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Social protection, household size and its determinants: Evidence from Ethiopia

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ABSTRACT

We examine the impact of a social protection program, Ethiopia's Productive Safety Net Programme (PSNP), on household size and the factors that cause household size to change: fertility, child fosterage, and in and out migration related to work and marriage. Participation in the PSNP leads to an increase in household size of 0.3 members. PSNP participation lowers fertility by 7.6 to 9.9 percentage points. The increase in household size arises from an increase in the number of girls aged 12 to 18 years. We present suggestive evidence that this occurs because the PSNP causes households to delay marrying out adolescent females.

Keywords: Social protection, household size, fertility, marriage, Ethiopia

JEL Classification: I38, J12, O12

1. INTRODUCTION

Interest in understanding the interplay between economics and demography goes back at least to Malthus. One strand, due in its modern form to Becker (1960, 1965) focuses on how economic changes, such as income shocks, affect fertility. A second seeks to understand how metrics used to assess welfare are affected by considerations of household size and composition (Deaton and Paxson 1998; Lanjouw and Ravallion 1995). A third, one that brings together both strands, focuses on how public policy changes – specifically those related to social protection interventions – may induce changes in household size or structure and how, in turn, these possibly unintended changes modify the welfare consequences of these policy changes. As Todd et al. (2012) note, discussion of this last strand also goes back to Malthus and his view that England's poor laws "create the poor which they maintain" (Malthus 1890, p. 342).

Social protection interventions are common in both developed and developing countries. Globally, approximately one billion people benefit from these programs (Fiszbein, Kanbur, & Yemtsov, 2014). These can affect household size through multiple channels: fertility; child fosterage; changed patterns of employment related in and out migration; and changed patterns of marriage, divorce, and household dissolution. Yet, when we look at the existing literature on these possible impacts in developing countries,[1] several striking features emerge. First, all these studies are partial in their explorations, largely focusing on only one channel. Second, the literature is dominated by work on two programs in two middle-income countries where fertility rates are already low and other demographic responses such as child fosterage and early marriage of girls are largely absent: South Africa's Old Age Pension; and Mexico's conditional cash transfer (CCT) program (Progresa/Oportunidades). Work on the Old Age Pension in South Africa focuses almost entirely on impacts on in and out migration of prime age males and females (Bertrand, Mullainathan, and Miller 2003; Edmonds, Mammen, and Miller 2005; Ardington, Case, and Hosegood 2009; Maitra and Ray 2003; and Posel, Fairburn, and Lund 2006) with only two looking at other demographic impacts, numbers of pre-school children (Edmonds, Mammen, and Miller 2005; Maitra and Ray 2003) and these reaching contradictory conclusions. Two papers focus on how Progresa/Oportunidades led to household partition or dissolution (Bobonis 2012; Rubalcava and Teruel 2006) and one of these also looks at how it led to return migration of older children (Rubalcava and Teruel 2006). Stecklov, Winters, Todd, and Regalia (2007) find no evidence that Progresa/Oportunidades affected fertility in Mexico, whereas a similar CCT had a small positive impact in Honduras. Stecklov, Winters, Todd, and Regalia (2007) find that a CCT program in Nicaragua had no impact on fertility, although subsequent work with additional data showed that it led to increased birth spacing (Todd, Winters, and Stecklov 2012).

Our paper attempts to fill some of these knowledge gaps. We use data from a poor developing country with high rates of fertility, Ethiopia. We look at a different class of social protection intervention, a labor intensive public works program called the Productive Safety Net Programme (PSNP). We build on the studies described above to examine effects on total household size as well as the factors (fertility, child fosterage, in and out migration related to work and marriage) that cause household size to change. We find that participation in the public works component of the PSNP leads to an increase in household size of 0.3 members. This effect is statistically significant, though small in magnitude, being approximately a five percent increase. This is not a consequence of increased fertility. We find that PSNP participation lowers fertility, specifically it reduces the likelihood that an adult female member gives birth by between 7.6 and 9.9 percentage points depending on the specification used. Instead, the increase in household size arises from an increase in the number of girls aged 12 to 18

[1] There is a vast literature on the demographic consequences of welfare and related interventions in developed countries. Moffitt (1997) provides an exhaustive review of much of this early literature with Baughman and Dickert-Conlin (2009) and Brewer et al. (2012) providing recent examples.

years. There is no impact on the number of males of any age nor is there an impact on the number of females in age groups other than 12 to 18 years. The increase in the number of adolescent females occurs because participation in the PSNP reduces outmigration by adolescent girls. Since outmigration in this age group is largely due to marriage, these results are consistent with the PSNP causing households to delay marrying out adolescent females, possibly because they are required to assist with household tasks. We present suggestive evidence consistent with this hypothesis.

The paper is structured as follows. We begin with a description of the PSNP. We then discuss conceptual models of how a program like the PSNP might affect household size. We note that while it is not possible to sign *a priori* the effect of PSNP participation on fertility or migration, these models indicate that we should disaggregate by age and sex as the aggregate effects might mask different responses by different demographic groups. We describe our non-experimental data and our model, paying careful attention to issues of identification, before turning to our results.

2. ETHIOPIA'S PRODUCTIVE SAFETY NET PROGRAMME

The genesis of Ethiopia's Productive Safety Net Programme was a major drought in 2002-03 that resulted in more than 13 million people being left reliant on emergency food aid. While this assistance was successful in preventing outright starvation, it left untouched the underlying vulnerability of many Ethiopians to rainfall shocks. In response, the Government of Ethiopia, in consultation with major international donors including the UK's Department for International Development, the United States Agency for International Development, and the World Bank, developed a new intervention, the Productive Safety Net Programme (PSNP). Implementation of the PSNP began in January 2005 and is scheduled to operate until 2020. Operating in eight regions, the PSNP provides benefits to approximately eight million people with a budget of approximately 500 million dollars per year. During preparatory work associated with the inception phase of the PSNP, discussions were held about the desirability of randomizing access to the program in order to evaluate the impact of the program. The Government of Ethiopia rejected this idea.

