Too Certain to Invest?
Government Credibility and Ethiopian Insurance Markets

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Abstract

A large population in developing countries remains uninsured despite that much of its agrarian-based populations' income fluctuates with variation in rainfall. However, when offered insurance many farmers fail to adopt it. This study builds on the literature on the determinants of insurance demand by taking advantage of a recent experiment offering farmers insurance in rural Ethiopia, an environment marked by a long-standing reliance on aid. Results from using a propensity score matching method show that individuals who are already covered by a government safety net demand less insurance than those without government protection. Government safety nets crowd-out private insurance markets because individuals perceive the government as being a reliable source of aid following economic shocks. Furthermore, of beneficiaries of the government safety net, individuals who perceive the government as being more credible takeup less insurance from the private market.

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Introduction

Private insurance markets are missing in many areas of developing countries despite great potential benefits. A large body of evidence exposes the debilitating impacts that vulnerability, risk, and economic shocks have on the livelihoods of the poor in developing countries (Morduch [1995]; Dercon and Krishnan [2000]; Baulch and Hoddinott [2000]; Yamano et al. [2005]). Lack of insurance also has economy-wide consequences as uninsured individuals are deterred from taking on loans and growth-enhancing investments such as productivity-enhancing technologies. Moral hazard, adverse selection, and lack of contract enforcement are well established explanations for the lack of insurance supply in developing countries. However, even when insurance is provided in developing countries take-up is suprisingly low. Numerous experimental studies offering farmers insurance reveal that they buy the least amount of coverage possible in the rare instances that they do purchase insurance (Binswanger-Mkhize [2012]; Cole et al. [2012a]; Giné and Yang [2009]). Although high price elasticity, liquidity constraints, and lack of trust in the product have been put forth as potential explanations (Cole et al. [2012a]), scholars still do not understand the reason for the lack of demand.

An alternative explanation for lack of insurance demand is that governments have been a credible source of aid during crises. Governments can respond to economic shocks with income transfers, food aid, or by providing other goods and services that help alleviate the effects of shocks. As the political science literature reveals, politicians may get punished for droughts and other weather events they cannot control, but they get rewarded when they increase spending on disaster relief (Cole et al. [2012b]; Healy and Malhotra [2009]; Besley and Burgess [2002]). The credibility of government thus enters as a key input in individual's calculation for investing in insurance. By forming safety nets governments may be creating moral hazard as individuals are unlikely to pay money today when, in the event that a disaster does occur, they can be certain that the government will provide them with aid. Whereas private insurance requires an upfront investment, the goods and services governments provide are post-hoc and costs, if they are born domestically by the individual

in the form of taxes (and not by international donors), are diffused across the population.

Studying the effects of government provision of safety nets on private insurance adoption is methodologically challenging because state and private provision of insurance are likely to be driven by many factors that are unobserved or difficult to measure. This paper leverages the exogenous variation provided by a recent randomized control trial offering insurance in the Amhara region of Ethiopia. It uses propensity score matching to compare adoption levels of private insurance among individuals who received the government safety net and their matched counterparts who are not recipients of the safety net. Matching methods reveal that public safety nets crowd-out private insurance markets. In addition, differences in perceptions of government credibility across individuals within the same region further corroborate the explanation by showing that conditional on receiving the safety net, individuals who perceive the government as less credible turn more to the private market.

Private Insurance Demand

Anticipation for the introduction of private insurance markets grew over the past decade with the formation of a new insurance product. The product, index insurance, overcomes the fundamental supply problems that inhibit the formation of insurance markets in developing countries: that insurance providers cannot know the risk level nor monitor the risk-taking behaviors of beneficiaries, and oftentimes, operate in an environment where they cannot enforce their contracts (Rothschild and Stiglitz [1976]; Finkelstein and McGarry [2006]). Index insurance overcomes these problems by basing individual's payments on an exogenous publically observable index (such as local rainfall) that is easily measured and not manipulable (Barnett et al. [2008]). The product typically covers agricultural risk although the model could be applied to other sources of risk.

Interestingly, the introduction of formal, private insurance in developing countries revealed that the missing market for insurance is also largely attributable to determinants of demand. Demand for insurance products, especially to cover losses related to agriculture, should

theoretically be high in developing countries: large swathes of the population are uninsured despite the vast majority of their income fluctuations deriving from frequent, observable variation in rainfall. In India, for example, 90% of variation in crop production in India is caused by variation in rainfall (Parchure [2002]) but 90 percent of the population does not have any insurance coverage (Mukherjee [2010]). A number of field experiments that randomize insurance offers have tempered these expectations (Cole et al. [2012a]).

The emerging literature on the determinants of insurance demand can be divided into explanations emphasizing the nature of the product, the characteristics of the beneficiary, and the context that the beneficiary inhabits. Product explantions contend that the formal market is limited in what it can offer (due to above mentioned supply-side issues) such that the resulting product is unattractive because so many risks remain uncovered (Banerjee et al. [2013]).[1] Other scholars stress that beneficiaries' characteristics, and not the product, inhibit take-up, as beneficiaries lack familiarity with insurance products and so may not understand the product or trust that they will get a payout in the event of a shock (Cole et al. [2012a]). Alternatively, they maybe so risk averse that they refuse to adopt a risk-mitigating product because it cannot fully cover all risk (Clarke [2011]).

A final set of explanations for insurance demand stress the nature of the context in which the insurance offer take place. Although formal financial arrangements are missing in many parts of developing countries, communities form other institutions, both formal and informal, to manage risk. Informal risk-sharing groups, in which community members support one another in the face of a shock, are prevalent in developing countries (Townsend [1995]; Ravallion and Dearden [2009]; Rosenzweig [1988]; Rosenzweig and Stark [1989]). Such informal groups offer, at best, incomplete risk protection. Informal insurance groups are hampered in their ability to protect against covariate shocks that affect entire communities but can shield against idiosyncratic shocks that affect individuals. Mobarak and Rosenzweig (Mobarak and Rosenzweig [2012]) find that communities that are better able to insure indi-

[1] An important limitation of index insurance is that policyholders are exposed to basis risk. Basis risk is the imperfect correlation between the index and the losses experienced by the policyholder.

vidual losses may have a greater demand for index insurance because these informal groups can cover the losses that the insurance product cannot.

As yet, the relationship between formal, public insurance programs and private insurance has not been explored in the insurance demand literature despite the economic literature showing that the provision of public insurance can crowd-out the private insurance market (Cutler and Gruber [1996]; Kronick and Gilmer [2002]). That government provision of insurance can crowd-out private insurance may not seem surprising. Crowd-out of the private market by government goods and services is observed in markets as diverse as fertilizers to charitable giving. But, beyond simply providing a substitute good, public insurance programs have also been associated with "dependency." In the Ethiopian context, for example, recipients of food aid saved less as they gained greater confidence in the reliability of food aid transfers as a form of insurance (Gilligan and Hoddinott [2007]). Similary, public insurance may be creating moral hazard as individuals who expect to receive future government transfers will invest less in privately insuring against risk.

