Is women's ownership of land a panacea in developing countries?
Evidence from land-owning farm households in Malawi

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Abstract: Our analysis of a rich representative household survey for Malawi, where patrilineal and matrilineal institutions coexist, suggests that (a) in matrilineal societies the likelihood of cash crop cultivation by a household increases with the extent of land owned (or de facto controlled) by males, and (b) and cultivation of cash crops increases household welfare. The policy implication is that facilitating female ownership of assets through informal and formal institutions does not, on its own, increase welfare, if women do not have access to complementary resources that are needed to generate income from those assets. (95 words)

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Introduction

The positive effect of female empowerment on key household welfare indicators, such as consumption, nutrition, child health and education is among the most well established stylized facts in the development literature (Kevane, 2004). Not surprisingly, much of the related academic and policy discourse has centred on creating the right institutional environment for improving the bargaining power of women. A number of papers have argued in favour of enhancing asset ownership, particularly land rights, as a way of raising household welfare through increased female bargaining (Quisumbing, 1994; Beegle, Frankenberg, and Thomas, 2001; Allendorf, 2007). Others have emphasized the positive effects of women's income on household welfare, thereby viewing asset ownership or control over land and other resources as an indirect determinant of household outcomes (Quisumbing and Maluccio, 2003; Duflo and Udry, 2004; Doss, 2006; Luke and Munsi, 2011).

Female ownership of assets, however, is neither given,[1] nor a panacea for household level welfare. In traditional societies, asset ownership is significantly shaped by institutional factors such as social norms. In some contexts, this implies that women have little or no customary rights in land (Agarwal, 1988). In certain other societies, such as some in rural Ethiopia, control over a household's productive assets is centralised in the hands of the household head, irrespective of whether it is a man or a woman (Fafchamps and Quisumbing, 2002). Sometimes these social norms influence the formal legal structure underpinning asset ownership. For example, prior to the enactment of the Married Women's Property Act of 1882, British women were "considered an extension of their husbands and did not have their own legal personality" (Deere and Doss, 2006; pp. 5). Even legislations that are consistent

with the United Nations Convention on the Elimination of All Forms of Discrimination against Women (CEDAW) may address the issue of female asset ownership only partially or in an ambiguous manner. For example, in India, under the Hindu Succession Act of 1956, the "separate" property of a Hindu dying without a will is divided equally among Class I heirs such as surviving children (both sons and daughters) and the spouse, but "joint" property is handed down only to male lineal descendants (Deininger, Goyal and Nagarajan, 2010).[2]

Even if women were to own assets, there could be a serious disconnect between such ownership and their ability to generate income (and hence consumption) out of these assets. If the assets owned by women are in the form of inputs for production, mainly land, they need access to complementary resources such as labour and capital to be able to translate their asset ownership into income-generating output. However, women may find it difficult to access some of these complementary resources, in particular, capital (Joireman, 2008). To begin with, the amalgamation of "customary laws" and civil laws governing property rights might weaken property rights of women land owners. Property rights can also be weakened by other economic, social, cultural and ideological factors (Agarwal, 1994; Arun, 1999). Further, the laws that underpin the property rights of women may be "difficult to enforce because they go against the grain of cultural practice" (Joireman, 2008; pp. 1238). Evidence of both these problems has been found in the context of developing countries such as Uganda (Kes, Jacobs and Namy, 2011). These problems, in turn, can adversely affect women's ability to collaterize their land/assets to gain access to capital. Earlier studies found that in Africa "women receive less than 10 percent of the credit to small farmers and less than 1 percent of the total credit to agriculture" (Blackden, 1999; pg. 4).

Even if complementary resources were available, in principle, intra-household allocation of these resources may be inefficient, and any uncertainty about long term property rights may make women reluctant to make necessary investments in assets such as land (Udry

and Goldstein, 2008). Further, women's productivity (and the productivity of the assets they own) may be adversely affected by their (generally lower) educational status, and socially determined household responsibilities of women. In Burkina Faso, for example, Udry (1996) finds that even after accounting for plot quality, plots controlled by women are farmed much less intensively than similar plots within the household controlled by men. Other studies on sub-Saharan African countries have concluded that in Kenya parity in agricultural input and educational status can raise yields in women-owned plots by more than 20 percent, while labour productivity in Tanzania could have increased by around 15 percent if the time burden women face was reduced (Blackden, 1999).

In other words, *given an income level*, women's ownership of assets can improve intra-household allocation of income and consumption in a way that augments welfare. But this income level itself may be adversely affected by women's ownership of land. We examine this tension in the impact of women's ownership of land on welfare using household level data from Malawi, whose rural landscape is characterised by patrilineal and matrilineal land tenure systems. Matrilineal kinship de facto places both the user and control rights in the hands of women and thus gives them a degree of economic security not found in patrilineal systems.[3] However, as noted earlier, the reality often involves a wedge between ownership and control in matrilineal societies. For example, when it comes to land sales, even though the women own land, they need to consult their maternal uncles who have the final say for such decisions (WOLREC, 2011).

Furthermore, *uxorilocal residence* (living in the wife's village) appears to be on the decline as having resided uxorilocally for a short period of time men can go back to their own village in exchange for a small payment made to the women's parents (Kishindo, 1990). Indeed, in the matrilineal system it is becoming increasingly common for parents to give land to their sons in their lifetime or for sons to be allowed to inherit land upon their mother's

death (World Bank, 1991). The growing uncertainty over rights to land decrease women's willingness to invest in cash crops, which bear fruit only over time (World Bank, 1991; Green and Baden, 1994). Not surprisingly perhaps, 82 percent of the inferior productivity outcomes for female managed plots in Malawi are explained by differences in high value crop cultivation and the level of household adult male labour inputs (Kilic, Palacios-Lopez and Goldstein, 2013). Indeed, changing social norms in matrilineal systems not only affect the production side, but also the consumption/welfare side of household bargaining. For example, Sear (2008) finds that increasing competition for resources has a detrimental effect on child health and survival in matrilineal communities.

