Land rights and the impact of farm input subsidies on poverty convergence

Mwale, Martin Limbikani and Kamninga, Tony Mwenda

Department of Economics, University of Stellenbosch, Cape town, South Africa, Equity and Social Policy Department, ODI, London, United Kingdom

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Abstract

Notwithstanding the global significant progress in reducing poverty over the last two decades, still many people live in poverty. Consequently, social protection remains key to welfare sustainability. In this paper, we used longitudinal data from Malawi to examine the impacts of farm input subsidies on poverty convergence. Convergence is coined here as the reduction in persistence of poverty over time. We specifically estimated the response of poverty convergence in a current period, to farm input subsidies that were provided in a prior period, to understand if the programs build sustainable welfare resilience among poor households. We analyse the convergence in two opposing land rights regimes: matrilocal settlements where only women hold rights to land, and patrilocal settlements where only men hold rights to land. Matrilocal and patrilocal settlements offer varying incentives to household heads, who are often men, of investing in familial land. We find that farm input subsidies lead to poverty convergence, only in settlements where men hold rights to land and receive the subsidies on behalf of their households. Poverty convergence is non-responsive to the subsidies in settlements where men receive the subsidies on behalf of their households, while women together with their extended families, hold rights to the land. We further find that the impact of farm input subsidies on poverty convergence is significant in a year when Malawi faced drought, suggesting that the subsidies built sustainable resilience, against an unanticipated climatic shock, in poor households. The paper calls for anti-poverty policies to target poor people while paying attention to their landholding traditions shared prosperity, is to be achieved.

Keywords: Poverty Convergence; Subsidies; Land rights; Resilience; Shared Prosperity; Malawi
JEL Classifications: D1; D6; H2; H5; O1; O2; Q1

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1 Introduction

Poverty remains one of the pressing issues in the current development policy (The World Bank, 2018), despite numerous efforts to curb its spread at both national and international levels (United Nations, 2015; Government of Malawi, 2012, 2017). In Malawi, poverty stagnated around 50 percent during implementation of the Millennium Development Goals (MDGs) (Government of Malawi and National Statistical Office, 2014). Malawi's poverty remains around 50 percent, as the country pursues Sustainable Development Goals (SDGs) (NSO, 2021). Like in most poor Sub-Saharan African countries, Malawian poverty is closely linked to climate variability (The Economist, 2019; Asfaw et al., 2016). Particularly, because 84 percent of the Malawian population depends on rain-fed agriculture (Asfaw et al., 2016), droughts expose the country to abject poverty (Winsemius et al., 2018). Social protection especially in periods before such negative climatic shocks occur, should therefore not only be viewed as a distributional virtue, but also a long-term investment in building resilience against welfare losses among vulnerable households.

Farm Input Subsidy Programs (FISP) are government social protection policies touted to reduce poverty through sustained food security (Chibwana et al., 2014; Chirwa and Dorward, 2013). In Malawi, a FISP targets poor farmers through household heads (Djurfeldt et al., 2018). By targeting the poor, the program is hoped to reduce poverty, and induce shared prosperity through reduction of the welfare gaps between the wealthy and the poor (Mwale et al., 2021b). The Government of Malawi established the FISP in 2006 (Harou, 2018), and has implemented it to date. The stagnant poverty amidst continued implementation of FISP, therefore, invites questions that until the present remain under-investigated in the FISP literature. Does the subsidy not reduce poverty and inequalities at all, or does it selectively do so with no aggregate country effects? These questions suggest that the context in which the FISP is implemented needs adequate understanding.

One of the important contextual factors that has the potential to mediate the impacts of FISP on poverty and inequality is rights to land. Malawian land is mostly held under customary law (Berge et al., 2014), and it is acquired through inheritance (Lovo, 2016). Only a child who settles in their natal community when they reach a certain age, inherits land (Benjamin, 2020). The settlement patterns follow either matrilineal or patrilineal kinship traditions (Kishindo, 2011). Upon marriage, patrilineal couples reside in the groom's village, a settlement pattern known as patrilocal, while matrilineal couples can live in either the natal village of the bride, in a settlement pattern called matrilocal, or reside in a patrilocal settlement (Lowes, 2020). Therefore, only one partner in the marriage owns land at a time, and it can only be the man or the woman depending on post-marriage settlement practices at play.

Malawian households are predominantly patriarchal: men make most of the decisions about resource use and allocation (Chikapa, 2021). By implication, men control how FISP inputs are used, and how produce, as a result of FISP, is distributed within households (Mwale et al., 2021b). Moreover, the FISP program directs that inside households the recipient should be the husband (Djurfeldt et al., 2018). Therefore, the impacts of FISP on household welfare could manifest, conditional on men's farm investment behaviour. However, due to land insecurity, matrilocal men often make little investment in land because it is owned and largely controlled by wives and the wives' clans (Walther, 2018; Place and Otsuka, 2001). Matrilocal men could then be less willing to invest the FISP in the familial land [1], or at least, be less inclined to provide adequate labour in household farms, to complement the FISP inputs. The impacts of FISP on poverty and inequality could therefore be limited to patrilocal settlements where FISP holders (men) are motivated to invest largely in familial land, since they own the land and fully control its produce.

A small literature in Economics quantifies the impacts of farm input subsides on poverty (Smale et al.,

[1] There is evidence that some beneficiaries sell the FISP inputs (Chibwana et al., 2012). However, this evidence is not well captured in national surveys because beneficiaries fear that revealing this behaviour could lead to exclusion from the program for the subsequent years

2019; Mkwara, 2013; Arndt et al., 2016; Funsani et al., 2016; Mason et al., 2017; Wossen et al., 2017). While there is agreement that the subsidies reduce poverty, these studies ignore a number of aspects that could inform the design, implementation, and evaluation of social protection policies like the FISP. Firstly, they do not investigate whether inequalities in poverty reduce due to the subsidies. Nevertheless, it is possible that some poor people progress out of poverty even when they do not move above the poverty line, which is a sign of progress towards shared prosperity. Secondly, they ignore the role of land rights in mediating the impacts of subsidies on the poverty inequalities. However, absence of land rights is well known to affect investment decisions (Hall and Kepe, 2017; Deininger et al., 2019; Engblom and Isacsson, 2019), and therefore could limit the impacts of the subsidies on poverty inequalities. In addition, the literature is limited to examining changes in poverty in response to instantaneous subsidy receipt. However, building resilience to current poverty shocks demands a social protection investment base of earlier periods (Johnson and Krishnamurthy, 2010). Otherwise, the remedial impacts of instant subsidies on contemporary negative shocks to welfare, could only be short-lived.

In this paper, we analyse the impacts of farm input subsidies on poverty convergence among Malawian households. We define convergence as whether, over time, poverty became less persistent among households that were poor at the baseline. To understand the mediating role of land rights on the impacts of FISP on poverty convergence, we split the analysis by matrilocal and patrilocal settlements. Assuming households have homogeneous preferences, poverty should reduce, over time, at a higher rate in patrilocal settlements than matrilocal settlements, because the patrilocal FISP is the responsibility of men who could have interest in investing it in the household farm. This is unlike the FISP that is with their matrilocal counterparts. We use the Malawi Integrated Household Panel Survey (IHPS) that provides four waves of longitudinal data for the years of 2010, 2013, 2016, and 2019. This time period is key, because in 2016, Malawi experienced drought which instantaneously eroded livelihoods. The year 2016 therefore allows investigating whether subsidy programs in the past built resilience to unanticipated climatic shocks of the future, within poor recipient households. Comparing the 2016 results to the other years that had more stable rains also allows understanding whether the subsidies are key to poverty convergence in either good or bad economic environments.