However, as Mobarak and Rosenzweig (Mobarak and Rosenzweig [2012]) find with respect to pre-existing informal insurance groups and private index insurance, there may be complementarities between different forms of insurance because they can cover different forms of risk. It may also be that the provision of a safety net provides the risk coverage needed for risk-averse individuals to invest in insurance products, which maintain a degree of uncovered risk. The relationship between public and private insurance must therefore be empirically analyzed.

The Ethiopian Case

The logic for private insurance markets in Ethiopia is particular compelling. Ethiopia is an agrarian-based economy that suffers from high poverty rates and frequent episodes of drought, causing its longstanding reliance on international aid. Agriculture accounts for 45% of GDP and ensures the livelihoods of 80 to 85% of the population. The World Bank

estimates that any small variation in rainfall or world prices (for coffee) affects the incomes of 30 to 40 million people and can mean hunger for 10 to 15 million people (World Bank). Beginning with the 1983-4 famine and continuing until the 2002 drought, the international community attempted to step in and provide food assistance in Ethiopia. The amount of people in need of food assistance rose from approximately 2.1 million in 1996 to 13.2 million in 2003, before falling back to 7.1 million in 2004 (World Bank APL).

Ethiopian state capacity is strong and the economy is growing. As part of aid-conditionality agreements, the Ethiopian government began privatizing its markets, including curtailing the operations of its official state marketing board (Jayne et al. [2002]). Over the past two decades, Ethiopia has adopted various agriculture and food policies such as the Agricultural Development-Led Industrialization (ADLI) program. The government undertook a series of initiatives to stimulate agricultural productivity growth including technology transfer based on agricultural extension, fertilizer, and high yield variety seeds. Bilateral and multilateral aid increased dramatically from previously extremely low levels. Investments in health and education infrastructure and importantly, new roads, resulted in real per capita GDP growth of more than three percent per year between 1994 and 2009 (Dercon et al. [2012]). A study up to 2004 shows that consumption poverty accordingly fell (Woldehanna and Dercon [2008]).

The logic for private insurance markets becomes less compelling after one considers the presence of a large, institutional competitor to private insurance and its history of food aid reliance. Beginning in 2002, the Government of Ethiopia and a consortium of donors formed the Productive Safety Net Program (PSNP) as a new form of safety net to curb the massive increases in international food assistance. The objectives of the PSNP are to provide transfers to the food insecure population to prevent asset depletion at the household level and creates assets at the community level (PSNP Program Implementation Manual). PSNP has since become the largest safety net program in Africa, outside of South Africa. The program, originally scheduled to end in 2008, has been extended twice, currently until 2015. Ten development partners have committed approximately US$2.3 billion for the third

phase of implementation (2011-2015).

PSNP mainly operates as a welfare program but also has aspects of a social insurance program. Social insurance differs from private insurance in that participation in social insurance programs is mandatory or is induced by substantial fiscal subsidies. Social insurance also differs from welfare programs because social insurance refers to transfers to deal with risk. Welfare benefits are means tested, i.e., they are paid only to those with incomes (and assets) below some level. In the context of Ethiopia, the determination of PSNP elibility varies by community but is based on an assessment of being chronically food insecure. The program also has features of a public insurance program as it includes a contingency fund and a risk financing mechanism: additional program features designed to scale up the program in times of transitory crisis. PSNP covers more than 7 million people through direct income support (cash transfer or food), primarily through participation in large-scale public works. Although PSNP is a large program by developing country standards, it only reaches roughly eight percent of the Ethiopian population, leaving many deserving people exposed (Berhane et al. [2011])).

Politics of the Productive Safety Net Program

The politics of PSNP offer a test of the proposed mechanism that government provision of safety nets creates moral hazard. PSNP has come under allegations of political targeting. If political targeting actually exists or, if there is a perception of political targeting, then individuals who are connected to the ruling party or are considered to be core supporters will expect to continue to receive government services. More generally, individuals who have confidence in the government will expect to continue to receive government services. The variation in perception of government credibility should predict takeup because individuals who perceive the government to be credible will expect to be able to continue to rely on the government for relief from economic shocks.

PSNP operates within a backdrop of slow political reform. The Ethiopian People's Rul-

ing Democratic Front (EPRDF) has maintained political dominance in Ethiopia since 1991. The EPRDF is a coalition of parties but the dominant position is held by the Tigray People's Liberation Front (TPLF). Since the return of electoral politics to Ethiopia in 1995, executive recruitment continues to be plagued by opposition party fractionalization and political interference by the ruling EPRDF (Polity IV, 2010). With the exception of the 2005 election, opposition parties are absent from most elections. The 2005 elections introduced the first genuinely competitive multiparty elections in Ethiopia's history. A non-competitive electoral environment has resurfaced in Ethiopia since the 2005 elections were marked by credible charges of election fraud that resulted in violent protests.

In 1994, the EPRDF oversaw the reestablishment of ethnic-based federalism by dividing Ethiopia into ten ethnic-based administrative districts. Most non-Tigrayan ethnic groups view this de jure devolution of power with great suspicion. The Amhara, the historical source of political power in Ethiopia, view the federal structure as an attempt to dismantle their hegemonic position within the national government. They argue that the regional and local administrative districts created by this new federal structure continue to be dominated by supporters of the EPRDF. Regional and local government officials, even in the most insignificant local arena, are not accorded an autonomous role but serve as intermediaries for national government directives (Polity IV, 2010).

In mid-2009, Human Rights Watch reported allegations of political distortions in PSNP. Gebru Asrat, spokesperson for the Forum for Democratic Dialogue and leader of Arena, a Tigrayan opposition party, claimed that members of the Forum and its parties were excluded from participation in the PSNP. In the aftermath of the 2005 elections, desperate households were having to switch their political allegiance to the ruling EPRDF to receive aid. Other opposition parties have claimed that political distortion exists but that it is not systemic or centrally-directed. Beyond the Forum for Democratic Dialogue, leaders of other opposition parties have alleged that there are signs of political distortion stemming from the woreda (district) level (Group [World Bank 2010]). Allegations of distortion in relation to PSNP relate to two stages of its targeting process: the allocation of resources to woredas and the

process of deciding which households should be included in the program.

The politics of PSNP predict that individuals who get PSNP and perceive the government to be credible – either because they are connected to the local party elite or because they have confidence in the government – will expect to continue to receive the safety net. The politics of PSNP thus enables an analysis of the extent of moral hazard comparing across individuals with different perceptions of government credibility. Individuals who get PSNP and believe that the government will continue to provide them aid will have no incentive to turn to the private market. Individuals who get PSNP but lack such faith will insure through private channels. Therefore, we can expect the following to be true:

Individuals who get PSNP and are connected to the local political elite will buy less insurance than individuals who receive PSNP and are not politically connected.