In this setting, we examine the direct and indirect effects of women's ownership of land on household level consumption. We examine the impact of such ownership on the household decision to undertake cash (or high value) crop production; female empowerment through these crops being one of the leitmotifs of recent political economy literature on agriculture (Dolan and Serby, 2003).[4] We also examine the direct impact of women's relative importance in the household's expenditure decisions, and the indirect impact on consumption through the households' exposure to cash (or high value) crops on household welfare.

As a start, we estimate a consumption equation in which household level per capita consumption is the dependent variable, and explanatory variables include (among other things) a household's exposure to cash (or high value) crops and women's relative position in the household's expenditure decisions, as well as institutional characteristics of matrilineal and patrilineal systems. To confirm the robustness of our results, we then experiment with alternative measures of welfare, namely, stylized poverty indicators. We restrict the sample to households that produce agricultural crops. Households have a choice between growing cash crops or food crops, and we later further distinguish between cash crops and a subset of high value cash crops.[5] We account for possible bias, whereby the choice of cash (or high value)

crops (as opposed to food crops) may not be random, and simultaneously estimate a decision equation in which the dependent variable is the binary indicator of whether a household has cash (or high value) crops as a source of income, and explanatory variables include (among other things) ownership patterns of land and unobserved institutional aspects of matrilineal and patrilineal systems. The two equations are jointly estimated using a maximum likelihood estimator.

We hypothesize that the decision to produce cash (or high value) crops and bigger role of women in expenditure decisions of households has a positive impact on the consumption (and hence welfare) of households, but the impact of women's ownership of land on the decision to produce cash (or high value) crops is ambiguous. In particular, while ownership may not be a matter of significance in a patrilineal society, male ownership of (or control over) land may (ironically) better facilitate cash (or high value) crop production in a matrilineal society if men have, in general, greater access to complementary resources and/or if they are better able to focus on agricultural activities than women who have multiple demands on their time. We are, therefore, not only able to directly address a key policy issue, namely, whether norms or legal structures that facilitate land (more broadly, asset) ownership of women necessarily facilitate economic activities that are potentially welfare enhancing, we are also able to distinguish between the de jure control of women over household matters (through land ownership) and the de facto control (through participation in decisions about household expenditure). This, in itself, is a significant contribution to the existing literature on the relationship between institutions, women's ownership of assets and the implications for household welfare.

The rest of the paper is structured as follows: In Section 2, we outline the empirical methodology. The data are discussed in Section 3. In Section 4, we report and discuss the regression results. Section 5 concludes.

[6]

Empirical methodology

We argue that household welfare depends on, among other things, on the household's ability to generate significant returns on its asset endowment, which in developing country contexts is generally land, and on the structure of the decision making process within households. We hypothesize that a household may not be able to generate significant returns from its asset endowment if the ownership (or control) of the asset is vested in women, but that greater voice (or control) of women within the household has a positive impact on the household's welfare.

In keeping with the literature, in our baseline specification we proxy welfare with the log of household level per capita expenditures (Glewwe and Hall, 1998; Adams, 2004, 2006; Bhaumik, Gang and Yun, 2006; Dimova and Wolff, 2008). The model specification is given by

$$C_i = \beta_0 + \sum_j \beta_{ij} X_{ij} + \sum_k \theta_{ik} CNTRL_{ik} + \delta CCRD_i + \varepsilon_i, \qquad [1]$$

where C_i is the per capita consumption of the ith household, X_j are a set of j variables that influence household consumption, $CNTRL_k$ are a set of k variables that capture the nature of the decision making process within the household (specifically, the whether women play a role in the decision-making process), $CCRD$ is a dummy variable that takes the value 1 if a household produces cash (or high value) crops, and 0 otherwise, and ε_i is the *iid* error term, $\varepsilon_i \sim N(0, \sigma^2)$.

As such, equation [1] can be estimated using ordinary least squares (OLS). But, in the light of our earlier discussion, the decision (or ability) to produce cash (or high value) crops

may not be randomly decided. It may depend on factors such as land ownership, with female ownership potentially having a detrimental impact on the household ability to produce these crops, on account of factors such as inadequate access to complementary resources such as capital. In that case, estimating equation [1] using OLS would lead to biased estimates, and we have to correct for the systematic selection of certain kinds of households into production of cash (or high value) crops.

The two most commonly used methods of correcting for selection bias involve the use of Heckman's approach to correction for selection bias (Heckman, 1979), and the treatment effect model. In Heckman's model, it is argued that the dependent variable in the regression equation of interest is observed only when some unobserved or latent endogenous variable (w) exceeds some threshold (say, 0), that is, $w* = \Phi'Z + \mu$; $w = 1$ if $w* > 0$, and $w = 0$ otherwise. Note that, by the very nature of this argument, for all observations in the sample $w = 1$. In the treatment effect model, by contrast, the dependent variable of the regression equation of interest is observed for $w = 0$ as well as $w = 1$. There is a functional difference as well. Unlike in Heckman's two-step model for correction of selection bias, in a treatment effect model w enters the regression equation of interest directly.

In our empirical model, equation [1] is the regression equation of interest, and *CCRD* (which can take the value 0 or 1) is the w variable. Hence, we estimate a treatment effect model which includes equation [1], the consumption equation, and a decision-equation given by

$$CCRD = \Phi'Z + \mu.$$ [2]

The "treatment", in other words, is the choice to produce cash (or high value) crops. Equations [1] and [2] are estimated jointly using maximum likelihood estimators. Subsequently, a likelihood ratio test is used to verify whether the error terms of the two

[8]

equations are correlated, such that using OLS without accounting for selection bias would indeed lead to biased and inconsistent estimates of equation [1].

In keeping with the literature, we also have to ensure that the decision equation and the consumption equation are identified, that is there is at least one variable that affects the decision to undertake cash (or high value) crop production without having an impact on household consumption, and vice versa. We propose that both the decision to undertake cash (or high value) crop production and consumption depend on factors such as the age, gender, marital status and education level of the household head.[6] However, as discussed earlier in the paper, while ownership patterns may have an impact on the decision to produce cash (or high value) crops without affecting household consumption, household consumption alone is likely to be affected by the relative importance of the women in the decision-making process for household expenditures. Hence, we include (only) in the decision-making equation a number of variables that together capture ownership patterns of land that can influence the decision about cash (or high value) crop production. Similarly, we include (only) in the consumption equation a number of variables that capture the relative importance of women in the determining the patterns of household level expenditure. Finally, as highlighted in equation [1], we include in the consumption equation the dummy variable that captures cultivation of cash (or high value) crops (*CCRD*). In principle, therefore, our model is identified, and we shall discuss later whether the identifying variables in the two equations are statistically significant.