We found that in years where Malawi did not experience drought, poverty convergence was non-responsive to the FISP which was provided to the poor in a prior period- prior FISP did not adequately thrust the welfare of the poor to catch up with that of the wealthier, in a good economic environment. However, in the year in which Malawian households faced a drought (2016), FISP that was provided in a prior period led to a high poverty convergence for the poor beneficiaries. This was likely because the FISP built resilience that cushioned its beneficiaries against the impacts of the drought on their welfare. The impacts of the subsidy on poverty convergence were limited to patrilocal settlements; we did not find similar impacts of the subsidy in matrilocal settlements. We argue that the stagnation of poverty in matrilocal settlements confirms that the FISP is under-invested in these areas, because its holders have less interest in enriching the household land whose proceeds are controlled by their wives and the extended family of the wives (Walther, 2018). Considering that matrilocal settlements dominate Malawi (Johnson, 2018), our results could illuminate why poverty has stagnated in the country despite numerous agriculture policy efforts that fight poverty at household level.

Our paper contributes to several strands of literature. Firstly, we add to scholarly work on the impacts of farm input subsidies on poverty. While previous evidence (Smale et al., 2019; Funsani et al., 2016; Mason et al., 2017; Wossen et al., 2017) reveals that the subsidy programs reduce poverty on aggregate, we show that heterogeneity in the impacts of the subsidies on poverty exist. Particularly, the Malawi FISP cushions poor farmers against adverse climatic shocks only in settlements where land rights and entitlement to the subsidies intersect. Secondly, we add to literature on targeting efficiency of welfare programs. While previous evidence (Mason and Jayne, 2013) suggests that targeting welfare programs towards women unambiguously

increases household welfare, we argue that if farm input subsidies are to attain such household welfare benefits, targeting only women is not a panacea, but rather targeting them while enforcing women's rights to land is key. This is because in communities where women only *de jure* own land, but not *de facto* own and control the land, poverty remained persistent in our sample. In addition, we speak to the literature on social protection. While studies (Miller et al., 2010; Pauw et al., 2016; Mason et al., 2020; Brugh et al., 2018) show that government programs are merited on their ability to either eliminate or fail to eliminate poverty, we argue that progress out of poverty across different arrays of welfare stress should also be included as an evaluation criterion. We show that even without inducing poverty convergence in normal times, the Malawi subsidies cushioned poor farmers against drought.

In section 2 which follows this one (section 1), we describe the data that we used to establish our findings. The emphasis is also placed on describing the context for the study and the variables of interest that we examine in the analysis. In section 3 we outline a conceptual framework that suggests how the mediating role of FISP on poverty convergence could manifest. We shed more light on how land rights regimes could lead to heterogeneity in the mediating role of FISP. In section 4 we present methods that we adopted, and section 5 presents the results. Section 6 discusses the results, while section 7 concludes the paper.

2 Context and Data

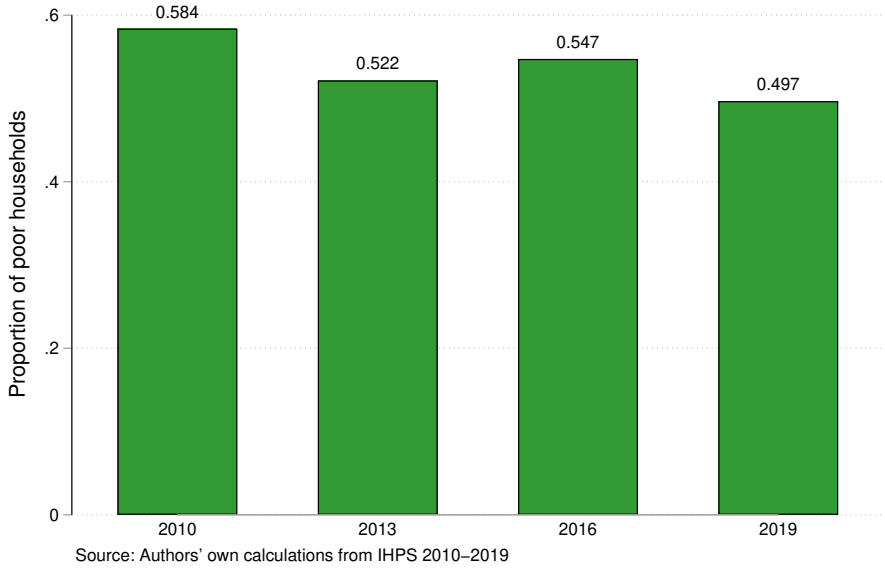
Malawi is a country that is well known for high levels of poverty, and its main livelihood is subsistence farming on small pieces of land (The World Bank, 2018). Malawian farming is largely rain-fed, such that climate variability is highly correlated with poverty in the country (Asfaw et al., 2016; IMF, 2017). In the past 36 years Malawi has experienced major droughts, with a more recent one in the 2015/2016 growing season (The World Bank, 2016; Katengeza and Holden, 2021). The negative impacts of drought are more pervasive in rural Malawi (Ajefu and Abiona, 2020; Asfaw and Maggio, 2018), where most farmers reside (GoM, 2020).

The data used in this paper are from four rounds of the Malawi Integrated Household Panel Survey (IHPS), an ongoing longitudinal research of Living Standards Measurement Study-Integrated Household Surveys (LSMS-ISA), that collects most of its information from rural Malawi. With technical support from the World Bank, the Malawi National Statistical Office (NSO) administers the IHPS. The IHPS is nationally representative across all regions and districts of Malawi. The baseline year was 2010, and the research is due to continue in the coming years. A cohort of 3,104 households residing in 204 Enumeration Areas (EAs) was followed in 2013 from the baseline of 2010. After 2013, split households increased.

Household split occurs when some members of the original living structure form their own homes in subsequent survey waves, often because of new marriages among members who were unmarried in the previous waves. Due to the rising cost of tracing the newly-formed households, in 2016 the Malawi NSO reduced the number of households that were targeted for interviews. From the 2010 baseline, 1,989 households were traced in 2016. These households resided in 102 out of the original 204 EAs. Following all the 1,989 households including their split households increased the sample to 2,508. The final wave of 2019, followed these 2,508 into their locations, including their split households, which further increased the final sample to 3,178.

Poverty was captured as a dummy for headcount. Households that were below the poverty line were assigned a value of 1, while those above the poverty line were assigned a value of 0. We used poverty at time t as a dependent variable. Figure 1 shows poverty distribution in our sample. Limited progress towards poverty reduction occurred between 2010 and 2019. From 2010 to 2013 poverty reduced by 12 percent. In 2016, poverty increased by 5 percent, before reducing by 10 percent in 2019. The hike in poverty for 2016 likely resulted from the drought that occurred in the year (The World Bank, 2016). This outcome also

Figure 1: poverty headcount over time



confirms that climate variability closely associates with poverty in Malawi, due to the country's dependence on agriculture, and rain-fed farming in particular. It is therefore not surprising that Malawi's anti-poverty policy mainly targets agriculture, with FISP as the key strategy.