The PSNP is a targeted intervention. The PSNP does not operate everywhere in Ethiopia; rather, it is focused on *woredas* which historically have been drought-prone recipients of food aid.[2] Within *woredas*, households are selected using a process that combines both administrative and community mechanisms. Administrative mechanisms include the provision of a specified number of clients that can be included within a specific administrative area (*woreda*, *kebele*); guidance found in the PSNP's Programme Implementation Manual (PIM) on targeting criteria to be used at the community level; and oversight to ensure transparency and accuracy. Household selection is carried out via community targeting, particularly the identification of clients by community Food Security Task Forces (FSTFs). In many, but not all localities, selection of beneficiaries is discussed during a public meeting. The PIM specifies that households that are targeted should: be community members; have faced continuous food shortages in the last three years; be acutely food-insecure due to a shock resulting in the severe loss of assets; lack adequate family support and other means of social protection and support. Moreover, consideration is given to level of household assets (land, livestock, land quality); income from agricultural and non-agricultural activities; and households' perceived vulnerability, such as female-headed households and elderly households or households with chronically-ill members (GFDRE 2010, 24). Assessment of this targeting has been the subject of extensive work in evaluations of the PSNP (Berhane et al. 2013; Berhane et al. 2011; Coll-Black et al. 2012). These show that, while PSNP targeting is progressive, there is evidence of rationing with eligible households excluded because the program budget is not large enough to include all eligible households. These assessments also show that household size or the presence of young children was not considered when households were selected for the PSNP (see for example, Coll-Black et al. 2012, Table 10.1). Importantly, early years of the program saw periodic re-targeting, particularly in 2006 and 2010, but this diminished over time (Berhane et al. 2013; Berhane et al. 2011).

Payments are provided in the form of food and cash. The goal of these payments is twofold: eliminate the food gap, the number of months the household cannot satisfy its food needs; and prevent distress asset sales, that is, to stabilize household asset holdings (GFDRE 2009a). Most beneficiaries receive these payments for undertaking public works. While these public works focus heavily on environmental remediation (soil and water conservation, gully reclamation, etc.), work has also been done on constructing and maintaining feeder roads and this road work was seen as beneficial in terms of making it easier for children to access schools. This work is largely carried out between January and July, outside the growing season when demand for labor is low. Both adult men and adult women could undertake this public work, but

[2] A *woreda* is equivalent to a county or district. A *kebele* is equivalent to a sub-district.

children younger than 15 were prohibited from doing so and this prohibition was enforced (see for example Berhane et al. 2011). A smaller number, approximately 15 percent of the PSNP caseload, receive payments without having to work. This component, called Direct Support, is targeted largely to households that are unable to supply labor, such as those consisting of elderly persons or those with disabilities (Coll-Black et al. 2012). Starting in 2008, pregnant and lactating women undertaking public works were shifted to temporarily receive Direct Support payments. Up until 2016, PSNP payments were made for six months. In practice, particularly in the first years the PSNP operated, payment levels were below those set out in the PIM. This was a particular problem for Direct Support payments which, prior to 2013, were small and episodic. While there were payment issues associated with Public Works, these were less marked than those associated with Direct Support. After 2008, under a system called Full Family Targeting, payments were tied to household size with larger households supposed to receive larger payments. In practice however, because of budget constraints, this system was not fully implemented. For example, in 2011, households with three or four members typically received nearly 100 percent of their entitled payment, but households with seven members received about 85 percent (Berhane et al. 2013, Figure 7.4). Also, children born in the last two years were excluded from the calculation of payment entitlements.

3. CONCEPTUAL FRAMEWORKS

How might a program like the PSNP affect household size? In models of household behavior, such as Singh, Squire and Strauss's canonical agricultural household model, household size *per se* does not enter the household utility function. Instead, economists focus on two behavioral aspects that influence observed household size: fertility and migration.

Modern economic analyses of fertility are based on Becker (1960) and Becker and Lewis (1973); also see more recent statements of these ideas in Schultz (1997) and Stecklov, Winters, Todd, and Regalia (2007). The basic insight in these models is that parents care about both the quantity and quality of their children. Assuming that children are normal goods, an increase in income raises both the demand for child quantity and quality. But Becker and Lewis (1973) emphasize that the income elasticities for child quantity and quality need not be equal; indeed they argue that the income elasticity for child quality is higher than for child quantity, with the result that rising incomes lead to increases in investments in child quality and a reduction in child quantity.

Other features of these economic models are also relevant to our assessment of how the PSNP might affect fertility. If benefits rise with the number of children, then PSNP payments might be seen as an incentive for additional child bearing. But while payments are supposed to rise with household size, thus keeping per capita transfers unchanged, in practice this does not occur and, as noted above, children under the age of two are not included when calculating households' payment entitlements. Second, child bearing has a potential cost to the extent to which mothers stop working. But recall that under the PSNP pregnant and lactating mothers can temporarily shift from public works employment to Direct Support, which reduces the likelihood of lost income. Third, as Todd, Winters, and Stecklov (2012) note, couples have preferences not only for the total number of children, but also their spacing and presence. Because in principle the PSNP allows mothers to receive a payment even when they do not work (this is the temporary shift described above), and because households are moved in and out of the program over time, couples might chose to reduce spacing so as to minimize the income loss associated with pregnancy by having their children while they are PSNP beneficiaries. Lastly, the PSNP might affect the price of child quality. Recall that the PSNP includes work on improving road access which, among other effects, is perceived by beneficiaries as making it easier for children to attend school and for mothers to reach health clinics when giving birth (Berhane et al. 2012; Berhane et al. 2013). However, since all members of a given community where the PSNP operates benefit from this improved infrastructure, it should not have a differential effect on PSNP beneficiaries.[3]

The migration effects of PSNP participation are also complex. If we begin with a simple Todaro (1969) type model, we can think of PSNP payments as, ceteris paribus, lowering the urban-rural wage differential and thus either reducing out-migration or possibly encouraging some urban workers to return to rural areas. But as Todaro and others have noted, there may be fixed costs associated with migrating. Credit-constrained households might find it difficult to raise funds needed to support a migrant; PSNP payments might be a means of obtaining these funds. Relatedly , in a series of papers, Stark and co-authors have emphasized that migration (and its associated remittances) should be seen as part of a strategy to diversify income sources through remittances (Stark and Bloom 1985). If the long term gain from improved income diversification that arises from the reduction of the credit constraint outweighs (does not outweigh) the possibly temporary reduction in the

[3] Since the PSNP does not have any component directly related to the provision of health and family planning services, it should not have a direct effect on the supply of children.

urban-rural wage differential, this line of argument suggests that the PSNP might lead to greater (lesser) outmigration. Hagen-Zanker and Himmelstine (2013), Stecklov, Winters, Stampini, and Davis (2005), and Angelucci (2012) discuss these issues further.

The arguments in the previous paragraph pertain largely to adults. But it is possible that PSNP participation might affect movement by children in and out of the household. While Akresh's (2009) work focuses largely on reasons why households send children out to be fostered, he notes that positive income shocks might result in households being more willing to take-in children. (On this, also see Rosenzweig (1988), Fafchamps (1999) and Fafchamps and Quisumbing (2007).) While children are not necessarily economically active, they are often responsible for tasks such as cleaning, tending livestock, and the collection of water and firewood. With the PSNP increasing demands on adult labor, it might be the case that beneficiary households take-in foster children to assist with this greater workload. Alternatively, households might delay the out-migration of adolescent daughters through marriage with these daughters taking on domestic chores previously undertaken by adult women. This latter effect might be amplified if beneficiary households use part of their PSNP payments to invest in adolescent girls' schooling, particularly if these investments increase the gains from marriage, see Becker (1973, 1974).

