outside options. Even if household consumption sharing is efficient, labor choices are no longer efficient. Using data on Malawi, where there is predetermined variation in land rights that determine outside options in marriage, I show that individuals spend more time on agricultural labor and less time on wage labor when household land is theirs. They also have lower overall income and consumption. The results are inconsistent with the fully efficient collective model but consistent with a noncooperative model with limited commitment, where individuals allocate their labor supply to maximize future bargaining power. Limited commitment can lead to inefficient allocations that reduce household welfare.

1. Introduction

In developing countries, it is paramount for households to allocate their limited resources as efficiently as possible. Economic and social institutions, such as the rules governing kinship and inheritance, may enable or constrain households in reaching efficient allocations. Malawi is a unique country because of its system of inheritance: around 60% of households are matrilineal and follow descent through the female line, so that land is passed from mother to daughter at the time of marriage, while the remainder are patrilineal and follow descent through the male line. In this paper, I exploit this variation to evaluate whether land rights impact household efficiency, and to obtain broader insights about the role of limited commitment in the household.

The continued coexistence of matrilineal and patrilineal is interesting in its own right. Matrilineal communities resisted active efforts to convert their inheritance system to patrilineal by British colonialists and religious missionaries in the early 20th century (Peters, 1997, 2002). This suggests that there may be efficiency benefits to the institution of matrilineal.

I study the role of spouses' land rights in the resource allocation of households in Malawi. In particular, I show that matrilineal households allocate their time more productively than patrilineal households, generating higher income and enjoying more consumption overall. I link these findings to economic theory: I analyze an extension to the standard collective model of household decision-making (Chiappori, 1988, 1997), which assumes efficient household allocations. I allow for

limited commitment and noncooperative choices in labor supply. The empirical results reject production efficiency and are instead consistent with noncooperative choices in labor supply.

In closely related work, Udry (1996) rejects efficiency in household production by comparing plot yields of male- and female-controlled plots and Udry and Goldstein (2008) show that individuals who have weak tenure security of their plots are less likely to leave their land fallow, which is inefficient. There are alternative models that explain inefficiency as a result of noncooperative behavior with limited commitment (Iyigun and Walsh, 2007; Lundberg and Pollak, 2003), but these models have not been tested.

I consider a standard model of the household, which makes two decisions: first, labor is allocated in order to maximize the total amount of consumption generated (Chiappori, 1997; Apps and Rees, 1997); second, consumption is shared efficiently between spouses according to a sharing rule that depends on spouses' outside options. In this case, bargaining power should not affect how labor is allocated in the first period, as long as the disutility from all types of labor (e.g. agricultural labor and wage labor) is the same. I compare this prediction with a model where the first period choice is noncooperative because spouses are unable to commit to a particular labor allocation. Bargaining power in the second period depends on previous labor allocation, because labor supply increases the value of future income, which determines outside options. In this version of the model, labor choices are no longer independent of distribution factors and are in general inefficient: individuals spend more time on the type of labor that most improves their

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outside option. This also results in lower overall consumption available for sharing in the second period.

I test productive efficiency by estimating how time allocation across different types of labor, and overall output, depend on predetermined variation in land ownership in Malawi. Malawi is a useful laboratory for this test because of the coexistence of matriliney and patriliney. It is well established in the literature that matrilineal women have strong outside options due to their access to land, while men have strong outside options in patrilineal communities (Lamphere, 1974; Johnson, 1988; Davison, 1997).¹ In addition, social norms dictate that men divide their working time between agricultural labor and wage labor, while women specialize in agricultural labor.

According to the collective model, the identity of who owns the family land should not affect labor supply choices nor overall production levels, conditional on the productivity of different labor types. Instead, I find that men spend more time on agricultural labor (+1.5 h per week) and less time on wage labor (−1.4 h per week) when they are patrilineal, controlling for a rich set of covariates, including temperature, rainfall and household-level soil quality. They generate 10% less consumption overall than matrilineal men. I find that, consistent with an overinvestment story, patrilineal men have substantially lower agricultural productivity than wages, and the wedge between these two returns is larger for patrilineal men, compared to matrilineal men. These findings are difficult to reconcile with an efficient model, but are consistent with a mechanism where men make noncooperative choices in labor supply because this raises their bargaining power in future periods.

Patrilineal households' income could be increased if men reallocated their time away from their land and towards wage labor. This finding is inconsistent with unobserved, higher agricultural productivity in patrilineal communities, which would imply higher agricultural labor for patrilineal men but also higher income. The difference in labor supply and consumption between patrilineal and matrilineal households is not observed for a placebo group of households that do not own any land.