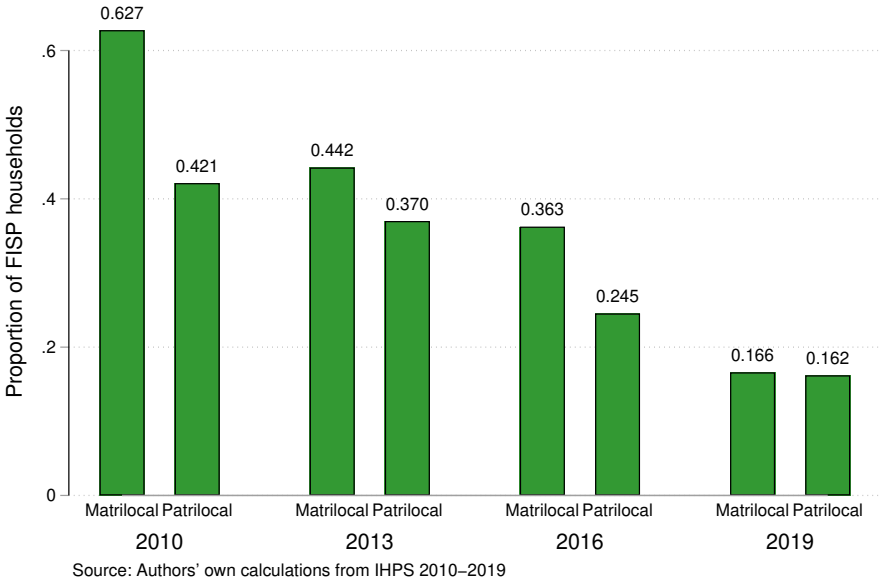
The IHPS captured FISP participation using a dummy variable, which we used as the main treatment: 1 represented beneficiary households while 0 represented non-beneficiary households. The Malawi FISP is a package that contains four vouchers. Two of these vouchers can be used to redeem 100kg of maize fertiliser: 50kg of basal dressing fertiliser and 50kg of top dressing fertiliser (Mwale et al., 2021a). The other two vouchers can be used to redeem maize seed. The Malawian Government covers about 80 percent of the market cost for the subsidised inputs, and farmers contribute the remaining 20 percent (Harou, 2018)[2]. FISP beneficiaries are *productive poor* farmers that are permanent residents of their communities and hold land for maize cultivation (Basurto et al., 2020).

Since 2008, FISP changed its goals from increasing productive efficiency of maize, to social protection (Lunduka et al., 2013). The social protection focus increased the proportion of poor farmers in the beneficiary list (Lunduka et al., 2013). However, the total number of beneficiaries declined over time (Mwale et al., 2021a), until 2020 when the FISP was replaced by the Affordable Inputs Program (AIP) (Malawi Anti-Corruption Bureau, 2021). The AIP aims to abolish targeting and extends the program to all smallholder farmers in Malawi(GoM, 2020).

Figure 2 shows the distribution of FISP beneficiaries over time in our sample. We split this distribution by settlement patterns, which also represents different land rights regimes. Figure 2 confirms that FISP reduced the proportion of beneficiaries between 2010 and 2019. More beneficiaries, as a proportion of total population within a settlement, were selected from matrilocal communities in comparison to patrilocal communities. The difference in proportion of FISP beneficiaries between matrilocal and patrilocal settlements is larger in the period from 2010 until 2016. In 2019, the two settlement patterns received FISP in similar proportions.

[2]Harou (2018) notes that the government contribution has been changing in different years, but the range is from 64 to 91 percent.

Figure 2: FISP and settlement patterns over years



In Table B.1 of Appendix B we present the characteristics of matrilocal and patrilocal settlements across years. In 2010 more matrilocal households than patrilocal households were poor, and the proportion of FISP beneficiaries was significantly higher in matrilocal relative to patrilocal settlements. In 2013 poverty reduced in matrilocal areas such that there were no significant differences in poverty by settlement types. However, the FISP still selected more beneficiaries from matrilocal settlements. In 2016, poverty increased in matrilocal settlements and became statistically higher for the matrilocal settlements, when compared to poverty in patrilocal settlements. In 2019, there were no statistical differences in either poverty or FISP distribution by settlement patterns. This is confirmed by Table C.2 of Appendix C which shows that all years but 2019 had differences in distribution of FISP across the settlement patterns. However, without differentiating by these settlement patterns more FISP beneficiaries were poor than Non-FISP beneficiaries, as revealed in Table Table C.2.

In general, these outcomes suggest that poverty and matrilocal settlements intersected strongly to determine the distribution of FISP. Moreover, Table B.1 of Appendix B confirms that FISP is a social protection strategy. Particularly, matrilocal settlements have low annual average rainfall across all four years, suggesting that they are prone to negative climatic shocks. Matrilocal settlements are also generally found in communities that are densely populated, which implies that they hold the smallest pieces of land. In addition, most matrilocal settlements are found in remote areas with poor access to roads. Furthermore, in 2016 and 2019, matrilocal settlements were highly targeted by the Malawi Social Action Fund (MASAF), a program that finances self-help projects, and transfers cash to vulnerable households (Kishindo, 2001).

Malawi has three regions, north, central, and south. The northern region of Malawi is predominantly patrilocal, the central region is mixed, while the southern region is largely matrilocal. Malawian poverty distribution also follow these unique spatial patterns. Across many years, poverty has been highest in the southern region, seconded by the northern, then the central region (NSO, 2012, 2021). As such, Malawian anti-poverty interventions, such as FISP, mainly focused on households in the matrilineal-matrilocal predominant southern region.

Figure 3: FISP, settlement patterns, and regions

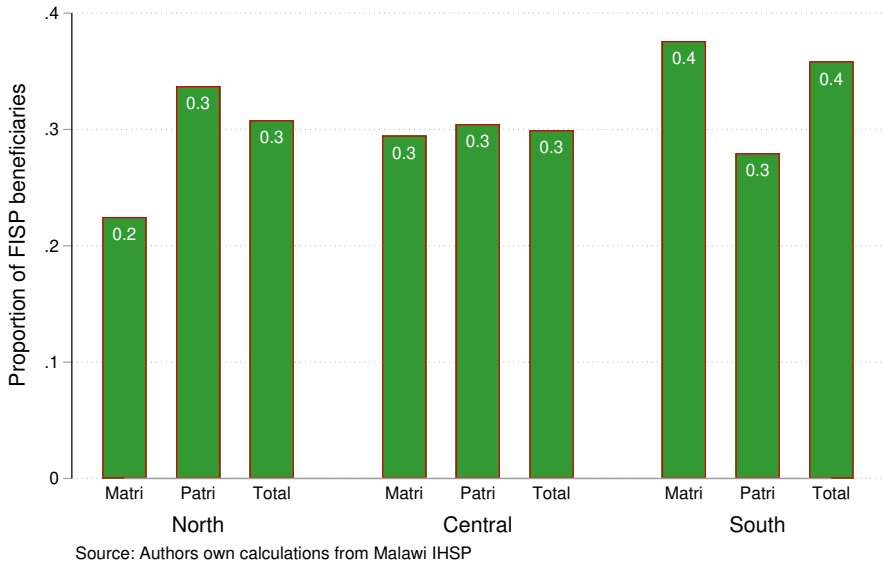


Figure 1 shows that between 2010 and 2019, 40 percent of households in southern region received FISP, while 30 percent of households received FISP in the northern and central region, during the same period. Regarding spatial patterns of poverty by settlement customs, Figure 1 reveals that the southern recipients were predominantly matrilocal, while the northern recipients were predominantly patrilocal. The central region had no custom differences in the distribution of FISP.

It is therefore evident that matrilocal settlements comprise more vulnerable households and receive more social welfare support, relative to patrilocal settlements. Nevertheless, whether the social welfare support through programs such as FISP affects poverty inequalities differently within these two settlement types, remains an empirical question that we conceptualise below.

3 Conceptual framework

To understand how FISP impacts poverty convergence among different land rights regimes, we draw insights from the general economic convergence hypothesis (Rassekh, 1998), which is a key implication of neoclassical growth modelling (Solow, 1956; Swan, 1956). The economic convergence hypothesis, particularly its branch of the income convergence hypothesis, states that the welfare differential between the wealthy and the poor countries should systematically diminish over time (Rassekh, 1998; Lyncker and Thoennessen, 2017). Several authors (including (King and Ramlogan-Dobson, 2015; Rivas and Villarroya, 2017; Oh and Evans, 2011; Lichtenberg, 1994) tested the hypothesis at macro level. Recently, micro studies have extended the hypothesis to examine convergence in non-income indicators. An example is the medical literature which examines nutrition convergence among children under the age of five (see (Balla et al., 2021; Outes and Porter, 2013). In this paper we adapt the income convergence hypothesis to estimate changes in poverty over time within households. Our important contribution to this framework is establishing whether farm input subsidies accelerate reduction in poverty stagnation differently, under opposing land rights regimes.