Taken collectively, two points arise from this discussion. First, it is not possible to sign *a priori* the effect of PSNP participation on fertility or migration. There are considerations that increase the likelihood of higher fertility and in-migration, thus raising household size, and there are considerations that reduce fertility and lower in-migration, thus lowering household size. Second, in addition to looking at aggregate effects, we should disaggregate by age and sex as the aggregate effects might mask different responses by different demographic groups.

4. DATA, MODEL, AND IDENTIFICATION

4.1. Data

A feature of the PSNP is the bi-annual collection of longitudinal data on beneficiaries and non-beneficiaries. We use data from the first four surveys. The first survey, in 2006, used a two-stage clustered sampling approach. Across the four regions where the PSNP operated (Amhara, Oromiya, SNNP, and Tigray), 68 *woredas* (districts) were randomly selected using probability proportional to size (PPS) sampling based on estimated numbers of beneficiaries. Within each selected *woreda*, depending on the region a random sample of two or three *kebeles* (sub-district unit) was selected. Beneficiary lists were used to select randomly 17 PSNP households and lists of non-beneficiaries were used to select an additional eight households yielding a sample of 25 households per *kebele*. The 2006 survey contained 3,668 households. Subsequent rounds added a significant number of additional households in the Amhara region, approximately 1,200, as well as additional Direct Support households.

We use data collected during the 2006, 2008, 2010 and 2012 surveys. These surveys have a number of strengths. Data are collected at approximately the same time (June and July) in each round. Questions on the survey instrument that are critical to our study, those pertaining to household demographics and program participation, are identical across all rounds as are a rich set of control variables. Both PSNP participants and non-participants are selected within the same geographic localities meaning, inter alia, they are exposed to the same shocks, infrastructure, and public services (including family planning). As we discuss below, the longitudinal design allows us to use a Difference-in-Difference estimator. Attrition is low, approximately two percent per year. Much of this attrition is due to kebeles being dropped where the PSNP ceased operating (Berhane et al. 2013). However, as noted above and as discussed in Gilligan, Hoddinott, and Taffesse (2009), access to the PSNP was not allocated randomly. After we describe our definitions of treatment (beneficiary) and comparison (non-beneficiary) households, given this non-randomized element, we discuss how we will identify the impact of the PSNP on household size, fertility, and household composition.

4.2. Defining treatment and comparison households

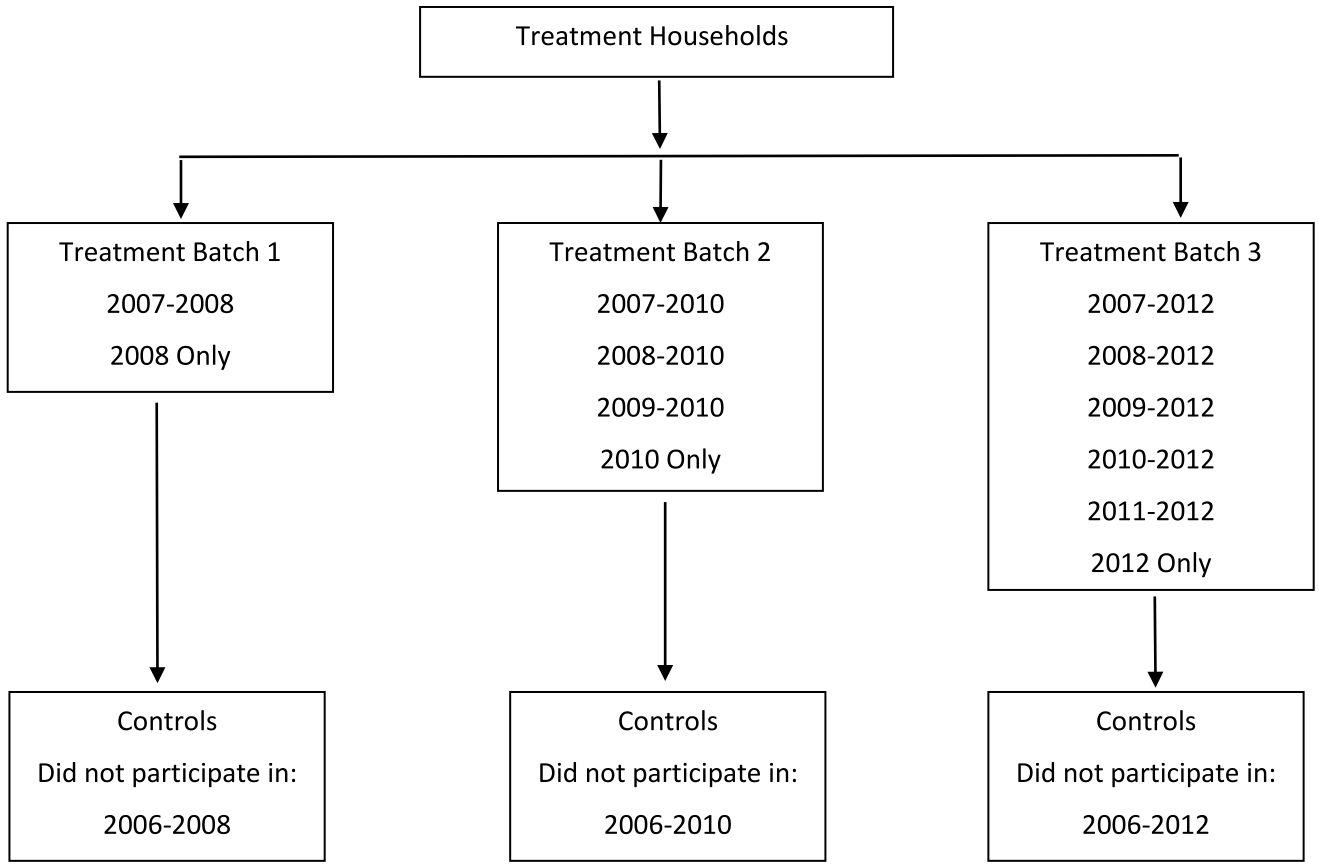
A treatment household is defined in terms of receiving payments for participating in the public works component of the PSNP. We exclude households solely receiving Direct Support. As explained above, these households have demographic characteristics (they are largely households with elderly persons or those with disabilities) which make them less relevant to outcomes such as fertility and migration that are the focus of our paper. Further, as noted, their payments tended to be small and episodic. Consequently, finding no evidence of impact of Direct Support participation could simply be a result of these low payments rather than the absence of a behavioral response.