Individuals who get PSNP and have confidence in the government will buy less insurance than individuals who receive PSNP and do not place confidence in government.

PSNP Operations

The determination of PSNP receipt occurs at both the woreda and the household level. The revised PSNP Programme Implementation Manual (PIM, 2006) outlines the targeting criteria to be used by government officials and community members to identify program participants. Participation at both levels is based on a determination of being chronically food insecure. At the woreda level, woredas are included if they are located in one of eight specified regions and if they had been a recipient of food aid for a significant period prior to the beginning of PSNP in 2005. Kebeles (villages) located within such woredas are given PSNP.

Household PSNP targeting is primarily a community determination although the number of beneficiaries is additionally determined by government administrators at different levels of government. Households are considered chronically food insecure if they face continuous food shortages, received food assistance prior to the formation of PSNP, experience a severe

loss of assets, and do not have other means of social protection. In assessing the "food gap," the PIM states that the determination be based on family size and number of dependents and status of expected household food production and other sources of income compared with household monthly consumption requirements. Households graduate from the program by accumulating an asset and income level that enables them to meet 12 months of food needs and to withstand modest shocks.

PSNP recipients either receive direct support, if they are unable to work (e.g. elderly, disabled, post-partum women), or are compensated for their engagement in public works (such as road building, soil and water conservation, etc.). In 2010, the PSNP introduced the principle of Full Family Targeting which stipulates that every household member in a PSNP household receive a cash or food transfer. Each able adult is required to work for five days per month, six months per year, and is compensated in cash, at a set wage rate, or in food. The choice of food or cash is mainly dependent on grain availability in the market, with cash being the default. Payments are made on a monthly basis with community representatives overseeing the cash payment process. Transfers are set at a level intended to smooth household consumption or fill the food gap over the annual lean period. Wage rates are reviewed annually and adjustments are made based on market food price changes. Total payments vary with household size, but the median is around US$200 per household over five years (Berhane et al. [2011]). Benefits are thus small, but can be significant for targeted households. PSNP benefits can represent the equivalent of approximately 10-40 percent of annual basic food needs, defined in terms of Ethiopia's national poverty line (World Bank, 2010). PSNP is thus a social insurance program because it is a publically provided program that provides relief to the chronic and transitory food insecure households.

Private Insurance in Ethiopia

Private insurance markets are largely missing in Ethiopia, particularly in the rural areas. Private insurance was recently piloted via a randomized project of over 15,000 farmers in the

Amhara region of Ethiopia between 2010-2014. The project was designed by a research team from the University of California, the United Nations Food and Agriculture Organization (FAO), the Joint Research Center of the European Commission, University of Athens, and the Ethiopian Economics Association (EEA). Insurance and credit were administered by the largest private insurance company and the largest private bank in Ethiopia, Nyala Insurance Company and Dashen Bank.

The pilot offered farmers rainfall index insurance which, in this case, only insured against inadequate rainfall. Farmers could purchase insurance prior to the planting season for a specified crop and quantity of land and purchase insurance to cover losses up to the total cost of inputs, such as fertilizers and high yield seeds. In the event of a drought, compensation would be determined according to a calculation based on the crop grown, the location, and the amount of rainfall. A typical product offered involved paying roughly 500-1000 birr (approximately $38-75 using the exchange rate in 2010 of 13.3 birr per USD) in premiums to insure 4000 birr (approximately $300) worth of input purchases for one hectare of land.

The relationship between PSNP and private insurance markets is not obvious. Whereas PSNP is a program targeted year after year to build up the asset base of chronically food insecure households, irrespective of actualized rainfall (with some deviations for temporarily needy households), the insurance offered by the pilot program only triggers a payout in the event that rainfall falls below a specified threshold. Moreover, the amount of benefits provided by PSNP is a small, roughly fixed amount (less than the market rate for five days of work per month), but the pilot project's payouts vary according to the cost of inputs purchased. PSNP and private insurance can be complements: individuals may feel that PSNP provides them with a sufficient asset base that can mitigate the adverse effects of shocks allowing them to engage in higher return, higher risk activities such as fertilizers investments (Alem and Broussard [2013]) that they would want to insure or in insurance itself, which can be seen as a risky investment. They may also want the coverage provided by both the safety net, to help smooth consumption, as well as the coverage against the loss of input costs. On the other hand, PSNP can substitute for private insurance: government

programs can disincentivize investment in private insurance as individuals may find that they are already given sufficient resources to withstand economic shocks and are uninterested in coverage beyond a given, small amount.

Implementation of the Insurance Pilot

The pilot project's research design randomized the placement of the treatment (insurance or insurance with credit) within study kebeles. The choice of kebeles was nonrandom but instead was designed on the basis of informed opinion of Nyala Insurance Company as to where in the Amhara region the market for insurance has best potential. Randomization of treatment assignment was done within the selected high potential kebeles. Of treated villages, cooperative members in half were to be offered insurance and cooperative members in the other half were to be offered insurance and credit. Additionally, voucher coupons were distributed to study households via a lottery system. Vouchers were distributed before the time of the marketing campaign, and could be subsequently redeemed if farmers bought weather insurance. This was done to increase the variability of prices faced by potential insurance buyers (McIntosh et al. [2013]).

Nyala Insurance Company administered sales to households in treatment cooperatives. Although a separate treatment arm was designed to interlink insurance sales with credit, logistical issues prevented Dashen Bank from supplying credit, so the intervention only consisted of a randomized insurance offer. The project experienced other implementation problems as the information was not directly communicated to farmers by Nyala but instead was conveyed through Ministry of Agriculture officials, "model farmers," and local extension agents. It is not clear whether the information about the nature of the insurance and interlinked credit and insurance contracts was transmitted clearly to all farmers (McIntosh et al. [2013]).

In 2010, a baseline survey was administered to 2,400 households in the study. EEA, an independent Ethiopian research organization administered the surveys. Households within

selected kebeles were randomly sampled to participate in the study. In each village, 18 cooperative households and two households that are not a member of the primary cooperative were selected. Over the course of the study, the sample was restricted first to limit it to those farmers that face deficit rainfall risk and are located close to rainfall stations. Subsequently, the number of study kebeles had to be further restricted to 49, as the available historical rainfall record for ten of the 17 stations was not complete enough to allow the construction of rainfall indices that would be acceptable by Nyala's partner reinsurance company. Of these, 34 were treatment kebeles and 15 were controls for the pilot, comprising 1,189 households (McIntosh et al. [2013]). The survey households provide the data for this study.