Data

We estimate equations [1] and [2] using the Third Integrated Household Survey (IHS3) of Malawi, conducted between March 2010 and March 2011. It is a representative

survey for the whole territory of the country, conducted by the National Statistical Office of Malawi (2012), which received technical support from the World Bank as part of the World Bank's Living Standards Measurement Study (LSMS). After accounting for missing observations and restricting the sample to those households who had access to land and derived income from agricultural production during the reference period, we are left with a sample of 7048 observations.[7]

The survey is informationally rich. It permits us to identify the exogenously given institutional drivers of land ownership, namely, matrilineal and patrilineal societies. Matrilineal systems are characteristic of the Yao and Chewa ethnic groups, while patrilineal systems are associated with the Ngoni, Nkonde and Tumbuka ethnic groups. The survey instrument also identifies whether women play a role in the decision making process of households, either on their own or jointly with the men in the households.

Further, aside from the usual LSMS household and individual level questions, aimed at assessing expenditures, household income, labour force characteristics, education and social assistance, the survey contains a separate section on agriculture. It is therefore possible to identify the nature of the crops (that is, whether they are cash or high value crops) produced by the households during the rainy and the dry seasons. Specifically, we are able to distinguish between more common and more exclusive high value crop categories: in our analysis, cash crops include hybrid maize, tobacco, groundnuts and cotton, and the more exclusive category of high value crops include only tobacco and groundnuts. We are also able to identify who in the household is responsible for which agricultural activity and who in the household is responsible for the allocation of earnings derived from that activity. Hence, for each household, we are able to identify the amount of land that are under female (and male) control. In the context of our analysis, male ownership of land in matrilineal societies is of interest.

INSERT Table 1 about here.

To begin with, as highlighted in Table 1, the data suggests the following:

- Men dominate ownership of land. While, on average, women own more land (0.88 acres) than men (0.85 acres), on average, in Malawian matrilineal societies, the difference is negligible. In patrilineal societies, on the other hand, men (1.16 acres) own about 40 percent more land than women (0.70 acres). This is consistent with the available evidence from other countries in the region. In Uganda, for example, while female ownership of land among female-headed households is comparable to male ownership of land overall, female ownership of land is much lower in male-headed households (Kes, Jacobs and Namy, 2011).

- There is widespread production of cash crops; over 80 percent of households produce cash crops in both matrilineal and patrilineal societies. Production of high value crops, however, is much less widespread, with just about 40 percent of households producing high value crops in both these societies.[8] It is important to note that there are no differences in the incidences of either cash or high value crop production across the matrilineal and patrilineal systems, where the ethnicities belonging to these two groups are to a large extent segregated geographically, with the matrilineal communities residing mostly in the South and Centre of the country and the patrilineal communities residing mostly in the Northern parts of the country. Hence, if we find any differences in the impact of ownership on entry into cash or high value crop production, we ascribe them to institutional patterns alone and not to climate or other geographic differences.

- There is significant divergence between ownership (that is, de jure) and de facto control of land. Even in matrilineal societies, while women own more land on average, women are the main decision makers about cash crop production in only 22 percent cases, and the

incidence of a woman as the main decision maker is even lower for high value crops (10 percent).[9] Predictably, in patrilineal societies, the incidence of women as main decision makers with respect to cash crop and high value crop production is smaller still, 18 percent and 8 percent, respectively.

- In matrilineal societies, household consumption is higher on average than in patrilineal societies, in terms of per capita Malawi Kwacha (MWK), MWK 57453.00 in the former and MWK 51315.18 in the latter. The difference is even greater -- MWK 63979.78 and MWK 47962.84, respectively -- when women make spending decisions within the households. This is consistent with the literature on the positive impact of bargaining power of women on household consumption and welfare.

INSERT Figures 1 and 2 about here.

The data also provide preliminary evidence that, on average, female-owned plots produce much lower average values of cash (and high value) crop production (Figure 1).[10] This is confirmed more rigorously by Kilic, Palacios-Lopez and Goldstein (2013), after controlling for numerous land quality, input and household characteristics. Also, per capita consumption levels are higher on average for households that undertake cash crop and high value crop production than for those households that do not produce these crops (Figure 2). However, it is evident from the figures that the difference is much more stark between output of cash (and high value) crops for male-owned and female-owned plots, than for the difference between per capita consumption of households that undertake cash (and high value) crop production and those that do not. In other words, it is entirely plausible that there is a strong indirect impact of women's ownership of land on cash crop production through the selection of women-owned plots into (more likely, out of) cash (or high value) crop production. Conversely, male-owned land is much more likely to be used for cash (or high

value) crop production than female-owned land. We shall explore this in more detail in the next section.

Empirical results

The regression results are reported in Table 2. As mentioned earlier (see footnote 6), perhaps as a consequence of government policies, a significant majority of the land-owning households in Malawi were involved in cash crop production, but fewer than half the households were engaged in the production of high value crops. Hence, to ensure that our results are robust, we estimate two different models. In the first model, equation [2] is estimated for the decision to produce cash crops (column 2), and in the second model equation [2] is estimated for the decision to produce high value crops (column 4). The corresponding estimates for the consumption equation [1] are reported in column (1) and column (3), respectively. The chi-square statistics associated with LR test for the independence of the equations are reported as well. The p-values for these statistics indicate that the null hypothesis of no correlation between the error terms is rejected at the 1 percent level, such that using OLS to estimate the consumption equation would have resulted in biased estimates.