We exploit the fact that the periodic re-targeting of the PSNP means that new households enter the program after our first round of data collection. The survey instrument collected data on both current participation (i.e., 2006, 2008, 2010, and 2012) as well as the year prior to the survey (i.e., 2007, 2009, and 2011). We categories their entry into groups based on the year in which they started to take part in the program. We refer to these groups as 'treatment batches'.

The first treatment batch includes households that were not part of the program in 2006 but become beneficiaries in 2008 only or both in 2007 and 2008. For these households, 2006 is their "before" period. The second treatment batch includes households that participated in the program during 2007-2010, 2008-2010, 2009-2010, or in 2010 only. The *before* periods for these households depends on when they entered the PSNP; this is 2006, 2006-2007, 2006-2008, 2006-2009, respectively. The third batch consists of households that were beneficiaries in 2012 and who started in 2007 or later. Again their before period depends on precisely when they entered the program. This yields 1,414 observations on 437 unique treated households. An implication of this approach is that we exclude households who received the PSNP public work benefit continuously over this period.

We construct control groups that are matched to these treatment batches. For each batch and period, our control group includes those households who did not receive a PSNP public works payment in that period. So, for example, non-PSNP beneficiaries in 2006-2008 are the comparison group for treatment batch one. This yields 1,457 observations on 466 unique comparison households. Figure 4.1 summarizes our treatment and control batches.

Figure 4.1: Beneficiary (treatment) households and their respective comparison (control) groups



Source: Authors

4.3. Model and estimation

We estimate the following difference-in-differences model:

$$H_{it} = \alpha + \beta_1 D_i + \beta_2 T_{it} + \beta_3 D_i \times T_{it} + \beta_4 X'_{it} + \beta_5 Z'_i + \gamma_t + \lambda_{tr} + \eta_r + \varepsilon_{it} \quad (1)$$

where $H_{it}$is the outcome of interest (size and composition of household i at time t), D_i is a dummy which indicates treatment status of household i ("Treatment" on our tables below), T_{it} is a period dummy which equals one if t is an after treatment period for household i ("Post") and zero otherwise. Because of the way we have constructed our treatment groups, T_{it} varies across households as households switch to the treatment group at different points in time. The coefficient estimate of the interaction term (β_3) captures the impact of the program ("Treatment x Post") on household demographic dynamics.

We estimate equation (1) using OLS regressions and household fixed effects (HHFE) specifications. Where the dependent variable is a count variable, we used a Fixed Effects Poisson (Quasi-ML) estimation technique. Where it is dichotomous, we estimate models using probits, linear probability models, and HHFE linear probability models. In all cases, the standard errors are clustered at the *woreda* level. We include: region fixed effects as denoted by η_r to control for time invariant factors that are specific to each region (these are dropped when we use a HHFE specification); year fixed effects (γ_t) to capture factors that vary over time and are common to all households (and regions); and time fixed effects interacted with region dummies (λ_{tr}) to control for time varying factors that may have differential impact across regions. X_{it} refers to vectors of time varying household characteristics that may affect both participation and household demographic dynamics. These include age of the household head, household wealth, assets, distress asset sales, household poverty perceptions, self-reported drought and other climatic shocks as well as shocks affecting crops and livestock. Finally, Z_i refers to a vector of time invariant household specific characteristics. ε_{it} is the white noise error term.

4.4. Identification

Our parameter of interest is (β_3) which captures the impact of the PSNP. An unbiased estimate of (β_3) requires that the interaction term ("Treatment x Post") is uncorrelated with ε_{it}. While it is not hard to think of reasons why this might not hold, we argue that the details of PSNP implementation, our specification, and our data protect us from threats to identification.

One argument could be that treatment and comparison households are exposed to different markets and to shocks in these markets, to different infrastructures, to different migration opportunities, or differ in terms of their access to family planning. But recall that treatment and comparisons are sampled within the same geographic locality. Second, treatment and comparisons might differ in terms of observable and unobservable time invariant characteristics. With this in mind, consider Table 4.1. It shows that there are some, but not many, statistically significant differences between comparison and treatment households in terms of household size and composition and that where these differences exist, they are not large in magnitude. Consistent with the observation that access to the PSNP was rationed among eligible households, we see little evidence of difference in other household characteristics between comparison and beneficiary households. Note too that our estimates that use household fixed effects effectively control for all baseline time invariant household characteristics, both observed and unobserved. Additionally, while we might worry that treatment and control households face different time varying shocks, these are explicitly controlled for via the inclusion of time fixed effects interacted with region dummies (λ_{tr}), to control for time varying factors that may have differential impact across regions and through the inclusion of household level self-reported drought and other climatic shocks as well as shocks affecting crops and livestock.

Table 4.1: Comparison of pre-program means

	Comparison	Beneficiary	Difference	P value
Demographic characteristics				
Household size (HH size)	5.63	5.26	0.37**	0.014
No. of HH members (0-6)	1.21	1.29	-0.08	0.291
No. of HH members (7-11)	0.85	0.84	0.01	0.878
No. of males (12-18)	0.62	0.57	0.05	0.299
No. of females (12-18)	0.53	0.39	0.14***	0.003
No. of males (19-29)	0.44	0.34	0.10**	0.010
No. of females (19-29)	0.41	0.41	0.00	0.952
No. of males (30-41)	0.30	0.30	0.00	1.000
No. of females (30-41)	0.36	0.37	-0.01	0.785
No. of males (42-60)	0.35	0.33	0.02	0.494
No. of females (42-60)	0.30	0.26	0.05	0.109
No. of HH members (61)	0.25	0.18	0.07**	0.028
Household characteristics				
Male headed household	0.87	0.81	0.06**	0.015
Age of head	46.14	44.31	1.83*	0.056
Head has no formal schooling	0.77	0.76	0.00	0.967
Head has primary education	0.20	0.20	-0.00	0.893
Head has secondary education	0.03	0.03	-0.00	0.860
Value of productive assets (Birr, log)	5.09	5.05	0.04	0.670
Dwelling has corrugated metal roof	0.17	0.11	0.06**	0.012
In the two years prior to the survey, the household reports:				
Making a distress sale of assets	0.51	0.53	-0.03	0.424
Climatic shocks to crop production	0.66	0.65	0.01	0.816
Input shocks to crop production	0.30	0.31	-0.01	0.644
Livestock shocks	0.66	0.67	-0.00	0.962
Household ranks itself:				
Poor relative to others	0.46	0.50	-0.04	0.181
Average relative to others	0.41	0.41	0.00	0.956

Source: Authors calculations.