Therefore, consider two homogeneous households i_1 and j_1 residing in community c_1, that differ only

in their liquidity constraints. If both households receive a uniform resource transfer from government that can be invested in time $t-1$, and household i_1 faces larger liquidity constraints than household j_1, the marginal increase in consumption due to the resource in time t should be higher in j_1 than i_1. This assumption has been empirically proven for the Malawi FISP by (Mwale et al., 2021a). The authors show that poor Malawian households that benefited from FISP in prior periods increased consumption, in their contemporary period, by a larger magnitude than wealthier households that benefited from the FISP.

Since the resource must be invested to produce enduring consumption effects in the long run, let us add another two households i_2 and j_2 that are identical to i_1 and j_1 respectively, but reside in a community c_2 that offers lower investment incentives for the government resource than community c_1. The enduring effects of the resource on future consumption could be weak or non-existent in household i_2 and j_2, such that a large consumption gap between the wealthy and the poor could remain persistent, because the impacts of the resource are too weak to allow welfare to catch up, or at least to make significant progress towards catch up. In Malawi, Walther (2018) confirmed that communities offer differing incentives for investment in households farms, due to variations in land inheritance customs. This could therefore alter how FISP is invested, hence the magnitude of its impacts against poverty persistence within beneficiary households relative to non-beneficiary households.

Particularly, matrilocal land inheritance customs provide land rights to women, but not to their husbands (Berge et al., 2014), while the opposite is true for patrilocal customs that confer land rights to husbands, but not to wives (Walther, 2017). Matrilocal men are therefore well known for being less supportive to investing in household farms, relative to their patrilocal counterparts (Walther, 2018). However, husbands receive the Malawi FISP on behalf of their households in either custom (Djurfeldt et al., 2018). Consequently, FISP is in the hands of men who are willing to invest it in familial land in patrilocal, but not matrilocal settlements. Therefore, poverty convergence, also coined here as a lower degree of poverty persistence over time, likely accelerates due to FISP in patrilocal, but not matrilocal settlements.

However, poverty convergence could happen because the poor, who are targeted by FISP, experience a consumption growth rate that is higher than that of the relatively wealthier, in an economically stable environment. Alternatively, poverty convergence could result from a reduction in the consumption growth rate of the relatively wealthier due to a negative economic shock, when that of the poor who are targeted by FISP remains the same in the same economically unstable environment. Thus when the poor beneficiaries are resilient due to the FISP cushion. A third possibility is where convergence happens only in an economic crisis because, in normal circumstances, FISP fails to propel the poor by a magnitude that is large enough to catch up with the wealthier people's consumption growth rate. Therefore, the FISP convergence that we anticipate in patrilocal settlements could manifest as any of the three possibilities, subject to the prevailing economic environment. We employ quantitative methods to uncover the possibility which is at play in our data.

4 Methodology

4.1 Empirical strategy

To estimate the impact of FISP on poverty convergence along different land rights regimes, we build econometric models specified as follows.

$$Poor_{it} = \beta_1 \text{Poor}_{it-1} + \beta_2 \text{FISP}_{it-1} + \beta_3 \text{Poor}_{it-1} \times \text{FISP}_{it-1} + \eta \mathbf{X}_{it-1} + \epsilon_{it-1} \quad (1)$$

In Equation 1 $Poor_{it}$ shows whether a household i is below the poverty line in year(t) while $Poor_{it-1}$ shows whether it was below the poverty line in year (t-1). $FISP_{it-1}$ entails whether in year(t-1) a household

benefited from FISP. Poverty convergence is captured by the parameter β_1. If β_1 is close to 1, households that were poor in the previous period $t-1$ more likely remained poor over time: poverty was persistent. A β_1 that is close to 0 entails that households that were poor in period $t-1$ more likely became less poor: poverty became less persistent. Less persistent poverty entails presence of convergence over time, while more persistent poverty shows that there is no poverty convergence over time. When poverty is perfectly persistent ($\beta_1 = 1$), the poor are stuck in a poverty trap, while when poverty is perfectly convergent ($\beta_1 = 0$), the poor catch up with the non-poor: the poor move above the poverty line. Any value between 0 and 1 entails partial convergence. Assuming convergence exists, one would wish to understand factors that necessitate transition out of poverty. In models such as that in Equation 1, this transition is captured as a change in probability of falling into poverty (β_1) as a household is exposed to other factors on the right hand side of the equation.

In this paper, we choose FISP as the mediating factor of interest. To understand how FISP mediates poverty convergence, we interact the FISP at time $t-1$ with baseline poverty status, $\text{Poor}_{it-1} \times \text{FISP}_{it-1}$. β_3 captures the impact of FISP received in time $t-1$ on poverty in time t, for households that were poor in time t. The reference category are households that were poor at time $t-1$, but did not receive FISP. Poverty convergence for the poor households that received FISP is therefore measured by $\beta_1 + \beta_3$. If β_3 is negative, then FISP contributes to a reduction in poverty persistence, thus increasing the probability that the poor catch up with the wealthy by moving the consumption up towards the poverty line. Whether this FISP pushes households above the poverty line is captured by $\beta_2 + \beta_3$. If β_3 is insignificant, then the poverty convergence observed in β_1 is not mediated by FISP.

Measuring FISP with a lag attains two methodological advantages. First, it allows matching the baseline FISP to the point at which convergence is calculated, because baseline poverty is also captured at a similar time. Second, lagged FISP evades estimation bias that is caused by reverse causality. Thus, households could essentially be beneficiaries of FISP at point t because of their poor status in period t, but poverty at point t cannot influence selection into FISP at time $t-1$, in reverse.

Considering that the effects of FISP on poverty convergence could generally differ by how effective the households invest the subsidised inputs under different land rights regimes, we estimate separate Equation 1s for matrilocal and patrilocal settlement arrangements.

$\mathbf{X}_{j,c,t-1}$ contains control variables for household j, that resides in community c at time $t-1$ added in the estimations, while ϵ_{it-1} is the error term. Inclusion of the control variables aims to reduce estimation bias[3]. However, some bias that is unobserved by the researchers could emerge because in either land rights regime, selection of FISP beneficiaries is non-random. Specifically, the *productive poor* (Basurto et al., 2020) attribute of selecting FISP beneficiaries could entail that our treatment variable is prone to other vulnerability traits that could confound the impacts of FISP on poverty convergence. We minimise this additional bias using a propensity score re-weighting procedure[4].

4.2 Identification

The empirical problem faced by studies that examine the impacts of FISP on welfare outcomes is that selection into the program is non-random. Recipients must be poor farmers (Basurto et al., 2020). The poor can be poor because they lack adequate capital to change their welfare status. Holding production capital constant, the poor can also be poor due to low ability in the agricultural productivity. Therefore, the counterfactual for our estimations could be systematically different from the treatment group in ways

[3]For means and differences in the control variables across different land rights regimes, see Table C.2 in Appendix B

[4]We made an attempt to use an instrumental variables approach-the Lewbel (Lewbel, 2012, 2018), to reduce the bias in FISP selection. However, our sample did not satisfy the instrumental relevance procedure as all first-stage F-statistics were below the rule of thumb of 10

that are unobservable to researchers. However other attributes that signal poverty can be matched between the treatment and control group to improve the quality of the counterfactual.

Therefore, to identify the impacts of FISP on poverty convergence we follow Karamba and Winters (2015) who re-weights models on the impacts of FISP using Inverse Propensity Weights (IPW) (More details on the theoretical foundations of the IWP can be found in Hirano and Imbens (2001)). IPW is appropriate because it reduces estimation bias. IPW creates probability weights of participation in a treatment group and apply their inverse on the control group. This enables the characteristics of the two groups resemble each other, allowing variation in the two groups to emerge from only the treatment.

The first step of the IPW involves estimating a Probit function of factors that affect household selection into FISP, as shown in Table C.3 of Appendix C. The function is employed on baseline characteristics of households [5]. The coefficients are used to generate propensity scores of FISP selection ($p_{j,c,t-1}$), that re-weight Equation 1 to reduce estimation bias.