Analysis

This paper tests whether individuals who receive the government safety net, PSNP, buy less insurance than individuals who do not have access to PSNP. Private insurance in this context can be thought of as an exogenous variable likely to differentially influence demand for insurance depending on whether or not one is already covered by the government safety net. Crowd-out is exhibited by relative lack of demand for private insurance among beneficiaries of the government safety net, as compared to demand among non-beneficiaries. To analyze the presence of crowd-out, I first run a reduced form regression of insurance uptake amount on PSNP, controlling for factors expected to influence both receipt of PSNP and insurance uptake. OLS provides a simple, easily interpretable measure of the effect of PSNP on takeup. Then, as PSNP is not randomly distributed across the population, a propensity score matching technique is used to compare insurance takeup among PSNP beneficiaries and non-beneficiaries. A final test is conducted, regressing insurance sales and including an interaction of PSNP and government credibility. I run the interactions twice, using different measures of government credibility, further testing whether the substitution effect is due to individuals' perception that the government can be depended on as the creditor of last resort.

This analysis restricts the sample to only those individuals that received a voucher and only kebeles reporting any sales. The reason is twofold: (1) Sales overwhelmingly took place only among voucher recipients. Restricting the sample to only voucher recipients therefore reduces noise, giving more precise estimates of the effect of PSNP on takeup. (2) Some kebeles had no sales. In the first year, Nyala teams were successful in selling insurance products in only 23 of 34 kebeles. In the second year, 29 kebeles had vouchers distributed, of which 25 had any sales reported. As described above, supply side problems existed stemming from Nyala's implementation. These kebeles are dropped as they could introduce a confound. It may be that constraints to adoption were on the supply or the demand side of the market and it is impossible to statistically distinguish between the demand-side correlates of behavior and the supply chain-driven explanations for why contracts could not be offered (McIntosh et al. [2013]).

Sample weights are used to construct all estimates of summary statistics and regression analyses. The sample weights weight the sample back to the population from which the sample was drawn. The weights are equal to the inverse of the probability of being included in the sample due to the sampling design which randomly selected a fixed number of cooperative (18) and non-cooperative (two) members from each village. The weights accordingly account for differences in population size, as well as the share of cooperative and non-cooperative members, across kebeles.[2]

Table 1 shows the summary statistics for the baseline observations. Only baseline observations were used in model estimates to prevent including outcome variables as explanatory variables. There have been two years of insurance sales thus far but only second year sales are reported here due to higher uptake rates in the second year. The sample size shown is reduced to 2,116 individuals due to missing sample weights for fourteen of 120 kebeles.

Only approximately 11 percent of individuals purchased insurance and the few that did

[2] Survey observations are weighted by the number of village cooperative members, divided by 18 for cooperative members, and the number of village non-cooperative members, divided by two for non-cooperative members.

Table 1: Summary Statistics

	mean	min	max
Insurance Purchased	.109	0	1
Amount Insured	185.721	0	4195.14
Voucher Amount	68.6009	0	300
PSNP	.0948	0	1
Officer in Household	.0524	0	1
Total Farm Income (1,000s)	4.527	0	198.1083
Female Headed Household	.115	0	1
Negative Shock	.502	0	1
Dependency Ratio	.335	0	1
Value of Agricultural Capital (1,000s)	.892	0	124.5
Cooperative Member	.424	0	1
Years of Education	1.236	0	16
Literacy	.454	0	1
Read and Write	.393	0	1
Non-Farm Cash Income	793.193	0	60000
Number of Parcels Cultivated	3.648	0	17
MFI Member	.242	0	1
Agricultural Credit	.163	0	1
Bank Account	.189	0	1
Years (in last 10) Income Reduced by 25 Percent	2.223	0	10
Population under Poverty Line	1242.44	1242.44	1242.44
Inkind and Food Expenditure Share	.803	.1264	1
N	2116		

Estimates have population adjustments using sample weights equal to the inverse of the probability that the observation is included in the sample

insured on average 186 birr (equal to $14 at the 2010 exchange rate of 13.3 birr to 1 USD). However, study conditions seem favorable for insurance. Approximatley half the population report experiencing a shock that negatively affected their incomes the previous year and reported that on average, over two years in the last ten their incomes were reduced by 25% or more. Although Nyala chose the study area for its high agricultural potential and relatively higher income, the population is still quite poor. Approximately ten percent of individuals receive PSNP and average farm income is 4,527 birr ($340). Inkind and food expenditures account for 80% of total expenditures. Most of the population is illiterate and only received one year of formal education. Connection to formal financial institutions is also low. Less than a quarter are members of microfinance institutions (MFI) and even fewer have a bank account or were able to get credit to fund their purchases of agricultural inputs.

OLS Regression of Insurance Demand

I first use ordinary least squares to measure the amount of insurance taken up. I run the regressions controlling for only institutional determinants of PSNP receipt. In a seperate regression, I include factors outside the official criteria to test whether political capital, social influence, or economic factors, that are not specified in the PIM, determine PSNP receipt and can also influence private insurance takeup. The PIM guidelines specify the official criteria for PSNP targeting, as described in the above PSNP Operations section. $PSNP$ indicates whether a given household is a PSNP beneficiary. $AgCapital$ measures the value of agricultural capital owned by the household in thousands. $NegShock$ indicates whether the household reported that a shock very negatively affected its consumption in the prior year. $DepRatio$ measures the share of members aged 0-12 and older than 65 to total number of household members. In addition to the official determinants, I ran a model controlling for factors outside the official PIM guidelines. I additionally control for whether anyone in the household is a chair of the kebele council or a kebele council member. These are positions

that are perceived as being intimately tied to the local political elite. I also controlled for whether the household is female headed and whether anyone in the household is a member of a cooperative. In Table 2, I control for voucher amounts (model 1), gradually adding in controls for PSNP receipt (model 2), official (model 3), and both official and unofficial determinants of PSNP receipt (model 4).