Our identification strategy also requires that, absent treatment, the underlying trend in the outcome of interest is the same for treatment and control group households. Here we explore whether this important assumption holds. To do so, we exploit our decision to define our earliest treatment batch as being households who enter the PSNP after 2006. This provides us with two data points in the 'before' period. For example, using households that become beneficiaries of the program after 2008 and their respective control households, $\Delta Y_{treat.}^{08-06} - \Delta Y_{cont.}^{08-06}$ should not be significantly different from zero for the parallel trend assumption to hold. A similar argument applies to households that become beneficiaries in 2010 and 2012. To check whether the parallel trend assumption holds, we use a simple placebo type regression by applying difference-in-differences estimation. For those who joined the program after 2008 but before 2010, the period between 2006 and 2008 will be their pre-treatment period. We thus implement a Placebo type test considering 2008 as if it is an after treatment period and 2006 as a pre-treatment period. Similarly, for those who become beneficiaries after 2010, the period 2006 to 2010 will be their pre-treatment period. For these households, 2006 is used as their before period and 2008 and 2010 are used as their fake treatment periods for the Placebo estimation.

For the parallel trend assumption to hold, $\Delta y_{treat.}^{08-06} - \Delta y_{cont.}^{08-06}$, which is given by the estimate for β_3, should be equal to zero. Results are reported in Table 4.2. The coefficient on the Treatment x Post interaction term is not statistically significant using either the OLS or a household fixed effects estimator, nor is it significant if we disaggregate by sex. The parallel trend assumption holds.

Table 4.2: Testing the parallel trends assumption

	Ordinary Least Squares (OLS)			Household Fixed Effects (HHFE)		
	HH size	No. Females	No. Males	HH Size	Females	Males
Treatment *x* Post	0.424	0.140	0.284	-0.247	0.141	-0.388
	(0.346)	(0.243)	(0.258)	(0.317)	(0.147)	(0.239)
Post Period	0.740	0.407	0.333	0.860***	0.481	0.379
	(0.700)	(0.878)	(0.472)	(0.314)	(0.308)	(0.289)
Treatment	-1.026***	-0.348	-0.679**			
	(0.362)	(0.293)	(0.283)			
Observations	467	467	467	467	467	467
Household Fixed Effects	No	No	No	Yes	Yes	Yes
Time Fixed Effects	No	No	No	No	No	No
Time Fixed Effects *x* Region Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Region Fixed Effects	Yes	Yes	Yes	No	No	No

Source: Authors calculations.

Notes: Standard errors clustered at woreda level in parenthesis. * p < 0.1, ** p < 0.05, *** p < 0.01. Controls: Household head characteristics (sex, age, schooling), household wealth, distress asset sales, poverty perceptions, self-reported drought and other climatic shocks as well as shocks affecting crops and livestock (see Table 1), treatment batch dummy, and duration of treatment. All regressions include region and time fixed effects and region *x* time interaction terms.

5. RESULTS

Table 5.1 shows the results of estimating equation (1) where the dependent variable is total household size. The OLS and the HHFE results (columns 1 and 2) report coefficients of approximately 0.3. Given mean household size of 5.5, this is equivalent to a 5.5 percent increase in household size. The fixed effects Poisson estimation gives a similar result; the coefficient estimate in Column 3 of Table 5.1 implies that program participation leads to a 5.3 percent increase in household size.

Table 5.1: Impact of participation in PSNP Public Works on household size

	Ordinary Least Squares (OLS)	Household Fixed Effects (HHFE)	Poisson Fixed Effects (Poisson FE)
Treatment *x* Post	0.295**	0.287**	0.053***
	(0.138)	(0.109)	(0.020)
Treatment	0.143	-	-
	(0.489)		
Post Period	-0.336*	-0.329**	-0.055***
	(0.198)	(0.126)	(0.020)
Observations	2,074	2,074	2,074
Household Fixed Effects	No	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes
Time Fixed Effects *x* Region Fixed Effects	Yes	Yes	Yes
Region Fixed Effects	Yes	No	No
Mean of Dependent Variable	5.57	5.57	5.57

Source: Authors calculations.

Notes: See Table 4.2.

Table 5.2 reports the results of estimating equation (1) where the dependent variable is the likelihood that a female adult member gave birth. (Note that this estimation is done conditional on a household having a female member of child bearing age.) This shows that participation lowers fertility, specifically it reduces the likelihood that an adult female member gives birth by between 7.6 and 9.8 percentage points depending on the specification used. The results of Table 5.2 could be taken to imply that, ceteris paribus, PSNP participation should reduce the number of pre-school children in the household. However, given that only one third of households report a birth in the previous two years, this modest reduction in births may not be large enough to affect this number, and this is indeed what Table 5.3 reports.

Table 5.2: Impact of participation in PSNP Public Works on likelihood that adult female members give birth

	Probit (Marginal effects)	Linear Probability Model (LPM)	LPM w/Household Fixed Effects
Treatment *x* Post	-0.093**	-0.098**	-0.076*
	(0.041)	(0.041)	(0.045)
Treatment	-0.087	-0.066	-
	(0.067)	(0.064)	
Post Period	0.040	0.046	-0.021
	(0.052)	(0.047)	(0.058)
Observations	2,044	2,044	2,044
Household Fixed Effects	No	No	Yes
Time Fixed Effects	Yes	Yes	Yes
Time Fixed Effects x Region Fixed Effects	Yes	Yes	Yes
Region Fixed Effects	Yes	Yes	No
Mean of Dependent Variable	0.33	0.33	0.33

Source: Authors calculations.

Notes: See Table 4.2.

Table 5.3: Impact of participation in PSNP Public Works on number of children aged 0 to 6 years

	Ordinary Least Squares (OLS)	Household Fixed Effects (HHFE)	Poisson Fixed Effects (Poisson FE)
Treatment *x* Post	0.036	-0.008	-0.019
	(0.094)	(0.088)	(0.057)
Treatment	-0.123	-	-
	(0.178)		
Post Period	-0.236**	-0.252**	-0.159**
	(0.102)	(0.101)	(0.068)
Observations	1,775	1,775	1,775
Household Fixed Effects	No	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes
Time Fixed Effects x Region Fixed Effects	Yes	Yes	Yes
Region Fixed Effects	Yes	No	No
Mean of Dependent Variable	1.44	1.44	1.44

Source: Authors calculations.

Notes: See Table 4.2.