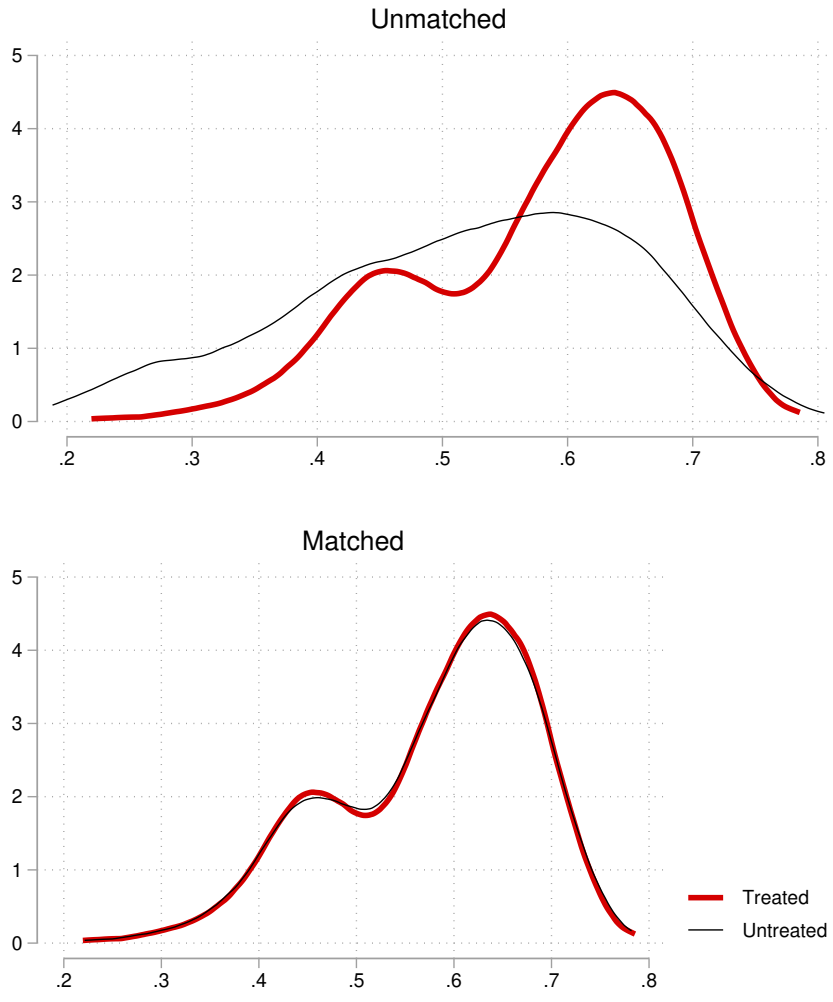
Observations that are treated (received FISP in time $t-1$) are re-weighted by 1. The untreated (did not receive FISP in time $t-1$) are re-weighted by $\frac{1}{1-p_{j,c,t-1}}$. The re-weighting changes the distribution of the control group's attributes to resemble those of the treated group. Under Conditional Independence Assumption (CIA) (Gatzoflias et al., 2021; Pesaran, 2014), the remaining variation in poverty at time t is only due to poverty at $t-1$ and FISP received during $t-1$ [6]. Hence, poverty convergence, and the impacts of FISP on the convergence, can be measured with less bias.

Figure 4 shows how the propensity scores are spread between households that benefited from FISP (Treated) and those that did not (Untreated), in time $t-1$. The top panel shows the distribution before re-weighting. Most observations are within the region of common support. However, the means of the distributions do not perfectly overlap. The bottom panel shows the distribution after re-weighting. The means of the households that received FISP and those that did not receive FISP now coincide after the re-weighting. Figure 4 therefore confirms that re-weighting Equation 1 using IPW reduces estimation bias.

[5] In our case we used 2010 household characteristics as the baseline and the FISP measured in this function is that received in 2010

[6] We also understand that another form of bias could result from the Poor_{it-1}'s time invariant unobservable attributes. However, poverty is the main FISP selection criterion. As such, the propensity weights for FISP participation may be synonymous with those of falling into poverty. Therefore, the IPW could be simultaneously mopping out FISP_{it-1} and Poor_{it-1} endogeneity

Figure 4: Kernel density distribution of propensity scores of FISP and non-FISP households



5 Results

Table 1: The impact of FISP on poverty convergence in different settlements

	(1)	(2)	(3)	(4)	(5)	(6)
	Poor in 2013		Poor in 2016		Poor in 2019	
	Matrilocal	Patrilocal	Matrilocal	Patrilocal	Matrilocal	Patrilocal
Poor 2010	0.298***	0.318***				
	(0.080)	(0.075)				
FISP 2010	0.120	0.036				
	(0.084)	(0.082)				
Poor 2010 × FISP 2010	-0.122	-0.073				
	(0.093)	(0.094)				
Poor 2013			0.291***	0.381***		
			(0.055)	(0.084)		
FISP 2013			0.062	0.234***		
			(0.062)	(0.083)		
Poor 2013 × FISP 2013			-0.101	-0.221**		
			(0.069)	(0.102)		
Poor 2016					0.295***	0.268***
					(0.047)	(0.089)
FISP 2016					0.065	-0.036
					(0.062)	(0.116)
Poor 2016× FISP 2016					-0.089	0.046
					(0.068)	(0.126)
Constant	-4.044	-0.083	1.032	-2.516	4.914***	6.496***
	(2.978)	(1.973)	(1.491)	(1.728)	(1.333)	(2.122)
Household head controls	Y	Y	Y	Y	Y	Y
Household attributes	Y	Y	Y	Y	Y	Y
Community controls	Y	Y	Y	Y	Y	Y
Observations	988	807	1439	743	2272	732
P-value: $\widehat{\beta}_{Poor_{t-1}} + \widehat{\beta}_{FISP_{t-1}} \times Poor_{t-1} = 0$	0.001	0.000	0.000	0.012	0.000	0.001
P-value: $\widehat{\beta}_{FISP_{t-1}} + \widehat{\beta}_{FISP_{t-1}} \times Poor_{t-1} = 0$	0.961	0.443	0.221	0.839	0.375	0.852

NOTES: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

$Poorin2013; 2016; 2019$ are binary variables indicating whether a household observed in year t has percepita consumption that is below poverty line. $Matrilocal(Patrilocal)$ is where the community in which the household lives practices $Matrilocal(Patrilocal)$ post-marriage settlements.

Standard errors are clustered by enumerator area and displayed in parentheses. The sample is limited to farming households. Estimates are re-weighted using inverse propensity scores of FISP participation. $\widehat{\beta}_{Poor_{t-1}} + \widehat{\beta}_{FISP_{t-1}} \times Poor_{t-1} = 0$ is the test for joint significance for the total poverty persistence among poor farmers that received FISP. $\widehat{\beta}_{FISP_{t-1}} + \widehat{\beta}_{FISP_{t-1}} \times Poor_{t-1} = 0$ is the test of joint significance foer the total effects of FISP on poverty, in time t.

Source: Own calculations using IHPS, 2010-2013-2016-2019, data

Table 1 presents results for the test of poverty convergence, and the mediating role of FISP on the convergence, in different land rights regimes among Malawian households. For parsimony, we only present the main effects interest, while details that include coefficients of control variables are included in Table D.4 of Appendix D. Columns 1 and 2 show the relationship within a household, between poverty in 2010 and poverty in 2013. There is a 30 percent chance that matrilocal households that were poor in 2010 remained poor in 2013, while those of patrilocal households remained poor by 32 percent in 2013. Because these two probabilities are close to, but not equal to zero, households in either settlement experienced partial poverty convergence between 2010 and 2013. Because the interaction between the program and poverty in 2010 is not significant, this partial convergence that we observe in both settlements is not due to FISP.