Table 2: OLS Regression of Year 2 Sales and PSNP Recipients

	(1)	(2)	(3)	(4)
	Model 1	Model 2	Model 3	Model 4
Amount Insured	b/se	b/se	b/se	b/se
Voucher Amount	4.070**	4.666***	4.477***	4.059***
	(1.59)	(1.65)	(1.48)	(1.42)
PSNP		-800.961**	-938.829**	-914.557***
		(298.89)	(343.23)	(319.40)
Total Farm Income (1,000s)			-9.038**	-10.084**
			(3.77)	(4.16)
Value of Agricultural Capital (1,000s)			-7.246**	-7.609**
			(3.17)	(3.11)
Negative Shock			-19.034	22.294
			(105.57)	(120.71)
Dependency Ratio			1151.361**	1067.746**
			(431.75)	(387.73)
Officer in Household				423.568*
				(236.17)
Female Headed Household				-83.232
				(210.71)
Cooperative Member				173.820
				(187.13)
Constant	-199.548	-245.492	-509.414**	-525.495**
	(197.91)	(201.11)	(223.00)	(193.20)
N	349	349	349	349

* indicates significance 10 percent, ** at 5 percent, and *** at 1 percent. Standard errors in parentheses, clustered at the kebele level. All models have population adjustments using sample weights equal to the inverse of the probability that the observation is included in the sample

Results are from second year sales, including sample weight adjustments. In the appendix are specifications of first and second year sales without sample weights as well as first year sales, including sample weights. For the first year and second year of sales PSNP coefficients are negative and significant without the inclusion of weights, but the PSNP coefficient is halved without the inclusion of sample weights. The differential marginal effects indicates that the effects of PSNP are larger for individuals residing in larger kebeles and for non-coop members, who were undersampled in the survey.

Results for PSNP receipt are relatively stable across the specifications of population weighted, second year sales. On average, being a PSNP beneficiary decreases the amount of insurance purchased by approximately 915 birr (in the preferred model), with results siginificant at the 99 percent confidence level. By comparison, every birr distributed by a voucher increases the amount of private insurance purchased by 4.2 birr on average, with voucher amounts in the second year of sales ranging from 100 to 300 birr. Whereas the negative coefficients on farm income and agricultural assets may appear strange, they are actually intuitive when considering that insurance has the greatest benefit for the most vulnerable population. Similarly, having a higher dependency ratio, positively predicts insurance sales, as would be theoretically expected. Having a kebele chairman or council member in the household positively predicts uptake. This may be due to greater risk-taking behavior that politically connectivity affords. OLS results thus support the explanation that government safety nets crowd out the private insurance market.

Impact of PSNP on Insurance Demand

The treatment in this study is participation in the government safety net. However, potentially omitted covariates prevent making causal claims about the relationship between PSNP and the outcome, private insurance takeup, as PSNP is not randomly distributed in the population. Therefore, a propensity score model is estimated to evaluate the amount of insurance that PSNP beneficiaries takeup compared to their non-PSNP counterparts. Matching constructs a counterfactual using a single propensity score to select relevant observations to compare individuals which receive PSNP (a treatment group) with individuals that do not (a control group), as developed in Rosenbaum and Rubin (Rosenbaum and Rubin [1985]).

To conduct propensity score matching it is necessary to first estimate a model of assignment to treatment, here PSNP receipt. The logit model of PSNP households, based on institutional (PIM) guidelines, is:

$$PSNP_i = \beta_0 + \beta_1 AgCapital_i + \beta_2 FarmIncome_i + \beta_3 NegShock_i + \beta_4 DepRatio_i + \varepsilon_i$$

Table 3 below shows the results of a logit model predicting PSNP receipt based on PIM guidelines only (model 1) and the PIM plus non-institutional determinants of PSNP receipt (model 2). Note that all baseline observations are used in this analysis to take advantage of all heterogeneity in available determinants of PSNP. Sample weights adjustments are included, restricting the sample to 2,114 households. Results without the inclusion of sample weights are in the appendix.

The performance of the institutional determinants of PSNP is mixed. As expected, experiencing a negative consumption shock and having a higher dependency ratio positively predict receipt of PSNP. Interestingly, farm income has no effect on receipt of PSNP nor does the value of agricultural capital owned by the household. This may be due to the fact that these variables are highly skewed towards zero. Some factors outside the PIM do determine receipt of PSNP. Whereas upward ties to local political elites do not predict PSNP, horizontal ties, as measured by being a member of an agricultural cooperative, are strong predictors of PSNP receipt.

As seen in the OLS results in Table 2, vouchers strongly predict insurance sales but are not determinants of PSNP receipt. To conduct propensity score matching it is thus necessary to first regress insurance sales on the voucher amounts only, and save those residuals. This saves only the variation in uptake amounts unexplained by the vouchers. Then, matching can be conducted using the residuals as the outcome variable and PSNP as the treatment variable, controlling for all the factors (in the above models) that determine receipt of PSNP. This approach estimates the difference in the sum insured, accounting for voucher amounts, between the PSNP and non-PSNP samples. If matching works, the only factor that differentiates the control from the treatment group is receipt of PSNP, enabling a determination of the causal effect of the impact of receiving PSNP on the amount of index insurance purchased. It is worthwhile to note, however, that one key assumption which must be satisfied to use matching methods is the conditional independence assumption. This requires that conditional on the vector of observable characteristics, the outcome variable is independent of the choice of treatment, that is, that unobservable do not predict assignment to PSNP as

Table 3: Logit Model of PSNP Receipt at Household Level

PSNP	(1) Model 1 b/se	(2) Model 2 b/se
Value of Agricultural Capital (1,000s)	-0.028	-0.045
	(0.07)	(0.10)
Total Farm Income (1,000s)	-0.066	-0.060
	(0.05)	(0.05)
Negative Shock	0.598**	0.587**
	(0.28)	(0.28)
Dependency Ratio	0.928*	0.888*
	(0.51)	(0.48)
Officer in the Household		0.385
		(0.50)
Female Headed Household		0.327
		(0.31)
Cooperative Member		0.708**
		(0.33)
Constant	-2.676***	-3.080***
	(0.34)	(0.43)
N	2114	2114

* indicates significance 10 percent, ** at 5 percent, and *** at 1 percent. Standard errors in parentheses, clustered at the kebele level. All models have population adjustments using sample weights equal to the inverse of the probability that the observation is included in the sample

well as the amount of private insurance purchased.

Propensity score matching is conducted for PSNP beneficiary households, with one-to-one matching imposing a common support. Imposing a common support drops all observations with a propensity score higher than the maximum or lower than the minimum propensity score of the controls in order to reduce the effect of any "bad" matches. Matching is conducted controlling for determinants of treatment specified in the PSNP PIM as well as with the non-institutional determinants of PSNP: households that have an officer, are female-headed, and are cooperative members. Fortunately, the logit models used perform well in generating matches that are on-support for all recipients in the first model and all but one of the PSNP recipients in the second model. There is no clear guidance in the econometric literature on how to accommodate sample weights when conducting matching. The current recommended approach seems to be to ignore sampling weights when conducting matching because we are not interested in generalizing the propensity score model to the population (Zanutto [2006]),

thus sample weights are not included.