Tables 5.2 and 5.3 indicate that the change in household size is not attributable to an increase in the number of children, particularly in the 0 to 6 year age group. So why does this change come about? We begin by assessing whether there is a differential effect by sex. Once we control for household fixed effects, Table 5.4 tells us that household participation in the PSNP results in an increase of 0.176 women (significant at the five percent level). The number of males rises by 0.095 but this effect is not statistically significant. Similar results are found from our Poisson fixed effects estimator.

Next we disaggregate by sex and age. These are reported for women (Table 5.5) and men (Table 5.6). We report three age groups for each: 7 to 11; 12 to 18; and 19 to 29 years. In preliminary work, we also estimated these regressions for older men and women, but there were no statistically significant impacts and for brevity, these are omitted here. For women, the aggregate increase found in Table 5.4 is driven entirely by an increase in the number of adolescent girls. The OLS and household fixed effects (HHFE) estimators show that household participation in the PSNP increases their number by around 0.3; in fact, this approximates the increase in total household size reported in Table 5.1. Given a dependent mean of 0.81, these estimates imply that program participation increases the number of girls aged 12 to 18 years by 33 and 39 percent respectively; converting the Poisson fixed effect parameter estimate yields a similar 39 percent increase. All three estimators show a statistically significant impact for this age and sex disaggregation and all show comparable magnitudes. By contrast, there is no impact on girls aged 7 to 11 or women aged 12 to 29 years and there is no impact on males even after disaggregating by age. Given these results, we further disaggregate the age results for girls aged 12 to 18 (Table 5.7). There does not appear to be a differential effect within this age group with the parameter estimates in both the HHFE and Poisson FE regressions similar across disaggregations of girls in this age group.

Table 5.4: Impact of participation in PSNP Public Works on number of female and male members

	Ordinary Least Squares (OLS)		Household Fixed Effects (HHFE)		Poisson Fixed Effects (Poisson FE)	
	Female	**Male**	**Female**	**Male**	**Female**	**Male**
Treatment *x* Post	0.154	0.149	0.176**	0.095	0.072***	0.032
	(0.096)	(0.105)	(0.075)	(0.090)	(0.028)	(0.033)
Treatment	-0.177	0.189				
	(0.302)	(0.306)				
Post Period	-0.125	-0.181	-0.155*	0.166**	-0.053*	0.050**
	(0.152)	(0.113)	(0.078)	(0.079)	(0.028)	(0.024)
Household Fixed Effects	No	No	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects x Region Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Region Fixed Effects	Yes	Yes	No	No	No	No
Mean of Dependent Variable	2.64	2.87	2.64	2.87	2.64	2.87

Source: Authors calculations.

Notes: See Table 4.2.

Table 5.5: Impact of participation in PSNP Public Works on number of female members, by age in years

	Ordinary Least Squares (OLS)			Household Fixed Effects (HHFE)			Poisson Fixed Effects (Poisson FE)		
	7-11	**12-18**	**19-29**	**7-11**	**12-18**	**19-29**	**7-11**	**12-18**	**19-29**
Treatment *x* Post	0.046	0.315***	0.029	0.053	0.270***	0.024	0.097	0.396***	0.040
	(0.099)	(0.102)	(0.066)	(0.101)	(0.095)	(0.061)	(0.140)	(0.115)	(0.091)
Treatment	0.096	-0.221	-0.051	-	-	-	-	-	-
	(0.124)	(0.181)	(0.113)						
Post Period	-0.085	-0.283***	0.069	-0.119*	-0.162**	0.165*	-0.183**	-0.214**	0.259*
	(0.085)	(0.101)	(0.093)	(0.068)	(0.079)	(0.093)	(0.092)	(0.094)	(0.149)
Observations	1,233	1,269	1,289	1,233	1,269	1,289	1,233	1,269	1,289
Household Fixed Effects	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects x Region Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region Fixed Effects	Yes	Yes	Yes	No	No	No	No	No	No
Mean of Dependent Variable	0.72	0.81	0.68	0.72	0.81	0.68	0.72	0.81	0.68

Source: Authors calculations.

Notes: See Table 4.2.

Table 5.6: Impact of participation in PSNP Public Works on number of male members, by age in years

	Ordinary Least Squares (OLS)			Household Fixed Effects (HHFE)			Poisson Fixed Effects (Poisson FE)		
	7-11	12-18	19-29	7-11	12-18	19-29	7-11	12-18	19-29
Treatment *x* Post	0.118	0.024	0.023	0.135	0.014	0.020	0.171	0.026	0.026
	(0.085)	(0.086)	(0.091)	(0.087)	(0.084)	(0.098)	(0.117)	(0.088)	(0.138)
Treatment	-0.045	0.150	-0.093	-	-	-	-	-	-
	(0.158)	(0.189)	(0.171)						
Post Period	-0.121	0.034	0.119	-0.091	0.027	0.130*	-0.110	0.013	0.211*
	(0.085)	(0.091)	(0.076)	(0.071)	(0.079)	(0.075)	(0.084)	(0.080)	(0.112)
Observations	1,268	1,350	1,237	1,268	1,350	1,237	1,268	1,350	1,237
Household Fixed Effects	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects x Region Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region Fixed Effects	Yes	Yes	Yes	No	No	No	No	No	No
Mean of Dependent Variable	0.77	0.98	0.71	0.77	0.98	0.71	0.77	0.98	0.71

Source: Authors calculations.

Notes: See Table 4.2.

Table 5.7: Impact of participation in PSNP Public Works on number of female members aged 12 to 18 years, by age

	Household Fixed Effects (HHFE)				Poisson Fixed Effects (Poisson FE)			
	12-14	12-16	14-18	16-18	12-14	12-16	14-18	16-18
Treatment *x* Post	0.236**	0.277***	0.245**	0.203**	0.449***	0.427***	0.462***	0.492**
	(0.091)	(0.087)	(0.094)	(0.092)	(0.173)	(0.122)	(0.150)	(0.198)
Post Period	-0.114	-0.123	-0.088	-0.119	-0.210	-0.199	-0.150	-0.238
	(0.101)	(0.089)	(0.095)	(0.129)	(0.194)	(0.136)	(0.130)	(0.224)
Constant	-0.480	0.101	0.459	0.747***	-	-	-	-
	(0.391)	(0.324)	(0.376)	(0.233)				
Observations	960	1,127	1,044	730	960	1,127	1,044	730
Household Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects x Region Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region Fixed Effects	No	No	No	No	No	No	No	No
Mean of Dependent Variable	0.55	0.70	0.63	0.50	0.55	0.70	0.63	0.50

Source: Authors calculations.

Notes: See Table 4.2.