Columns 3 and 4 present results for the test of poverty convergence using 2013 as the base year, and 2016 as the end year. In matrilocal settlements, households that were poor in 2013 likely remained poor

by 29 percent in 2016, while there is a 38 percent chance that patrilocal households that were poor in 2013 remained poor in 2016. Thus, either of the two settlement patterns experienced partial poverty convergence within this period. The convergence remains insensitive to FISP in matrilocal settlements. However, FISP mediates convergence in patrilocal settlements. Particularly, patrilocal households that received FISP in 2013 had only a 17 percent (0.38+(-0.21)) chance of remaining poor in 2016. The test for joint significance, P-value: $\widehat{\beta}_{Poor_{t-1}} + \widehat{\beta}_{FISP_{t-1}} \times Poor_{t-1} = 0$, confirms that this partial convergence of poverty among FISP households inside patrilocal settlements, is statistically significant.

Therefore, inequalities in poverty reduced among patrilocal households due to FISP in 2016, such that the poor that received FISP in 2013, were catching up with the relatively wealthier. However, as earlier highlighted in Section 3, this catch up could emerge because the welfare of poor FISP recipients increased while that of the wealthier remained the same. Alternatively, it could result from reduced welfare of the wealthier while that of poor FISP beneficiaries remained the same. Column 4 reveals that the total effects of FISP received in 2013 on poverty in 2016 is null. This is because the test for joint significance, P-value: $\widehat{\beta}_{FISP_{t-1}} + \widehat{\beta}_{FISP_{t-1}} \times Poor_{t-1} = 0$, is statistically insignificant. Therefore, it is likely that the partial convergence that we observe in 2016 among patrilocal settlements results from a reduction in welfare among both the wealthier and the poor who did not receive FISP, while that of the poor FISP beneficiaries did not reduce. Thus, FISP cushioned poor-recipient households from welfare depletion in 2016. The negative and significant Poor 2010 × FISP 2010 confirms that poor people who received FISP in patrilocal settlements are resilient to negative welfare impacts of the 2016 drought.

Columns 5 and 6 show results using 2016 as the base year and 2019 as the end year. Between these two periods convergence was 30 percent in matrilocal settlements, and 27 percent in patrilocal settlements. This partial convergence in either of the two settlements is however not related to FISP.

6 Discussion

In this paper we establish that FISP led to poverty convergence in patrilocal settlements - where men hold rights to land and receive FISP on behalf of their households. More specifically, we find that there is only a 17 percent chance that patrilocal households that were poor in 2013 remained poor in 2016 when they obtained FISP, while their counterparts who did not receive FISP remained poor with a probability of 38 percent. The convergence that is mediated by FISP is only evident in 2016, and does not extend to matrilocal settlements, where women hold rights to land under the command of the women's maternal uncles (Berge et al., 2014), while men receive FISP on behalf of their households (Djurfeldt et al., 2018). Further, we find evidence that non-FISP poverty convergence occurs across all years in the sample. However, both FISP and non-FISP convergence are partial, since their coefficients are not equal to zero.

Because the FISP-convergence occurred in 2016, a year when Malawi experienced drought (The World Bank, 2016; Katengeza and Holden, 2021), it is likely that recipient households were resilient to the adverse welfare impacts of the negative climatic shock. The resilience was built through enduring effects of the FISP over time, since we measured the impacts of the FISP received in 2013 by poor households on their probability to remain poor in 2016. Enduring effects of FISP on household welfare were also found by Ricker-Gilbert and Jayne (2017). These authors showed that households that received FISP in prior periods increased usage of fertiliser in the subsequent years, hence maize production also increased in response, over time. This could suggest that FISP has multiplier effects that sustain beyond the year in which a household benefited from the program. In our results, FISP might have improved the welfare base for poor households who benefited from it, such that their consumption remained high under the 2016 drought stress, in comparison to that of non-beneficiary households. The finding that this progress towards equality in welfare is limited to patrilocal settlements highlights how different rights to land affect the impacts of

FISP on poverty reduction.

Patrilocal rights to land are in the hands of husbands in nuclear families (Berge et al., 2014). Because decisions about resource use and consumption inside households are dominated by husbands not wives in both matrilocal and patrilocal settlements (Djurfeldt et al., 2018), the FISP becomes the responsibility of men. More likely patrilocal husbands invest the FISP in the household farms and provide labour to the farms to ensure effective use of the FISP resources. Moreover, Walther (2018) confirms that patrilocal husbands spend a great deal of time in household farms because their ownership and control of land guarantees them access to the farm produce. This is unlike matrilocal husbands who spend much of their labour hours working off household farms, where they fully control the proceeds of their labour(Walther, 2018) - only women hold rights to matrilocal land (Johnson, 2018), thus the women, together with their extended family largely control produce from household farms in matrilocal settlements (Walther, 2018).

Because the FISP comes to the nuclear family through husbands who, in matrilocal settlements, benefit less from the production process (Djurfeldt et al., 2018; Lunduka et al., 2013), it is likely under-invested in the matrilocal familial land[7]. Mwale et al. (2021b) confirms this hypothesis, showing that FISP has no impacts on household maize productivity in matrilocal settlements, while positive gains in maize productivity due to FISP exist in patrilocal settlements. This could explain why FISP builds resilience to negative climatic shocks only in patrilocal settlements.

Our paper not only provides compelling evidence about the impacts of FISP on poverty convergence, but also illuminates areas for further investigation. For instance, we show that non-FISP partial convergence occurs across all years under study, in both patrilocal and matrilocal settlements. Future research should investigate the effects of alternative social protection programs such as public works, on poverty convergence. Furthermore, the impacts of non-social welfare programs, such as access to free primary education, on poverty convergence, needs to be investigated. In addition, how these programs dampen the possible negative effects of non-agriculture, negative shocks on poverty convergence such as pandemics need to be considered. Understanding how to induce poverty convergence amidst pandemics is now more necessary than before as since 2019, the world has been fighting the Coronavirus disease (COVID-19) which has negatively affected most livelihoods across the globe (Bargain and Aminjonov, 2021; Diop and Asongu, 2021).

7 Conclusion

Poverty remains stagnant in most poor countries, justifying the inclusion of anti-poverty objectives in the global 2030 agenda of Sustainable Development Goals, despite poverty being the primary target of the SDGs predecessor Millennium Development Goals (MDGs). Using data from Malawi, our paper has established that farm input subsidies reduce inequalities in poverty through building household resilience against negative climatic shocks. We specifically showed that among poor households that benefited from the subsidies in periods prior to a drought, poverty became less persistent during the drought. Poor households that did not benefit from the program in the same period, experienced more persistent poverty. The results are limited to settlements where men hold rights to land and receive subsidies on behalf of their households, but not where women hold rights to land while men receive the subsidies on behalf of their households. Therefore, land rights and farm input subsidies intersect to induce household poverty convergence.

We argue that FISP does not build resilience to warrant poverty convergence in settlements where women, together with their maternal uncles, hold rights to matrilocal land, because the holders of the subsidies inside

[7]There is speculation that some beneficiary households sell FISP inputs after redeeming the vouchers (Chibwana et al., 2012). We are more inclined to believe that such sales are dominated by matrilocal husbands. However, data does not allow us to test this premise because respondents may be unwilling to reveal their involvement in these activities fearing disqualification from the FISP beneficiary list

nuclear households are husbands who have less interest in investing in familial land. Considering that the Malawi subsidy FISP goes to household heads (Djurfeldt et al., 2018), who are often men, could directly targeting the FISP towards women in matrilocal settlements derive the much needed welfare improvements that could lead to poverty convergence? Although our paper does not provide an answer to this question, the organisation structure of matrilocal settlements led us to conclude otherwise.