<div align="center">**INSERT Table 2 about here.**</div>

The results reported in column (2) suggest that the likelihood of cash crop production increases with the human capital of the household, and is lower for households that have women as household heads. These results are entirely plausible. While the evidence about the impact of human capital on agricultural productivity is mixed, evidence from a number of contexts suggests that an increase in human capital can augment farm productivity (Huffman, 1981, 2001). This could, in part, be on account of greater ability to use better technology or, more likely, greater ability to allocate resources efficiently in response to changing relative

<div align="center">[13]</div>

prices. It has also been argued that farmers with greater human capital may also have greater access to capital, whether because they are better aware of credit opportunities or because they are considered to be better credit risks. If greater human capital, therefore, raises the expected returns from investment in cash crops, the likelihood of cash crop production becomes larger. Similarly, greater risk aversion on the part of women household heads, to which we alluded earlier, can explain the lower likelihood of cash crop production for female-headed households.

The results related to land-ownership, however, are more interesting. They suggest that, there is no direct impact of matrilineal institutions on the decision to undertake cash crop production, but that land size is positively correlated with the likelihood of high value crop production in a gender neutral way. This is not surprising, given than while cash crops are widely cultivated, cultivation of high value crops is a more selective process and it is not surprising that it is more likely to be undertaken by households with large land endowments, who are likely to be able to bear the risks associated with the cultivation of these crops. The results also indicate that the extent of land ownership by men and women in a household does not influence the choice of cash crop production in a patrilineal society, which is the omitted category. However, in matrilineal society, the likelihood of cash crop production increases with the extent of the men's landholding. This is consistent the assumption that men generally have greater access to complementary resources that make their farms more productive and profitable than women-owned farms. The coefficient estimates reported in column (4) indicate that this is also true for high value crops, even though the impact of male landholding is smaller for high value crops (0.07) than for cash crops (0.15). In other words, creation or modification of social/informal and formal institutions to facilitate transfer of assets such as land to women is unlikely to be a panacea; such transfers may not enable

women to undertake economic activities that can potentially generate higher income, whether for lack of access to complementary resources or other reasons discussed earlier in this paper.

The coefficient estimates reported in columns (1) and (3) indicate that (per capita) household consumption (and hence household welfare) increases with the age of the household head and with the human capital of the household. Consumption is lower for female-headed households. These results are broadly consistent with the extant literature. Interestingly, consumption is lower for households with married household heads, irrespective whether the marriage is monogamous or polygamous. This is inconsistent with the use of marital status as a proxy for social networks, which generally have a benevolent impact on household welfare.

Not surprisingly, a reduction in the status of women that could be the case in patrilineal societies reduces household consumption. The coefficient of the dummy variable for patrilineal societies is -0.09 in column (1) and -0.11 in column (3); both are significant at the 1 percent level. The negative impact of patrilineal societies on household consumption is mitigated somewhat when women take decisions about household expenditures; the interaction term involving the patrilineal dummy and the dummy variable for female decisions about household expenditure is positive and statistically significant in both columns (1) and (3). Interestingly, however, in a matrilineal society (the omitted category) there is no difference in the impact of male and female decision-making about household expenditures on household consumption.[11] This points to a complexity of interaction between the genders within households that go beyond stylised bargaining models (Jackson, 2003).

Importantly, from the point of view of our paper, household consumption is significantly higher for households that cultivate cash crops (0.69) and high value crops (0.57) than in households relying solely on subsistence farming In other words, if women landowners can produce these crops, there can be a significant increase in household

consumption (or welfare), *but in matrilineal societies that ensure de jure ownership of land to women, the likelihood of producing these crops is increased if men own (or control) large amounts of household land*. To recapitulate, the plausible explanation for this is that men have better access to complementary factors that are required for successful cultivation of cash (or high value) crops. The policy implication of this result is that policies should be holistic in nature, matching efforts to increase land ownership of women with those that facilitate the use of land for high value economic activities. In the absence of such policies, the outcome may be socially regressive: the optimal response of women who are concerned more about the collective good of the household than about their own personal interests might be to give up de jure and/or de facto ownership of land in favour of the men in the household, for the sake of augmenting household consumption.[12]

INSERT Table 3 about here.

In Table 3, we report the results of regression models that we estimate for robustness checks. The dependent variables used for these estimations are the stylised P_α measures of poverty: when $\alpha = 0$ we have a binary measure of whether or not a household is below the poverty line, when $\alpha = 1$ we have a measure of the depth of poverty, and when $\alpha = 2$ we have a measure of poverty intensity.[13] While these measures are dependent on per adult equivalent consumption, they do not vary linearly with the consumption variable. The regression estimates indicate that: (a) the likelihood of cash (or high value) crop production in matrilineal societies increases with male ownership of land; (b) cultivation of cash (and high value) crops reduce all measures of poverty; and (c) while poverty is higher among households in patrilineal societies, on average, it is not ameliorated by female decision making about household expenditures. In other words, these results are broadly consistent with those reported in Table 2, and if we focus on poverty and not on the wider issue of welfare, the likelihood of cash (or high value) crop production and its impact on poverty

measures trumps the impact of gender role in determining patterns of household expenditures. Hence, in low income countries where poverty alleviation is a high priority objective, female empowerment through land ownership may be at odds with this objective, by reducing the likelihood of cash (or high value) crop production, unless women landowners have access to complementary resources to produce these crops, distribution channels and so forth.

Conclusion

In the development literature, increasing per adult equivalent household expenditure and, correspondingly, poverty alleviation, is an end in itself. At the same time, there is strong advocacy in favour of increasing the incidence and extent of asset (primarily land) ownership of women, based on extant literature that highlights various beneficial influences of female ownership. These parallel discussions ignore that possibility that while the greater bargaining power of women (and hence greater say in decision-making) within households can have a beneficial impact on household welfare, *given the level of household income*, this income itself might be adversely affected by women's ownership of assets if they are able to deploy these assets less profitably than their male counterparts, on account of weaker access to markets and (in the case of land) complementary resources (such as capital). Alternatively, women may be less willing to take the risks associated with high-return use of these assets, or undertake necessary complementary investments, if their de facto property rights are weak. In such cases, even in contexts where social norms guarantee women ownership of assets (such as land), household consumption (and hence welfare) may ironically be better served if men are de facto allowed to own (or control) significant amounts of these assets.