To address concerns over omitted variables that correlate with descent, labor and consumption, I pursue several strategies. I control for a rich set of geographical, community and individual characteristics, various measures of plot quality, colonial influence and ethnic group characteristics, and restrict the sample to areas where patrilineal and matrilineal groups are well mixed. The estimates are also robust to conservative assumptions of selection on unobservables (Oster, 2017; Altonji et al., 2005).

I discuss alternative interpretations of the results, in particular market failures, dynamic investment considerations and the role of marital residence and social norms. In the theoretical model, I show that most standard market failures, such as credit constraints in agriculture, and imperfect insurance for risk in agricultural production, predict a different pattern of results to what is observed empirically. There are, however, two alternative models that predict higher agricultural labor and lower output in patrilineal households: transaction costs in the wage labor market and tenure insecurity, if they are higher in patrilineal communities. In the empirical section, I show that while there is evidence that transaction costs, such as bus fares and the distance to the nearest government office, do reduce wage labor and output and increase agricultural labor consistent with the predictions of the theory, these costs cannot explain the estimated effect of patriliney on labor supply and consumption. This suggests that the empirical results are driven

by noncooperative decision making rather than this market failure. I find no evidence that patrilineal households face more tenure insecurity than matrilineal households.

The findings produce several other interesting implications. First, the results in this paper suggest an efficiency gain to matrilineal descent. Matriliney has remained surprisingly prevalent in Malawi, despite efforts by external groups to eradicate it. Matriliney weakens men's incentives to overinvest in the land, which may be a potential reason for the persistence of matrilineal descent to this day.²

Second, endogenous bargaining power leads to inefficient decisions when there is limited commitment. This suggests that there may be efficiency gains to commitment devices in marriage, such as prenuptial contracts that condition on labor supply choices. This coheres with recent findings on the potential efficiency benefits of prenuptial contracts in Voena (2015) and Bayot and Voena (2015).

This paper contributes to the family economics literature by proposing a new test of efficiency in production decisions, rejecting the null hypothesis of efficiency, and finding evidence for an extension to the collective model that allows for limited commitment in the first stage. Endogenous bargaining power has been studied, for example, in a model where bargaining power is increasing in income and education and decreasing in fertility for women; women are predicted to overinvest in their education to make up for the negative effect of having a child on the sharing rule (Iyigun and Walsh, 2007). In an alternative model with limited commitment, couples make location choices in the first period, which advantage one spouse in their subsequent consumption share. Even if consumption sharing is efficient, the first period location choice may not be (Lundberg and Pollak, 2003). Finally, bargaining power as determined by labor income has also been endogenized in a collective model with no intertemporal commitment (Basu, 2006). However, none of these papers provide empirical evidence for inefficient labor supply allocations due to endogenous bargaining power. The theory is also related to a growing literature on noncooperative models of the household (Cherchye et al., 2016; Lechene and Preston, 2011; Chen and Woolley, 2001).³

There is empirical evidence for noncooperative behavior in various contexts, including Kenya, where men use their power over migration decisions to reduce the ability of their wives to earn their own income (McPeak and Doss, 2006), and Northern Cameroon, where women overinvest in those crops whose income they control (Jones, 1983). There is also evidence of a lack of consumption smoothing in the household, with allocations depending on whether shocks affect the husband or wife (Doss, 2001; Duflo and Udry, 2004) and wives bearing a larger burden of adverse shocks (Dercon and Krishnan, 2000). In experimental contexts, spouses are observed to engage in income hiding (Ashraf, 2009), even if this reduces their expected income (Jakiela and Ozier, 2016). This paper provides a more general test of efficiency in production by taking into account choices across several types of labor income, rather than focusing only on agricultural work.

The paper proceeds as follows. In Section 2, I discuss descent in Malawi. Section 3 outlines the collective model of labor supply and consumption, as well as a noncooperative extension to the collective model and alternative constraints such as market failures. In Section 4, I describe the data and empirical approach. Section 5 presents the key empirical results. Section 6 considers alternative mechanisms and Section 7 concludes.

¹ I define an individual's outside option as his or her utility when divorced because divorce is frequent and not stigmatised in Malawi: lifetime divorce probabilities are between 40 and 65% and over 40% of women remarry within the first two years after a divorce (Reniers, 2003). For societies where divorce is uncommon, an alternative outside option is within-household noncooperation, as in the separate spheres model of Lundberg and Pollak (1993).

² This is consistent with a related literature on tenure insecurity and long-term investments in land: e.g. Besley (1995), Place and Otsuka (2001), Kishindo (2010).

³ The model also relates to Rainer (2007), who discusses theoretically the role of prenuptial contracts in a model where individuals invest in a relationship-specific asset that determines individuals' outside options, and therefore individuals' bargaining power over the asset during marriage.

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