Matrilocal rights to land are *de facto* held by the women's maternal uncles, even though women are the *de jure* land owners (Berge et al., 2014). FISP that is transferred to women could therefore more likely end up in the hands of their uncles. Assuming targeting the nuclear households of the women was based on dire vulnerability, the FISP will be less effective in inducing poverty convergence as some resources move to the women's extended family. Therefore, if subsidies are to be relied upon as a strategy that should also induce poverty convergence in matrilocal settlements, perhaps women's rights to land need to be asserted. Thus, matrilocal women, not their uncles, should, *de facto*, control land, and the subsidy should be given directly to the women who cultivate the familial land, not their husbands who often work outside the household farm (Walther, 2018).

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Appendices

A The poverty methodology

This Appendix explains our poverty methodology. Households consumption was used as our poverty metric, and included a number Food and non-Food items obtained from the Malawi IHPS data. The food items include: a) **cereals, grains and cereal products** such as maize flour, rice , bread, spaghetti etc; b)**roots, tubers and plantains** such as cassava tubers, sweet potato, bananas and cocoyams (*masimbi*) etc; c)**Nuts and Pulses** such as beans, groundnuts, soya macademia etc; d) **vegetables** such as onions, cabbages, cucumbers, tomatoes, okra, mushrooms etc; e) **Meat, Fish and Animal products** such as eggs, fish, beef, pork, goat, termites etc; f) **Fruits** such as Mangoes, avocado, papaya, wild fruits etc; g) **cooked foods from vendors** such as boiled maize, samosa, doughnuts, *mandazi*, *kalongonda*, boiled groundnuts etc; h) **milk and milk products** such as fresh and powdered milk, *chambiko*, yoghurt, margarine etc, i) **sugar, fats and oils** such as sugar, sugarcane, and cooking oil etc j) **beverages** such as tea coffee, *sobo* squash and fruit juices *maheu*, *kachasu*, *chibuku*, freezes etc; k) **spices and miscellaneous** such as salt, yeast, jam, sweets and honey etc.

Non food items include charcoal, paraffin, candles, newspapers, public transport, soap, toiletries, vehicle spare parts, wages paid to servants, clothes, mosquito nets, mattress, cement, paint, bricks funeral costs, marriage ceremony costs, *lobola*, desks, computer equipment, satellite dish and generators etc. This is the full list of the items as listed in the IHPS household questionnaire, and can be found on the World Bank micro-data portal[8].

We adjusted nominal consumption values for cost of living, to enable the poverty analysis. These adjustments were spatial and temporal, and all adopted from the IHPS. The spatial adjustments dealt with differences on cost of living over locations. IHPS spatial price indices adjusted the cost-of-living across regions. Temporal adjustment were implemented by combining unit values of food items from the IHS data and NSO nonfood Consumer Price Indices (CPI). A unit price was generated by dividing total household expenditure on the Food and Non-Food items by the total quantity of the items purchased on the market. We generated unit prices for food expenditure and non-food expenditure, separately.

The questions in the data use recall. Subjects were asked to provide their expenditure in past one week or one month or 3 months. To generate total annual household expenditure, we multiply weekly expenditure by 52.143 weeks, monthly expenditure by 12 months, and quarterly expenditure by 4 months. The total annual consumption expenditure, therefore, is a sum both food and nonfood expenditure across all the three recall questions. Using the total annual consumption expenditure, we generated total annual household per-capita consumption by dividing the expenditure by household size.

A household was considered poor is its annual per-capita consumption fell bellow the basic needs basket that cost K37000 in 2010, K85852 in 2013, K137428 in 2016, and K137428 in 2019. Except for the 2010 poverty line, which we obtained from the IMF bulletin (IMF, 2017), the poverty lines for the remaining years (2013;2016;2019) were readily provided in the IHPS data across the waves.

[8] https://microdata.worldbank.org/index.php/catalog/3819

B Descriptive statistics

Table B.1: summary of variables used in the analysis

	(1)	(2)	(3)	(4)	(5)	(6)
	2010			2013		
	Matrilocal	Patrilocal	t-test	Matrilocal	Patrilocal	t-test
Poor	0.730	0.482	0.248***	0.539	0.501	0.038
FISP	0.627	0.421	0.206***	0.442	0.370	0.072**
Male-headed household	0.706	0.833	-0.127***	0.743	0.802	-0.059**
Age of the head	42.424	40.987	1.437	42.307	41.521	0.787
Household size	4.653	4.809	-0.155	4.841	5.097	-0.256*
Number of households in the community	916.459	1494.445	-577.986***	1186.564	1082.935	103.628
All seasons road access to the community	0.639	0.525	0.114***	0.832	0.921	-0.089***
Daily market in the community	0.236	0.237	-0.001	0.520	0.573	-0.053*
Micro finance institution in the community	0.060	0.101	-0.041**	0.174	0.212	-0.038*
MASAF program in the community	0.131	0.158	-0.027	0.584	0.832	- 0.248***
Annual average rainfall	803.223	853.946	-50.723***	814.725	851.405	-36.680***
Observations	665	956	1621	1093	897	1990
	2016			2019		
	Matrilocal	Patrilocal	t-test	Matrilocal	Patrilocal	t-test
Poor	0.599	0.462	0.137***	0.500	0.487	0.013
FISP	0.363	0.245	0.117***	0.166	0.162	0.004
Male-headed household	0.731	0.779	-0.049**	0.717	0.785	-0.067***
Age of the head	42.714	42.097	0.617	41.951	41.570	0.380
Household size	4.816	5.016	-0.200*	4.609	4.611	-0.003
Number of households in the community	2284.824	1536.866	747.958***	4853.569	872.559	3981.010***
All seasons road access to the community	0.746	0.781	-0.036*	0.664	0.880	-0.217***
Daily market in the community	0.388	0.408	-0.020	0.392	0.374	0.018
Micro finance institution in the community	0.261	0.129	0.132***	0.263	0.285	-0.022
MASAF program in the community	0.792	0.536	0.255***	0.661	0.620	0.041*
Annual average rainfall	859.481	887.497	-28.016***	832.984	844.807	-11.822**
Observations	1570	938	2508	2375	803	3178

C Determinants of household selection into the FISP program

FISP was established to enhance household income through sustained food self sufficiency (Chibwana et al., 2014; Chirwa and Dorward, 2013). As such, selection of beneficiaries into the program has often emphasised targeting vulnerable households. The main attribute is that beneficiaries must be poor farmers who cannot afford market priced fertilizer, and hybrid seeds (Ricker-Gilbert and Jayne, 2017; Holden and Fisher, 2015). To emphasise the vulnerability, in 2008, FISP included explicit pro-poor characteristics for selection that include female headed households and households of the elderly (Chibwana et al., 2014). At regional and district levels, FISP originally provided more vouchers to areas with more maize land, until 2008. After 2008, the emphasis of vulnerability led to increased number of beneficiaries in areas with large numbers of households, often the southern region district of Malawi, which are predominantly matrilineal and matrilocal (Mtika, 2007; Berge et al., 2014).