We examine this proposition within the context of Malawi, where patrilineal and matrilineal societies co-exist in mutually exclusive geographical locations. Our results

suggest that while household consumption (and hence welfare) is enhanced by cash (and high value) crop production, the likelihood of cultivating these crops in matrilineal societies increases with the amount of land owned by men in the households. In other words, there is at least weak evidence to suggest that de jure female ownership of assets may not be a panacea in developing economy contexts; household interests may be better served by male ownership of these assets, either because men in these contexts have better access to complementary resources that enable them to deploy the assets in ways that enhance returns to them, or because uncertainty about property rights induce women to take less risk or under-invest in these assets.

The policy implication is that female ownership of assets cannot be approached piece-meal, and in order to make it consistent with the equally important objective(s) of enhancing household welfare (and poverty alleviation) a wider and holistic approach has to be adopted. Along with de jure ownership of assets (such as land), women need to be assured of their long term property rights. As we have discussed earlier in the paper, this may not always be the case and assurance of property rights may therefore involve the enactment and enforcement of formal laws which violate traditional institutions such as the social norms that work to undermine women's property rights. Moreover, women should have improved access to complementary resources and other factors (such as capital and market access) that are required to generate significant returns on assets (such as land) over which they have ownership (or control). In other words, while women's ownership of assets may be a necessary condition for both female empowerment in developing countries and for enhanced household welfare, on its own ownership cannot guarantee either of these objectives. While this has been recognised in discussions about the interaction between ownership, institutions (including uncertainty about property rights) and access to resources in contexts where the units of assessment are firms,[14] there are few evidence-based discussions in the context of

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households. This paper adds to that evidence-based discussion and thereby makes a significant contribution to the related yet somewhat parallel literatures about female ownership of assets and economic development (through household welfare).

Endnotes

[1] See, for example, Doss, Growth and Deere (2008).

[2] Deininger, Goyal and Nagaran (2010) demonstrate that a state-level amendment to the Act, which stipulated that a female descendant of an individual has the same rights to "joint" property has led not just to greater land ownership among women, but has also led to greater educational endowment of women, perhaps reflecting their greater social status. Other amendments to the act gave widows the right to their deceased spouses' properties if they remarry.

[3] In the patrilineal land tenure system, typically found in the Northern parts of the country among the *Ngoni, Ngonde* and *Tumbuka* ethnic groups, sons inherit land directly from their fathers and women can only gain user rights to land through their husbands. *Virilocal residence* (that is, having the man's village as the matrimonial home) is customary for patrilineal kinship systems and the man pays *lobola* or bride price to the wife's parents to establish his right to take is wife and children to his own village. By contrast, in the matrilineal land tenure system, characterising the *Yao* and *Chewa* ethnic groups, residing predominantly in the Southern and Central parts of the country, women have the primary rights to land through their lineage. Husbands can seek land from the village headman or their in-laws, but do not automatically retain rights to wife's land in the event of divorce or female landowner's death (Green and Baden, 1994).

[4] The extant literature suggests that revenue from cash crops have a positive and statistically significant impact on household income but, perhaps on account of the lumpiness and seasonality of cash crop related income, the impact of cash crop production on (per capita)

consumption expenditure of households is ambiguous. The impact is positive in certain contexts such as Vietnam (Cuong, 2009), but insignificant in other contexts such as sub-Saharan Africa (Masanjala, 2007).

[5] We discuss the incidence of "regular" vs. "high value" cash crop cultivation by agrarian households in Malawi later in the paper.

[6] See, for example, Bhaumik, Gang and Yun (2006) for an example of the consumption equation. The extant literature on decision-making in the agricultural context suggests that human and social capital (the latter measured by marital status in our specification) are expected to have an impact on decision-making (Pender and Gebremedhin, 2007). In addition, there is evidence to suggest that there are significant differences in the risk perceptions and risk appetite of men and women (Eckel and Grossman, 2008), which may have an impact on the decision to undertake a particular type of economic (or production) activity.

[7] To arrive at this sample size we further restrict to households that are clearly either "matrilineal" or patrilineal" as explained in the next paragraph. We base all the analysis on this sample of 7048 observations.

[8] In the early post-independence years the country followed the typical sub-Saharan policies of heavy government involvement and stimulation of cash crops (predominantly tobacco) at the expense of food crops. Agriculture was subdivided into two sectors, roughly contributing to 70 percent and 30 percent of the agricultural GDP, respectively: (i) smallholder sector made up predominantly of maize producing farmers, the majority surviving at the bare subsistence level (Devereux, 1999; Whiteside, 2000), and (ii) cash crop (mainly tobacco dominated) sector with production concentrated in estates. As in other sub-Saharan African countries, the dramatic change in terms of trade during the late 1970s (together with external shocks like the war in Mozambique and a severe draught in the early 1980s) paved the way

for IMF and World Bank led adjustment programs, including, among others, active encouragement of smallholder involvement in the production of exportable cash crops such as tobacco, groundnuts and cotton and adoption of higher value hybrid maize varieties. Although the adjustment policies were subject to multiple stop-and-go experiences, mainly on account of renewed food crises and changes in political ideology, the change in regime did result in an increased production of higher value crops, especially hybrid maize by smallholders (Harrigan, 2003).

[9] This phenomenon has been observed in other contexts, as well as in connection with other forms of assets. For example, Goetz and Sen Gupta (1996) found that in Bangladesh, where women receive a high proportion of loans provided through rural credit programmes, they "retained full or significant control over loan in 37% of the cases, while nearly 22% of respondents were either unable to give details of the loan use, or were aware of how their husbands or other male household members had used loans .... About 63% of the cases fall into the three categories of partial, very limited, or no control; indicating a very significant pattern of loss of direct control over credit" (Goetz and Sen Gupta, 1996; pp. 49).

[10] Note that while we perform our analysis at the household level, due to the availability of consumption and other welfare related information at that level of analysis, our rich data sets contains plot level information for each household. At the plot level, we have information on the total area of each plot and are able to identify who in the household manages the production on the plot, who owns the plot, how many inputs are used and how much output is produced. For the purposes of Figure one we have calculated the average value of production across male owned/managed and female owned/managed plots respectively.