Table 4: Propensity Score Regression of Year 2 Sales and PSNP Households

	(1)	(2)
	PS Matching PIM	PS Matching PIM Plus
Residuals	b/se	b/se
Treated	-638.585**	-483.221**
	(200.74)	(234.56)
Constant	273.35	134.63
N	365	365

* indicates significance 10 percent, ** at 5 percent, and *** at 1 percent. Standard errors in parentheses. Outcome variable is the residual from an OLS regression of the amount insured on voucher amounts only, with kebele level clustering. Both models use one-to-one matching imposing a common support. Model 1 calculates propensity score matching, matching on the determinants of PSNP specified in the PSNP PIM. Model 2 calculates propensity score matching, matching on the determinants of PSNP specified in the PSNP PIM plus additional factors expected to determine receipt of PSNP.

Matched results are of a similar magnitude to OLS results without sample weights. Matched sample estimates for PSNP recipients are on average 480 less birr of private insurance purchase than the control group. This is the estimate of the average-treatment-effect-on-the-treated, the statistic that shows the effect of the safety net policy on private insurance uptake while controlling for sample selection bias.

PSNP and Government Credibility

An implication of the political context of the study is that there is likely to be heterogeneity in credibility among PSNP recipients in the sample. Individuals who perceive the government as being less credible have a greater incentive to purchase insurance from the private market since they believe that they cannot rely on continuing to get government services. Heterogeneity in government credibility is measured in two ways to test whether those individuals who perceive the government safety net to be a credible commitment from the government purchase less insurance than those individuals who do not have faith in government. The first measure of credibility is whether anyone in the household is a chair of the kebele council or a council member. As mentioned above, this variable captures direct

connections with the local political elite, positions that are strongly tied to the ruling party. This dummy is interacted with a dummy for whether the individual is a PSNP beneficiary. A significant and negative interaction effect thus indicates that individuals who receive the government safety net and have ties to the ruling party perceive the safety net as being more credible and so turn to the private insurance market less than individuals who receive the government safety net but do not perceive it as being a credible commitment.

The second measure of heterogeneity in credibility is respondents' responses about their confidence in government. The survey instrument asked respondents how much confidence they have in district government. This variable is likely to be an accurate measure of credibility given the federal structure of Ethiopian politics and its single party dominance as well as district governments' influence in resource allocation, including PSNP distribution. They were presented with a choice of answering: a great deal of confidence, quite a lot of confidence, not very much confidence, or none at all. These responses are collapsed into a binary indicator for whether respondents answered a great deal or quite a lot versus not very much or none at all.

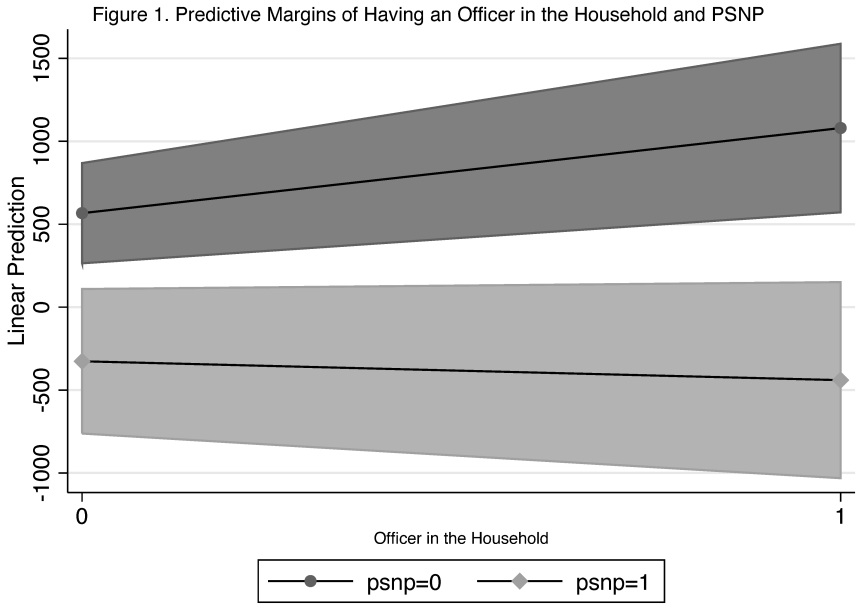
Table 5 shows the results of including the interaction effects in OLS regression of insurance uptake amounts. The differential effect of being a recipient of PSNP and having direct ties to the local political elite is a reduction of insurance sales of 627 birr. Similarly, the differential effect of both having confidence in district government and receiving PSNP reduces insurance sales by 759 birr. Both sets of interaction effects are significant at the 90 percent confidence level.

The figures below illustrates the marginal effect of PSNP and the corresponding standard errors among households for whom the government is more or less credible. The figure shows the marginal effect of the government safety net on the amount of private insurance purchased, moving across households that do not have strong ties to the ruling party to households with strong ties. Individuals who get PSNP but lack strong ties to local elites buy more insurance than individuals who get PSNP and have direct political connections.

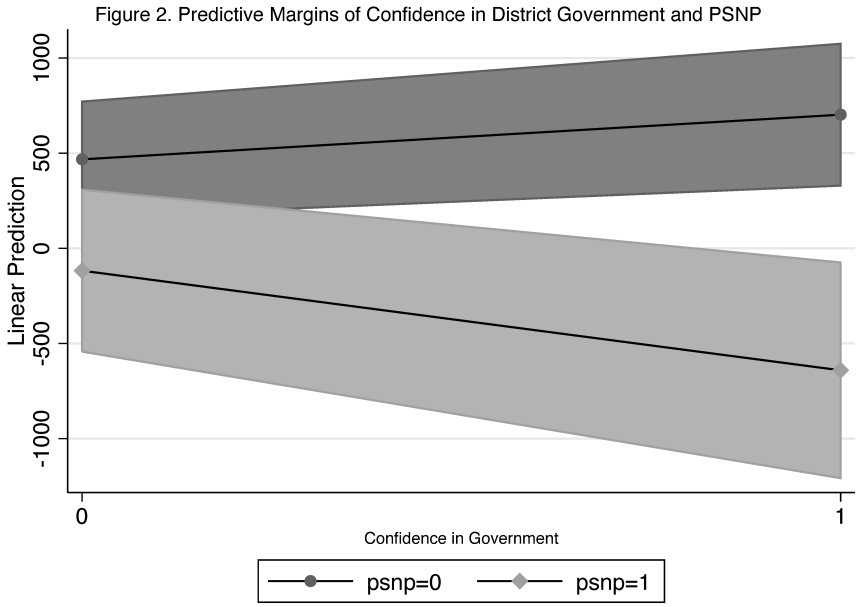
Table 5: OLS Regression of Insurance Uptake Interacting PSNP and Government Credibility