Table C.2 shows differences in characteristics of FISP and Non-FISP beneficiaries across the four years under study-2010,2013,2016, and 2019. FISP beneficiaries are significantly poor than non-beneficiaries. Despite the FISP's emphasis on vulnerability to include female headed households as an important attribute, there are no differences in gender of the household head by FISP. However, the emphasis on the elderly is

Table C.2: characteristics of FISP beneficiaries

	(1)	(2)	(3)	(4)	(5)	(6)
	2010			2013		
	FISP	Non-FISP	t-test	FISP	Non-FISP	t-test
Poor	0.755	0.600	0.155***	0.672	0.575	0.097***
Male-headed household	0.752	0.780	-0.028	0.750	0.764	-0.014
Age of the head	43.938	41.137	2.801**	46.479	41.365	5.113***
Household size	4.987	4.880	0.107	5.297	5.039	0.258*
Number of households in the community	1143.809	1265.982	-122.173	899.980	1050.119	-150.139**
All seasons road access to the community	0.669	0.754	-0.085***	0.793	0.880	-0.087***
Daily market in the community	0.214	0.382	-0.168***	0.412	0.537	-0.125***
Micro finance institution in the community	0.087	0.123	-0.036*	0.152	0.175	-0.023
MASAF program in the community	0.128	0.243	-0.114***	0.659	0.725	-0.067**
Annual average rainfall	834.598	827.240	7.358	828.549	831.941	-3.392
Matrilineal	0.768	0.625	0.144***	0.873	0.732	0.142***
Matrilocal	0.606	0.400	0.207***	0.601	0.527	0.074**
Observations	686	618	1304	656	943	1599
	2016			2019		
	FISP	Non-FISP	t-test	FISP	Non-FISP	t-test
Poor	0.732	0.620	0.111***	0.497	0.587	0.089***
Male-headed household	0.711	0.743	-0.032	0.734	0.710	0.028
Age of the head	46.727	42.548	4.179***	41.855	43.228	2.580**
Household size	5.116	4.985	0.132	4.610	4.748	0.335**
Number of households in the community	1750.759	1650.088	100.671	3873.162	3508.266	-1748.349*
All seasons road access to the community	0.716	0.751	-0.035	0.718	0.674	-0.008
Daily market in the community	0.304	0.376	-0.073**	0.387	0.343	-0.076**
Micro finance institution in the community	0.237	0.214	0.023	0.268	0.273	-0.089***
MASAF program in the community	0.687	0.668	0.018	0.651	0.615	-0.037
Annual average rainfall	870.255	872.005	-1.750	835.971	827.577	4.120
Matrilineal	0.544	0.497	0.048*	0.560	0.587	-0.015
Matrilocal	0.742	0.621	0.120***	0.747	0.756	0.005
Observations	619	1299	1918	3178	1953	2339

visible with older household heads being more in the FISP group than Non-FISP group, across all years. The beneficiaries' group had larger households than the Non-FISP group, but only in 2013 and 2019. Other factors that differed between beneficiaries and non beneficiaries included roads accessibility, availability of a daily market and availability of a micro-finance institution in a community, which signal remoteness of residents. While the FISP group lived in areas with MASAF more programs than the Non-FISP group in 2010 and 2013, there was no difference in FISP distribution between these areas in 2016 and 2019. Across all years, rainfall patterns were similar in areas where FISP beneficiaries and Non-beneficiaries lived. Except in 2019, the FISP group had more households living in matrilineal and matrilocal communities than the Non-FISP group.

Table C.3 shows marginal effects from a probit estimation of factors that affect FISP participation in 2010. The year is our baseline on which propensity scores of FISP participation were generated. There are no differences in likelihood of receiving FISP by gender of the household head. Households with older heads have a 0.5 percent chance of being included in the FISP. Selection into the program is non-related to: Household size, number of households in a community, and accessibility to the community through an all seasons road. Households that reside in communities where there is a daily market face a 41 percent less likelihood of receiving FISP in comparison to households in communities that do not have a daily market.

Table C.3: Factors that affect FISP participation

	(1) FISP	(2) FISP	(3) FISP
Male headed household	0.056	0.074	0.116
	(0.102)	(0.097)	(0.099)
Age of the head	0.005**	0.005**	0.005**
	(0.002)	(0.002)	(0.002)
Household size	0.032	0.024	0.028
	(0.020)	(0.020)	(0.020)
Number of households in a community	0.069	0.088	0.068
	(0.065)	(0.064)	(0.059)
All seasons road access to the community	-0.148	-0.178	-0.061
	(0.147)	(0.155)	(0.148)
Daily market in the community	-0.413**	-0.406***	-0.360**
	(0.160)	(0.156)	(0.155)
Micro finance institution in the community	-0.056	-0.081	-0.006
	(0.225)	(0.210)	(0.198)
MASAF program in the community	-0.424***	-0.405***	-0.292**
	(0.152)	(0.147)	(0.149)
Rainfall(log)	0.478	1.359	1.696*
	(0.869)	(0.897)	(0.945)
Poor 2010		0.150	0.143
		(0.109)	(0.111)
Matrilineal		0.327**	
		(0.146)	
Matrilocal			0.422***
			(0.135)
Constant	-3.996	-10.950	-13.480*
	(6.563)	(6.788)	(7.127)
Observations	1288	1288	1288

Standard errors in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Whether a community has a micro finance institution does not relate to its households' likelihood of receiving FISP. Households that reside in communities where Malawi Social Action Fund (MASAF) programs are implemented face a 42 percent less likelihood to obtain FISP than households in communities where MASAF programs are non-existent. Finally, most beneficiaries are from matrilineal-matrilocal settlements.

D Results that display control variables

Table D.4: The impact of FISP on poverty convergence in different land rights regimes

	(1)	(2)	(3)	(4)	(5)	(6)
	Poor in 2013		Poor in 2016		Poor in 2019	
	Matrilocal	Patrilocal	Matrilocal	Patrilocal	Matrilocal	Patrilocal
Poor 2010	0.298***	0.318***				
	(0.080)	(0.075)				
FISP 2010	0.120	0.036				
	(0.084)	(0.082)				
Poor 2010 × FISP 2010	-0.122	-0.073				
	(0.093)	(0.094)				
Poor 2013			0.291***	0.381***		
			(0.055)	(0.084)		
FISP 2013			0.062	0.234***		
			(0.062)	(0.083)		
Poor 2013 × FISP 2013			-0.101	-0.221**		
			(0.069)	(0.102)		
Poor 2016					0.295***	0.268***
					(0.047)	(0.089)
FISP 2016					0.065	-0.036
					(0.062)	(0.116)
Poor 2016× FISP 2016					-0.089	0.046
					(0.068)	(0.126)
Male-headed household	-0.136***	-0.160***	-0.087***	-0.097*	-0.109***	-0.117***
	(0.035)	(0.046)	(0.031)	(0.055)	(0.024)	(0.044)
Age of the head	0.003***	0.003**	0.002**	0.005***	0.003***	0.006***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Household size	0.045***	0.041***	0.058***	0.040***	0.057***	0.070***
	(0.007)	(0.009)	(0.006)	(0.009)	(0.005)	(0.009)
Number of households in the community (log)	-0.028	-0.018	-0.054***	0.028	-0.022**	-0.047
	(0.017)	(0.021)	(0.014)	(0.021)	(0.010)	(0.032)
All seasons road access to the community	-0.008	-0.073	-0.147***	0.006	-0.004	-0.011
	(0.047)	(0.066)	(0.033)	(0.065)	(0.030)	(0.095)
Daily market in the community	-0.083**	-0.062	-0.028	-0.181**	-0.103***	-0.044
	(0.037)	(0.048)	(0.033)	(0.080)	(0.036)	(0.062)
Micro finance institution in the community	-0.041	-0.130**	0.066*	-0.155**	-0.037	0.062
	(0.058)	(0.055)	(0.034)	(0.069)	(0.030)	(0.055)
MASAF program in community	0.055	-0.095	0.074**	0.004	-0.006	-0.085
	(0.037)	(0.065)	(0.037)	(0.071)	(0.027)	(0.063)
Annual average rainfall (log)	0.598	0.077	-0.056	0.315	-0.636***	-0.840***
	(0.398)	(0.256)	(0.200)	(0.224)	(0.179)	(0.263)
Constant	-4.044	-0.083	1.032	-2.516	4.914***	6.496***
	(2.978)	(1.973)	(1.491)	(1.728)	(1.333)	(2.122)
Observations	988	807	1439	743	2272	732
P-value: $\widehat{\beta}_{Poor_{t-1}} + \widehat{\beta}_{FISP_{t-1}} \times Poor_{t-1} = 0$	0.001	0.000	0.000	0.012	0.000	0.001
P-value: $\widehat{\beta}_{FISP_{t-1}} + \widehat{\beta}_{FISP_{t-1}} \times Poor_{t-1} = 0$	0.961	0.443	0.221	0.839	0.375	0.852