[11] In order to facilitate an easier and intuitively clear interpretation of the results, we omit matrilineal from the consumption equation and patrilineal from the production equation.

[12] See Folbre (1986) and Jackson (2003) for an interesting discussion.

[13] The P_α index of poverty is given by

$$P_\alpha = (1/n)\sum\nolimits_{y_p > y_i} [(y_p - y_i)/y_p]^\alpha$$

where the summation is over the poor, those observations whose per capita expenditure, y_i, is below the poverty line, y_p; n is the number of households; α is a poverty aversion parameter: $\alpha = 0$ gives us the headcount ratio measure (the percentage of the population living below the poverty line); $\alpha = 1$ yields a poverty gap index which represents a ratio of the minimum to maximum costs of poverty elimination; and $\alpha = 2$ is related to the mean of the squared proportional poverty gap which captures an aspect of the severity of poverty; the higher the value of α, the more sensitive the index is to the income of the poorest person.

[14] Note that this not much different from arguing that private (as opposed to state) ownership of assets (such as firms) would enhance their productivity, *only if there are supporting institutions that enable the private owners of these assets the same access to complementary resources (such as capital and managerial talent) as the state* (Bhaumik and Estrin, 2007). If credit, for example, is controlled by state-owned financial institutions in a way that ensures flow of credit only to state-owned firms, or if there is inherent uncertainty about de facto property rights of the private owners, state-capitalism might be better than private ownership of firms.

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Table 1

	Matrilineal	**Patrilineal**
Land size controlled (acres)		
By male	0.85	1.16
	(1.53)	(1.61)
By female	0.88	0.70
	(1.24)	(1.24)
Cash crop and High value crop production		
Household produces cash crops	0.83	0.81
	(0.37)	(0.38)
Household produces high value crops	0.40	0.41
	(0.49)	(0.49)
Household per capita consumption		
All households	57453	51315.18
	(69362.25)	(44372.02)
Household where female decides on household expenditures	63979.78	47962.84
	(57502.72)	(31138.70)
N of observations	5839	1209

Note: The figures in brackets are standard deviations. The differences in means across matrilineal and patrilineal were tested and are significant in all cases.

Table 2

	Cash crops (family)		High value crops (family)	
	Per capita consumption	**Decision equation**	**Per capita consumption**	**Decision equation**
Constant	10.5622*** (0.0593)	0.6518*** (0.1078)	10.9528*** (0.0432)	-0.6055*** (0.0984)
Age of head	0.0028*** (0.0005)	-0.0013 (0.0011)	0.0019*** (0.0005)	0.0016 (0.0010)
Female head	-0.1592*** (0.0299)	-0.1166* (0.0692)	-0.1822*** (0.0305)	-0.0027 (0.0643)
Married monogamous	-0.0908*** ().0306)	0.0328 (0.0712)	-0.1115*** (0.0314)	0.0648 (0.0654)
Married polygamous	-0.1039*** (0.0368)	-0.0125 (0.0876)	-0.1411*** (0.0379)	0.1075 (0.0783)
Household size	-0.1210*** (0.0036)	0.0271*** (0.0087)	-0.1200*** (0.0037)	0.0069 (0.0076)
Primary education	0.2401*** (0.0241)	0.2793*** (0.0625)	0.2706*** (0.5360)	0.0433 (0.0505)
Secondary education	0.4798*** (0.0224)	0.3702*** (0.0588)	0.5360*** (0.0225)	-0.0046 (0.0472)
Higher education	1.3857*** (0.0568)	0.7590*** (0.1770)	1.5808*** (0.0591)	-0.5363*** (0.0288)
Female decides on expenditures	-0.0196 (0.0325)		-0.0339 (0.0328)	
Male decides on expenditures	-0.0061 (0.0298)		-0.0286 (0.0296)	
Patrilineal	-0.0932*** (0.0206)		-0.1128*** (0.0209)	
Patrilineal*Female decides	0.1707* (0.0879)		0.1606* (0.0885)	
Patrilineal*Male decides	-0.0114 (0.0715)		-0.0113 (0.0715)	
Cash crop/high value production	0.7031*** (0.0575)		0.5850*** (0.0587)	
Female land size		0.0530 (0.0343)		0.1136*** (0.0288)
Male land size		0.0209 (0.0244)		0.1275*** (0.0214)
Matrilineal		0.0124 (0.0604)		-0.0419 (0.0535)
Matrilineal* Female land size		-0.0092 (0.0379)		-0.0103 (0.0314)
Matrilineal* Male land size		0.1574*** (0.0299)		0.0708*** (0.0236)
LR test of independent equations	Chi2(1)=39.12 Prob>chi2=0.00000		Chi2(1)=49.11 Prob>chi2=0.00000	

Note: Values within parentheses are robust standard errors. ***, ** and * indicate significance at the 1%, 5% and 10% levels respectively. The dependent variable for the "first stage" regression model is binary, indicating the choice of producing cash (or high value) crops. The dependent variable for the second stage regression is per adult equivalent household consumption.