	(1)	(2)
	Amount Insured	Amount Insured
Amount Insured	b/se	b/se
Voucher Amount	4.256***	5.352***
	(1.42)	(1.59)
PSNP	-892.977**	-584.884*
	(333.48)	(285.82)
Total Farm Income (1,000s)	-9.203**	-9.071**
	(3.77)	(3.83)
Value of Agricultural Capital (1,000s)	-6.874**	-9.277**
	(3.13)	(3.46)
Negative Shock	23.619	63.614
	(105.50)	(105.09)
Dependency Ratio	1078.285**	1226.523**
	(414.77)	(456.71)
Officer in the Household	513.264**	
	(206.92)	
Officer in Household*PSNP	-627.154*	
	(305.33)	
Confidence in District Govt		234.789
		(183.87)
Confidence in District Govt*PSNP		-758.502*
		(377.29)
Constant	-499.564**	-840.812**
	(211.31)	(339.54)
N	349	333

* indicates significance 10 percent, ** at 5 percent, and *** at 1 percent. Standard errors in parentheses, clustered at the kebele level. All models have population adjustments using sample weights equal to the inverse of the probability that the observation is included in the sample



Results of including the interaction effect of confidence in government and PSNP are consistent. The relatively flat slope on the individuals who do not receive PSNP indicates that there is little effect on private insurance sales among this group, regardless of their confidence in district government. The interaction effect of getting the safety net and reporting confidence in district government shows that individuals who get the safety but have little confidence in government invest more in private insurance than those who report having confidence in government.



Discussion

The working hypothesis states that individuals fail to adopt insurance because they believe that they can rely on the government for support following economic shocks. To show this, the first part of the paper illustrates that individuals who receive the government safety net buy less insurance on the private market than individuals who do not get the safety net program. But other factors could potentially be influencing adoption of private insurance that could also predict PSNP receipt. Risk aversion, for example, is likely to be correlated with PSNP and with demand for index insurance. PSNP recipients are likely to be among the most poor and to have suffered from economic shocks, making them loathe to take on risks. As index insurance still leaves insurers exposed to basis risk, PSNP recipients will be less likely to purchase it. The original survey questionnaire asked respondents "Many farmers consider new agricultural practices that give higher yields but may have upredictable and unknown consequences. Are you generally a person who is prepared to take such risks or do you try to avoid taking risks?" Respondents who answered that they "never take such risks" are coded as risk averse. Results from both OLS regressions and propensity score matching show that risk aversion does have a negative effect on index insurance purchases, but PSNP estimates remain robust to the inclusion of risk aversion.

An alternative explanation is that individuals who receive PSNP are likely to be less educated and unlikely to understand how insurance operates. Survey questions attempted to illicit respondents' ability to reason and to apply simple numerical concepts. It asked them simple mathematical questions such as filling in the missing number in a numerical sequence or to count backwards (such as "what is 40 minus 10? and that answer minus 10?"). Respondents were given no more than 1.5 minutes to answer each question. Only 22 percent of respondents were able to answer the missing number questions correctly but 77 percent of respondents could answer the subtraction questions correctly. Including a measure of whether respondents answered both the subtraction and the missing number questions correctly, or including seperately a measure of the ability to correctly respondent to either type of question, does positively effect insurance takeup but has no effect on the PSNP

coefficient. OLS results and propensity score matching results are shown below.

Table 6: OLS Regression of Insurance Sales Accounting for Risk Aversion and Numeracy

	(1)	(2)
	Model 1	Model 2
Amount Insured	b/se	b/se
Voucher Amount	4.079***	4.012***
	(1.44)	(1.42)
PSNP	-907.673***	-925.671***
	(315.15)	(324.21)
Total Farm Income (1,000s)	-10.159**	-10.336**
	(4.34)	(4.24)
Value of Agricultural Capital (1,000s)	-7.644**	-7.632**
	(3.20)	(3.14)
Negative Shock	13.640	31.560
	(117.94)	(126.74)
Dependency Ratio	1059.080***	1103.974**
	(375.39)	(399.25)
Officer in Household	429.244*	408.166*
	(242.54)	(231.81)
Female Headed Household	-71.401	-104.748
	(206.42)	(213.62)
Cooperative Member	151.889	165.956
	(181.74)	(188.36)
Numeracy	197.077	
	(148.99)	
Risk Averse		-330.833
		(205.98)
Constant	-532.035**	-506.456**
	(194.93)	(187.88)
N	349	349

Standard errors in parentheses, clustered at the kebele level. All models have population adjustments using sample weights equal to the inverse of the probability that the observation is included in the sample

The second part of this paper tests the casual mechanism that reliability on government services decreases private insurance demand by examining the interaction of PSNP with measures of perception of government credibility, including confidence in district government. It may be, however, that individuals' general levels of trust would cause them to be more trusting of a new product. The measure of trust in government would thus incorporate individuals' likeliness to be trusting, in addition to their trust in government. To account for individuals' generalized trust level, a measure of trust is included in the OLS regression of insurance purchase that includes an interaction of PSNP and stated confidence in government. The measure of trust is a dummy equal to one if individuals responded to the question

Table 7: Propensity Score Regression Accounting for Risk Aversion and Numeracy

	(1)	(2)
	Model 1	Model 2
Residuals	b/se	b/se
Treated	-480.64*	-852.820**
	(255.14)	(286.76)
Constant	132.05	504.23
N	365	365

Standard errors in parentheses. Outcome variable is the residual from an OLS regression of the amount insured on voucher amounts only, with kebele level clustering. Both models use one-to-one matching imposing a common support. Model 1 calculates propensity score matching, matching on the determinants of PSNP specified in the PIM plus households with an officer, that are female headed, have a cooperative member, and can accurately complete the numeracy tests. Model 2 calculates propensity score matching, matching on the determinants of PSNP specified in the PSNP PIM plus households with an officer, that are female headed, have a cooperative member, and risk aversion.

"Generally speaking would you say that most people living in this village can be trusted or that you need to be very careful in dealing with people" by answering that "most people can be trusted." In a seperate regression, I conduct two placebo tests showing that interacting PSNP with other measures of trust, that are unrelated to the government – trust in banks and trust in the press – yield an insignificant interaction effect. Results are shown in Table 8 below.