Participation in the Public Works component of the PSNP leads to increases in household size. This does not appear to be a consequence of increased fertility, instead it arises from an increase in the number of adolescent females. Relative to comparison households, this increase could reflect a reduction in out-migration or an increase in in-migration by this demographic group. We now consider both possibilities.

The PSNP survey instrument records the reasons why individuals enter or leave the household. For females, the most important reason to leave the household is for marriage (34 percent) followed by taking up or seeking work (13 percent) with only six percent leaving the household to attend school. The principal reason why males migrate is to take up or seek work (35 percent), marriage (17 percent), or attend school (11 percent). Approximately seven percent of both males and females leave the household in order to re-unite with parents. Movement into the household is dominated by births, accounting for 63 and 68 percent of female and male entry respectively. An additional 18 percent of women move into the household on marriage. Few individuals migrate into the household for work related reasons (1.8 percent for females; 5.2 percent for males) or to assist with household tasks (1.6 percent for females; 4.7 percent for males). Fosterage is relatively uncommon in this sample with only 5.1 percent of female and 7.2 percent of males fostered in. Mindful of all this, using the same methods as described above, we estimate the impact of program participation on the probability of observing a household with at least one out-migrating female. Results are shown in Table 5.8.

Table 5.8: Impact of participation in PSNP Public Works on likelihood household has female out-migrants, by age

	Probit				OLS Linear Probability Model (LPM)				Linear Probability Model with Household Fixed Effects			
	12-18	14-18	16-18	19-29	12-18	14-18	16-18	19-29	12-18	14-18	16-18	19-29
Treatment *x* Post	-0.046**	-0.061**	-0.082**	0.057*	-0.052*	-0.069*	-0.099*	0.052*	-0.057*	-0.082*	-0.109*	0.033
	(0.023)	(0.028)	(0.033)	(0.031)	(0.031)	(0.040)	(0.053)	(0.027)	(0.034)	(0.045)	(0.060)	(0.027)
Treatment	0.028	0.034	0.005	0.010	0.032	0.027	0.003	0.011	-	-	-	-
	(0.057)	(0.070)	(0.066)	(0.039)	(0.059)	(0.072)	(0.067)	(0.046)				
Post Period	0.078**	0.098**	0.107**	-0.042	0.075**	0.093**	0.100**	-0.038	0.075**	0.103**	0.075	-0.030
	(0.034)	(0.040)	(0.043)	(0.029)	(0.031)	(0.036)	(0.039)	(0.032)	(0.035)	(0.042)	(0.053)	(0.041)
Observations	1,286	1,024	773	1,346	1,286	1,024	773	1,346	1,286	1,024	773	1,346
Household Fixed Effects	No	No	No	No	No	No	No	No	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects x Region Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	No

Source: Authors calculations.

Notes: See Table 4.2.

For each estimator, it is helpful to begin with the results for females aged 12 to 18 and aged 19 to 29 years. These show that in households participating in the Public Works component of the PSNP, the likelihood of a girl aged 12 to 18 leaving the household is reduced by 4.6 to 5.7 percentage points. By contrast, for females aged 19 to 29, household PSNP participation raises the likelihood that they leave the household by 3.3 to 5.7 percentage points. There is some suggestion in the detailed age-disaggregated results that the reduction in out-migration is concentrated in the age range 16 to 18 years, with the likelihood of an adolescent girl in this age group leaving the household falling by 8.2 to 10.9 percentage points.

We repeat this analysis for older women, finding no impact on the likelihood of out-migration. We repeat it for males and find no impact on out-migration. Further, we repeat this analysis for in-migration by males and females, for both the full sex-specific samples and disaggregating by age. Again, we see no impact. Finally, we also run regressions on in-migrants to and out-migrants aged 1 to 11 years from the households, and we do not find any significant impact (Table 5.9 and Table 5.10). The change in household size we observe in these data is due solely to the impact on females, specifically reduction in out-migration by females aged 12 to 18 years.

Table 5.9: Impact of participation in PSNP Public Works on likelihood household has out-migrant aged 1 to 11 years, by sex

	All			Female			Male		
	Probit	OLS	FE	Probit	OLS	FE	Probit	OLS	FE
Treatment *x* Post	0.013	0.013	0.001	0.018	0.020	0.015	0.014	0.015	-0.001
	(0.018)	(0.021)	(0.024)	(0.017)	(0.014)	(0.015)	(0.014)	(0.015)	(0.016)
Treatment	0.000	-0.000	-	0.009	0.011	-	-0.004	-0.002	-
	(0.028)	(0.036)		(0.021)	(0.033)		(0.025)	(0.029)	
Post Period	0.009	0.012	0.018	-0.009	-0.008	-0.001	0.022	0.018*	0.037***
	(0.017)	(0.018)	(0.018)	(0.014)	(0.015)	(0.014)	(0.013)	(0.010)	(0.012)
Observations	2,016	2,016	2,016	1,891	1,891	1,891	1,704	1,704	1,704
Household Fixed Effects	No	No	No	No	No	No	No	No	No
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effect *x* Region Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Source: Authors calculations.

Notes: See Table 4.2.

Table 5.10: Impact of participation in PSNP Public Works on likelihood household has in-migrant aged 1 to 11 years, by sex

	All			Female			Male		
	Probit	OLS	FE	Probit	OLS	FE	Probit	OLS	FE
Treatment x Post	-0.027	-0.036	-0.023	0.004	-0.010	-0.009	-0.035	-0.038	-0.029
	(0.036)	(0.039)	(0.041)	(0.027)	(0.030)	(0.031)	(0.022)	(0.029)	(0.031)
Treatment	-0.015	-0.009		-0.005	-0.003		0.001	0.010	
	(0.053)	(0.054)		(0.036)	(0.041)		(0.045)	(0.049)	
Post Period	0.001	0.006	-0.028	0.012	0.015	0.000	0.003	0.007	-0.016
	(0.036)	(0.032)	(0.042)	(0.030)	(0.026)	(0.029)	(0.026)	(0.025)	(0.033)
Observations	2,185	2,185	2,185	2,185	2,185	2,185	2185	2185	2185
Household Fixed Effects	No	No	No	No	No	No	No	No	No
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effect *x* Region Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Source: Authors calculations.

Notes: See Table 4.2.