Table 3: Robustness checks with alternative welfare proxies

	Poverty incidence (poor=1)				Poverty depth				Poverty intensity			
	Cash crop		High value		Cash crop		High value		Cash crop		High value	
	welfare	decision	welfare	decision	welfare	decision	welfare	decision	welfare	decision	welfare	decision
Constant	0.4666*** (0.1227)	0.6422*** (0.1085)	-0.5244*** (0.0958)	-0.6344*** (0.0987)	31.3765*** (1.6473)	0.5776*** (0.1041)	8.7723*** (1.3235)	-0.6307*** (0.0987)	15.6332*** (0.9278)	0.5841*** (0.1049)	3.2211*** (0.7704)	-0.6308*** (0.0988)
Age of head	-0.0051*** (0.0010)	-0.0012 (0.0011)	-0.0041*** (0.0011)	0.0014 (0.0010)	-0.0903*** (0.0171)	-0.0014 (0.0011)	-0.0700*** (0.0155)	0.0015 (0.0010)	-0.0451*** (0.0099)	-0.0014 (0.0011)	-0.0353*** (0.0090)	0.0015 (0.0010)
Female head	0.1293** (0.0650)	-0.1240* (0.0696)	0.2034*** (0.0666)	0.0110 (0.0640)	1.9393* (1.0602)	-0.0953 (0.0681)	3.4747*** (0.9564)	0.0060 (0.0640)	1.0908* (0.6144)	-0.1050 (0.0686)	1.9393*** (0.5604)	0.0063 (0.0640)
Married monogamous	-0.0299 (0.0668)	0.0305 (0.0717)	-0.0097 (0.0692)	0.0654 (0.0653)	-1.5409 (1.0889)	0.0243 (0.0702)	-1.4684 (0.9829)	0.0634 (0.0653)	-0.8505 (0.6310)	0.0246 (0.0708)	-0.8641 (0.5756)	0.0645 (0.0652)
Married polygamous	-0.0418 (0.0789)	-0.0097 (0.0881)	0.0053 (0.0818)	0.1095 (0.0784)	-0.3469 (1.3115)	0.0045 (0.0851)	0.1401 (1.1847)	0.1057 (0.0784)	0.0871 (0.7599)	0.0056 (0.0855)	0.2803 (0.6935)	0.1060 (0.0785)
Household size	0.1997*** (0.0084)	0.0274*** (0.0086)	0.2064*** (0.0083)	0.0076 (0.0076)	3.5440*** (0.1268)	0.0388*** (0.0083)	3.3424*** (0.1145	0.0063 (0.0076)	1.8528*** (0.0734)	0.0362*** (0.0083)	1.7356*** (0.0670)	0.0065 (0.0076)
Primary education	-0.3291*** (0.0522)	0.2645*** (0.0618)	-0.4273*** (0.0521)	0.0487 (0.0506)	-5.5271*** (0.8520)	0.1918*** (0.0588)	-7.4459*** (0.7633)	0.0494 (0.0507)	-2.6511** (0.4932)	0.1940*** (0.0593)	-3.7105*** (0.4470)	0.0479 (0.0507)
Secondary education	-0.7348*** (0.0547)	0.3350*** (0.0618)	-0.8867*** (0.0533)	0.0056 (0.0471)	-9.0856*** (0.7891)	0.2399*** (0.0563)	-11.6439*** (0.7049)	0.0098 (0.0471)	-4.1739*** (0.4566)	0.2570*** (0.0567)	-5.5497*** (0.4129)	0.0092 (0.0471)
Higher education	-1.9479*** (0.2591)	0.6198*** (0.1702)	-2.3376*** (0.2614)	-0.4260*** (0.1346)	-13.0991*** (2.0178)	0.4341*** (0.1636)	-19.2059*** (1.8343)	-0.4073*** (0.1340)	-5.7126*** (1.1685)	0.4725*** (0.1651)	-8.8449*** (1.0723)	-0.4128*** (0.1341)
Female decides on expenditures	0.0056 (0.0648)		0.0424 (0.0706)		-1.9657* (1.0337)		-1.8230* (1.0831)		-1.5970*** (0.6140)		-1.5718** (0.6407)	
Male decides on expenditures	-0.0091 (0.0609)		0.0168 (0.0647)		-0.6764 (0.9624)		-0.3279 (0.9802)		-0.5384 (0.5698)		-0.3719 (0.5799)	
Patrilineal	0.1030** (0.0436)		0.1554*** (0.0446)		1.2502* (0.7263)		2.1866*** (0.6605)		0.5512 (0.4216)		1.0646*** (0.3873)	
Patrilineal*Female decides	-0.2543 (0.1772)		-0.2788 (0.1930)		-5.3053* (2.7881)		-4.6935* (2.9306)		-2.3208 (1.6608)		-1.8506 (1.7346)	
Patrilineal*Male decides	-0.0758 (0.1471)		-0.0529 (0.1556)		-0.1603 (2.2923)		0.2660 (2.3603)		0.3509 (1.3609)		0.4093 (1.3963)	
Cash crop/high value production	-1.5048*** (0.0925)		-0.8709*** (0.0978)		-33.4043*** (1.1185)		-12.1084*** (1.5006)		-18.0368*** (0.5787)		-5.7119*** (0.8123)	
Female land size		0.0635* (0.0339)		0.1279*** (0.0302)		0.0597** (0.0297)		0.1335*** (0.0306)		0.0601* (0.0307)		0.1322*** (0.0309)
Male land size		0.0236 (0.0242)		0.1361*** (0.0227)		0.0172 (0.0206)		0.1358*** (0.0229)		0.0105 (0.0212)		0.1357*** (0.0232)
Matrilineal		0.0213 (0.0601)		-0.0276 (0.0549)		0.0299 (0.0553)		-0.0290 (0.0551)		0.0266 (0.0562)		-0.0314 (0.0553)
Matrilineal* Female land size		-0.0149 (0.0375)		-0.0229 (0.0329)		-0.0117 (0.0329)		-0.0227 (0.0335)		-0.0110 (0.0341)		-0.0201 (0.0339)
Matrilineal* Male land size		0.1542*** (0.0299)		0.0732*** (0.0253)		0.1297*** (0.0259)		0.0748*** (0.0254)		0.1310*** (0.0266)		0.0752*** (0.0257)
LR test of independent equations	Chi2(2)=38.989 Prob>chi2=0.00000		Chi2(1)=23.9796 Prob>chi2=0.0000		Chi2(1)=113.96 Prob>chi2=0.00000		Chi2(1)=20.20 Prob>chi2=0.0000		Chi2(1)=122.62 Prob>chi2=0.0000		Chi2(1)=10.42 Prob>chi2=0.00012	