This paper provides evidence that is consistent with the explanation that lack of demand for private insurance is attributable in part to government provision of safety nets. It further presents evidence that perception of government credibility drives this behavior because individuals consider the government to be a reliable source of aid. A few caveats must be presented along with these findings. First, Ethiopia is only one case, and in many respects, a most likely case to test this hypothesis. Its history of drought, longstanding reliance on aid, and strong state capacity make it an environment where a perception of government responsiveness to economic shocks is highly likely to be found. Second, the power is limited by problems with implementing the randomized control trial. Thus, although the negative effect of receiving PSNP on private insurance takeup is substanital, the size of the confidence intervals means that the effects could be far more moderate. Finally, the identification

Table 8: OLS Regression of Insurance Uptake Controlling for Trust Levels

	(1) Amount Insured b/se	(2) Amount Insured b/se	(3) Amount Insured b/se
Voucher Amount	4.634***	5.177***	5.322***
	(1.52)	(1.62)	(1.56)
PSNP	-1105.133**	-626.893**	-576.028*
	(420.98)	(228.09)	(297.21)
Total Farm Income (1,000s)	-9.463**	-8.628**	-10.194**
	(3.93)	(3.67)	(4.29)
Value of Agricultural Capital (1,000s)	-7.811**	-9.484**	-8.862**
	(3.53)	(3.76)	(3.39)
Negative Shock	-42.811	46.506	2.586
	(126.64)	(108.50)	(99.76)
Dependency Ratio	1158.248**	1312.091**	1147.988***
	(438.10)	(507.94)	(404.52)
Trust in Press	13.614		
	(139.08)		
Trust in Press*PSNP	383.939		
	(314.30)		
Trust in Banks		337.141	
		(223.45)	
Trust in Banks*PSNP		-575.275	
		(398.43)	
Generalized Trust			236.521
			(236.02)
Confidence in District Govt			236.776
			(181.21)
Confidence in District Govt*PSNP			-842.760*
			(450.69)
Constant	-516.271**	-923.596**	-852.697**
	(228.64)	(403.02)	(340.78)
N	334	337	332

Standard errors in parentheses, clustered at the kebele level. All models have population adjustments using sample weights equal to the inverse of the probability that the observation is included in the sample

strategy relies on a matching strategy which assumes that the model of assignment to PSNP is correctly specified. Given allegations of political targeting of PSNP it may be that the government rewards supporters with PSNP, which may also correlate with private insurance demand. As the insurance pilot survey did not collect data on voting behavior or political preferences it is not possible to rule out this confound.

Conclusion

Many governments have fashioned themselves as being credible sources of aid following disasters. The reliability of governments as a source of disaster relief is likely to enter individuals' demand functions when presented with a private insurance offer. This paper shows that a safety net program crowds out private insurance markets in Ethiopia, a case marked by high government capacity and a long-standing reliance on aid. Supplying insurance privately in developing countries is likely to require major expenditure in the form of subsidies. However, even highly subsidized insurance offers have been met with indifference in field experiments. Given the many challenges that the introduction of insurance in developing countries faces, on both the supply and the demand side, the case for providing insurance privately is unclear and may be better provided publically.

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Appendix

Table 9: OLS Regression of Year 2 Sales without Sample Weights

	(1)	(2)	(3)	(4)
	Model 1	Model 2	Model 3	Model 4
Insurance Purchase	b/se	b/se	b/se	b/se
Voucher Amount	2.608***	2.690***	2.798***	2.873***
	(0.78)	(0.81)	(0.80)	(0.82)
PSNP		-401.707**	-460.242**	-416.817**
		(177.55)	(193.44)	(188.54)
Total Farm Income			-8.413**	-8.471**
			(3.50)	(3.57)
Value of Agricultural Capital			-6.929***	-7.042***
			(2.08)	(2.20)
Negative Shock			-22.387	-15.334
			(92.61)	(95.73)
Dependency Ratio			538.048*	488.718*
			(299.86)	(277.80)
Officer in the Household				113.971
				(166.78)
Female Headed Household				-264.676
				(189.82)
Cooperative Member				-216.239
				(148.17)
Constant	98.916	117.735	-0.906	200.313
	(97.79)	(100.65)	(148.04)	(162.92)
N	365	365	365	365

* indicates significance 10 percent, ** at 5 percent, and *** at 1 percent. Standard errors in parentheses, clustered at the kebele level. No sample weight adjustments are included.

Table 10: OLS Regression of Year 1 Sales without Sample Weights

	(1)	(2)	(3)	(4)
	Model 1	Model 2	Model 3	Model 4
Insurance Purchase	b/se	b/se	b/se	b/se
Voucher Amount	1.644***	1.637***	1.635***	1.593***
	(0.39)	(0.39)	(0.40)	(0.40)
PSNP		-314.641**	-324.363**	-333.698**
		(137.31)	(147.45)	(150.56)
Total Farm Income			-10.338	-10.998
			(7.35)	(7.92)
Value of Agricultural Capital			-5.004***	-4.890**
			(1.70)	(1.75)
Negative Shock			-150.404	-159.480
			(107.27)	(108.47)
Dependency Ratio			108.864	155.698
			(201.06)	(198.32)
Officer in the Household				-277.989
				(181.90)
Female Headed Household				-0.317
				(138.09)
Cooperative Member				128.152
				(134.78)
Constant	230.412**	268.156**	358.572**	271.962
	(105.26)	(109.87)	(139.07)	(173.75)
N	379	379	379	379

Standard errors in parentheses, clustered at the kebele level. No sample weight adjustments are included.

Table 11: OLS Regression of Year 1 Sales with Sample Weights

	(1)	(2)	(3)	(4)
	Model 1	Model 2	Model 3	Model 4
Insurance Purchase	b/se	b/se	b/se	b/se
Voucher Amount	1.878***	1.853***	1.796***	1.858***
	(0.51)	(0.51)	(0.53)	(0.53)
PSNP		-312.457**	-243.114	-240.774
		(136.87)	(146.33)	(141.89)
Total Farm Income			-17.783	-16.491
			(12.97)	(12.47)
Value of Agricultural Capital			-6.343	-6.304
			(4.07)	(3.98)
Negative Shock			-209.450	-215.251
			(171.69)	(163.83)
Dependency Ratio			-385.965	-387.487
			(385.46)	(365.46)
Officer in Household				4.333
				(285.90)
Female Headed Household				102.425
				(211.19)
Cooperative Member				-25.714
				(158.70)
Constant	102.205	146.164	456.913	437.579
	(158.13)	(167.21)	(303.67)	(274.71)
N	317	317	317	317

* indicates significance 10 percent, ** at 5 percent, and *** at 1 percent. Standard errors in parentheses, clustered at the kebele level. All models have population adjustments using sample weights equal to the inverse of the probability that the observation is included in the sample.

Table 12: Logit Model of PSNP Receipt at Household Level without Weights

	(1)	(2)
	Model 1	Model 2
PSNP	b/se	b/se
Value of Agricultural Capital	-0.043	-0.041
	(0.12)	(0.11)
Total Farm Income	-0.149***	-0.149***
	(0.04)	(0.04)
Negative Shock	0.610***	0.589***
	(0.19)	(0.19)
Dependency Ratio	0.213	0.244
	(0.27)	(0.26)
Officer in the Household		0.207
		(0.21)
Female Headed Household		0.412**
		(0.20)
Cooperative Member		0.667***
		(0.25)
Constant	-1.838***	-2.519***
	(0.26)	(0.32)
N	2397	2397

* indicates significance 10 percent, ** at 5 percent, and *** at 1 percent. Standard errors in parentheses, clustered at the kebele level. No sample weight adjustments are included.