6. REDUCED OUT-MIGRATION BY ADOLESCENT GIRLS: FURTHER EXPLORATIONS

Why would household participation in the PSNP cause out-migration of adolescent girls to fall? There are at least three possible reasons. First, the PSNP increases household income. Mani, Hoddinott, and Strauss (2013) show that female schooling in rural Ethiopia is income elastic. As noted above, girls do not out-migrate to attend school and so this increased demand for schooling means that girls who might otherwise leave the household (for marriage or work) remain in the household instead. Second, the PSNP's labor requirements might result in a shift in the allocation of work within the household. Children under 15 are not permitted to work on the PSNP and evaluation of the program shows that this prohibition is enforced (Berhane et al. 2011). Third, households might wish to delay marriage. If child marriage is an inferior good, an increase in household income resulting from the PSNP would reduce the likelihood that an adolescent girl out-migrates in order to marry. These reasons are not mutually exclusive. For example, choosing to keep an adolescent girl in school might also result in a decision to delay her marriage. Alternatively, a household might decide that the benefits of the domestic work a daughter undertakes exceeds the benefits (to the household) associated with marrying her at an earlier age.

Work by Berhane et al. (2016) gives some insight into these possible processes. Using a propensity score matching estimator, they find that in 2012 (but not in earlier years), household participation in the PSNP increased girls' grade attainment between 6 and 14 percent (depending on the age of the child). Part of that study included separate focus group discussions with adolescent boys and girls on how their lives were affected by parental participation in the PSNP. Boys indicated that they participated in household farming related activities but noted that many of these occurred outside the time period when the PSNP operated. Girls, particularly older girls, reported having to take on additional domestic tasks, though as one noted these did not necessarily prevent them from attending school:

> *As you are required to cover your parents' work, it affects the time you need for study. You may not even get time to study, but the good thing with the safety net is it at least provides you the means to attend the school, rather than completely failing to attend. That means, since you have the educational materials, even with additional workload, you could still be in school.*
>
> Female participant, Mezalet (Tigray)

We complement this analysis by estimating a model where the dependent variable is defined as equaling one if household reports that a female in the 12 to 29 age range out-migrates in order to marry. Results are shown in Table 6.1. Coefficient estimates are negative and similar in magnitude to those reported in Table 5.8, although they are less precisely measured.

Table 6.1: Impact of participation in PSNP Public Works on likelihood household has a female out-migrant because of marriage, by age

	Probit				OLS Linear Probability Model (LPM)				Linear Probability Model with Household Fixed Effects			
	12-18	14-18	16-18	19-29	12-18	14-18	16-18	19-29	12-18	14-18	16-18	19-29
Treatment x Post	-0.035*	-0.047**	-0.033*	0.004	-0.042	-0.063	-0.046	0.007	-0.036	-0.064	-0.048	-0.032
	(0.020)	(0.022)	(0.020)	(0.017)	(0.036)	(0.044)	(0.041)	(0.024)	(0.039)	(0.045)	(0.047)	(0.026)
Treatment	-0.003	-0.019	-0.017	-0.011	0.001	-0.022	-0.015	-0.005	-	-	-	-
	(0.045)	(0.052)	(0.051)	(0.021)	(0.063)	(0.075)	(0.082)	(0.035)				
Post Period	0.040*	0.051*	0.034	-0.020	0.041	0.052	0.034	-0.027	0.020	0.023	0.037	-0.002
	(0.024)	(0.028)	(0.030)	(0.019)	(0.029)	(0.035)	(0.041)	(0.028)	(0.038)	(0.045)	(0.057)	(0.036)
Observations	1,022	852	618	1,061	1,022	852	618	1,061	1,022	852	618	1,061
Household Fixed Effects	No	No	No	No	No	No	No	No	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effect *x* Region Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	No

Source: Authors calculations.

Notes: See Table 4.2.

7. CONCLUSION

Social protection interventions now benefit approximately one billion people globally. There is considerable value in understanding how they might induce changes in household size or structure and how in turn these possibly unintended changes modify the welfare consequences of these interventions. As we noted in the introduction, this is an old question in economics. Theory does not provide us with a clear answer and much of what we know about this empirically in the context of developing countries comes from two programs in two middle-income countries where fertility rates are already low and other demographic responses such as child fosterage and early marriage of girls largely absent.

Our paper attempts to fill some of these knowledge gaps. We use data from a poor developing country with high rates of fertility, Ethiopia. We look at a different class of social protection intervention, a labor-intensive public works program called the Productive Safety Net Programme (PSNP). We find that participation in the public works component of the PSNP leads to an increase in household size of 0.3 members. This is not a consequence of increased fertility - PSNP participation reduces the likelihood that an adult female member gives birth by between 7.6 and 9.9 percentage points. Instead, the increase in household size arises from an increase in the number of girls aged 12 to 18 years; there is no impact on the number of males of any age nor is there an impact on the number of females in age groups other than 12 to 18 years. The increase in the number of adolescent females occurs because participation in the PSNP reduces outmigration by adolescent girls. Since outmigration in this age group is largely due to marriage, these results are consistent with the PSNP causing households to delay marrying out adolescent females, possibly because they are required to assist with household tasks. We present suggestive evidence consistent with this hypothesis.

While there are advantages in having a randomized design to assess program impact, this was simply not possible. Instead, we use a difference-in-difference estimator, exploiting the fact that program rationing led to movement in and out of the program. Consistent with the observation that access to the PSNP was rationed among eligibles, we see little evidence of difference in household characteristics between comparison and beneficiary households. Our use of household fixed effects controls for all baseline time invariant household characteristics, both observed and unobserved. We might worry that treatment and control households face different time varying shocks but as noted above, these are explicitly controlled for via the inclusion of time fixed effects interacted with region dummies to control for time varying factors that may have differential impact across regions, household level self-reported drought and other climatic shocks as well as shocks affecting crops and livestock. Further, we do not reject the null hypothesis that the parallel trends assumption holds. All these considerations give us confidence that we have identified an impact of the PSNP.

Our findings point to a larger issue. Many of the empirical studies in this area focus on a limited set of demographic outcomes. Our results suggest that such an approach risks being misleading. Our finding that PSNP participation leads to an increase in household size could be perceived as an unintended adverse outcome. Our explorations focusing on why we observe this increase, however, points to a different and more positive interpretation, namely that households are retaining adolescent female members.

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IRB Approval

This paper is based on the secondary analysis of previously collected, anonymized data made available to the authors by the Ethiopian Central Statistics Agency. For this reason, it is exempt from IRB review.

Data availability

Data used to generate the results reported in this paper are available on request.

About ESSP

The Ethiopia Strategy Support Program is an initiative to strengthen evidence-based policymaking in Ethiopia in the areas of rural and agricultural development. Facilitated by the International Food Policy Research Institute (IFPRI), ESSP works closely with the government of Ethiopia, the Ethiopian Development Research Institute (EDRI), and other development partners to provide information relevant for the design and implementation of Ethiopia's agricultural and rural development strategies. For more information, see http://www.ifpri.org/book-757/ourwork/program/ethiopia-strategy-support-program; http://essp.ifpri.info/; or http://www.edri-eth.org/.

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