.Figure 1a: Value of production by male/female agricultural management
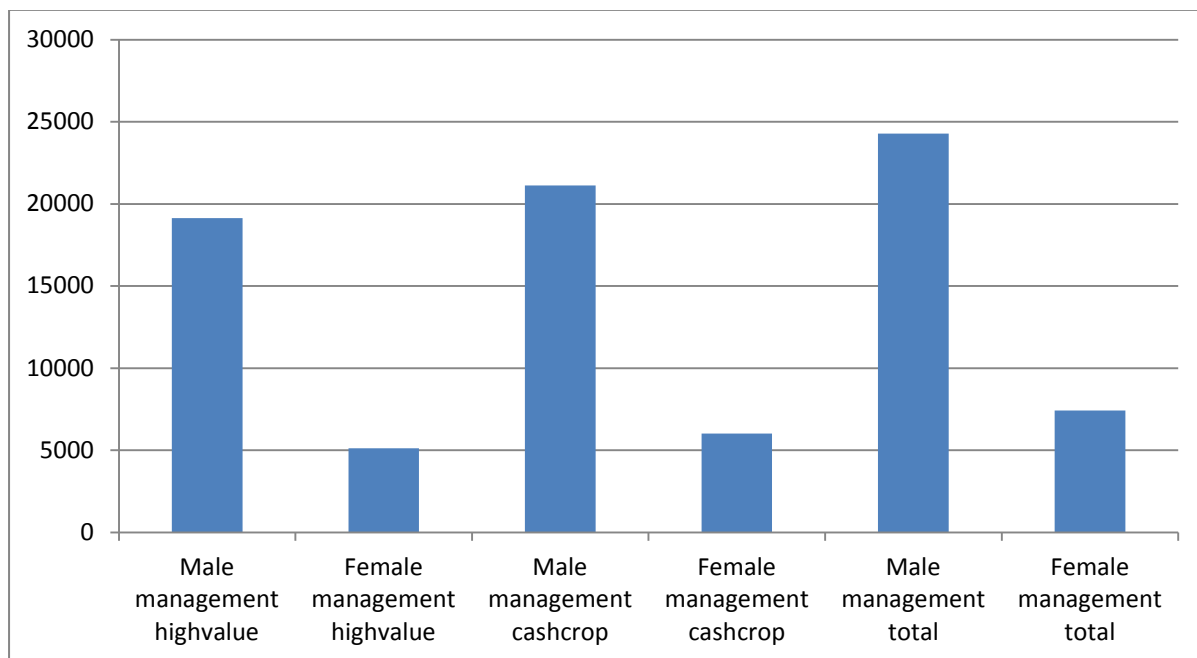

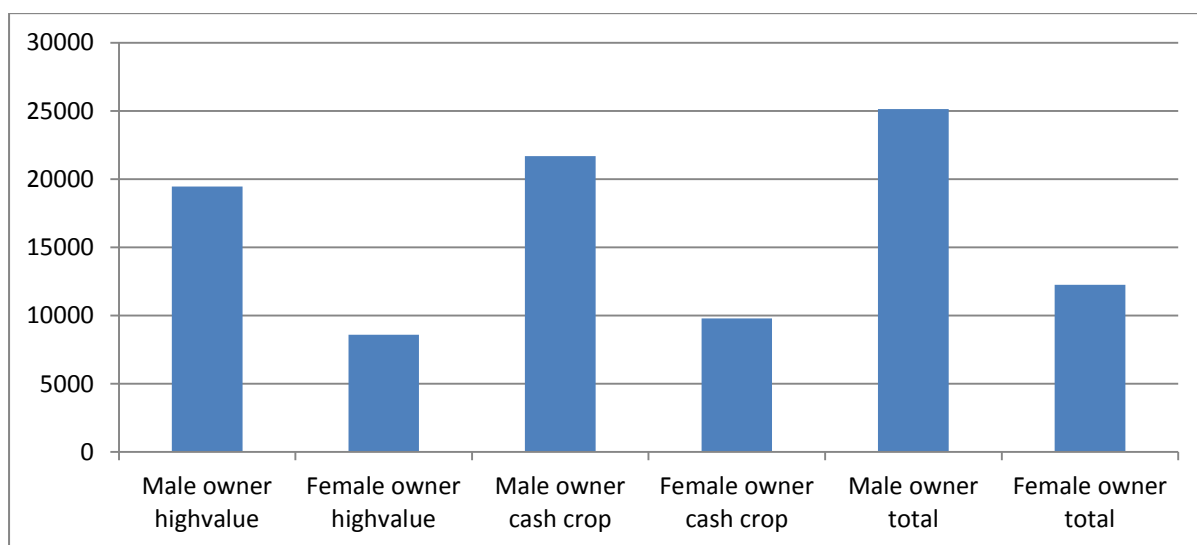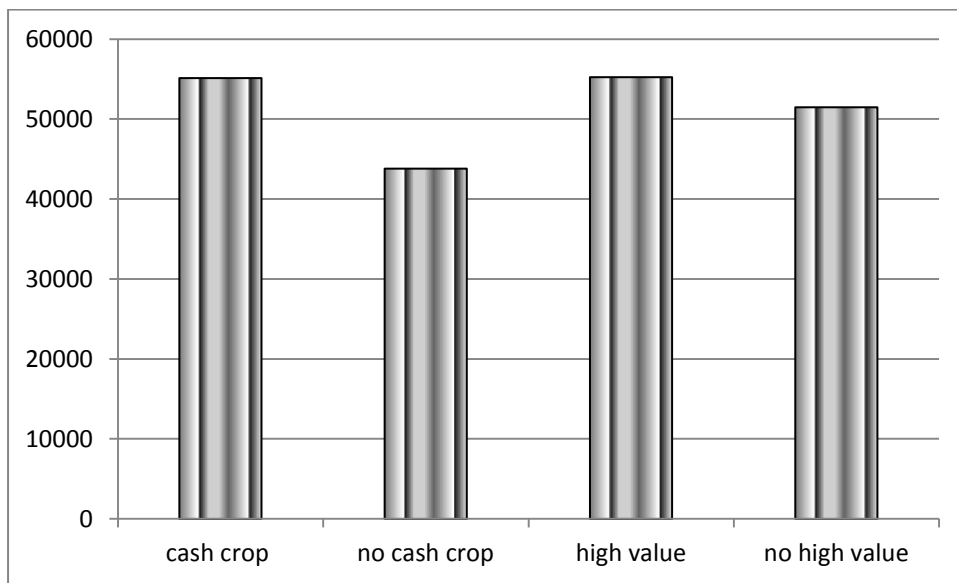**.Figure 1b: Value of production by male/female agricultural ownership**

Figure 2: Impact of cash (or high value) crop production on household consumption

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