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Impacts of Productive Safety Net Program on Household
Welfare and Labour Supply in Rural Ethiopia: A Panel
Data Approach

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A thesis submitted to the school of graduate studies of Addis
Ababa University in the partial fulfillment of the requirements
for the degree of Masters of Science in Economics

(Economic Policy Analysis)

July, 2011

Addis Ababa

Acknowledgement

All praise is due to Allah the lord of the worlds, the all knowing, who thought man with the use of the pen, and thought man what he knew not.

I would like to extend my heartfelt gratitude to my supervisor, Dr. Sosina Bezu for her indispensable advice and constructive suggestions on my thesis. Dr. the way you interpret issues in Economics gave me an important input not only on research undertaking but also on understanding of the subject matter in general. I really also appreciate the enthusiastic behavior and the good manner that you show me throughout the year. I have learned much more from you how to treat people and students. Many thanks Dr.

I am very grateful to Dr. Alemayehu Seyoum Taffesse and Dr. Tassew Woldehanna for their invaluable support, advice and comments on my thesis. I appreciate the cooperation of Fanaye Taddesse and Tewodros Tebekaw for their support in cleaning ERHS survey data. Dr. Daniel Zerfu, who provided me important materials, also deserves many thanks. I am also thankful to Addis Ababa University for the partial financial support of my thesis. Finally I thank AERC for the service it provided me in Joint Facility of Electives at Nairobi, Kenya and for funding my thesis partially.

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List of Acronyms

DD: Difference-in-Difference

DPRD: Development Planning and Research Department

ERHS: Ethiopian Rural Household survey

GDP: Gross Domestic Product

GoE: Government of Ethiopia

MoFED: Ministry of Finance and Economic Development

NGO: Non Governmental organization

PASDEP: Plan for Accelerated and Sustained Development to End Poverty

PSM: Propensity Score Matching

PSNP: Productive Safety Net Program

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Abstract

Using ERHS survey data of round six (2004) and round seven (2009) the study examines the impact of PSNP on five outcomes, namely, household welfare, food consumption, labour supply, asset holding, and private transfers. The paper applied double difference with fixed effect regressions to estimate the impacts. However, since beneficiary households might have differences to non-beneficiary households even before the program, propensity score matching technique on the baseline is also adopted to match participants with non-participants and to estimate the impacts without bias. Thus the double difference and fixed effect regressions are estimated across participant and matched control units within the common support. PSNP reduces the welfare, food consumption, and asset holding of beneficiary households compared to non-beneficiary households. It also crowds out private transfers to participant households. But it increases the supply of labour towards off-farm markets. In line with these results the study also found that family size has welfare reducing effect and credit increases the asset holding of households.

Chapter One

Introduction

1.1 Background of the Study

The Ethiopian economy has registered impressive growth rate of over 10 % per annum over the last four years. Overall real GDP growth rate for the first two years of the PASDEP (2005/06 through 2006/07) averaged 11.5 %. However, this impressive growth has been accompanied by inflationary pressure particularly since 2005/06. Inflation, which was on average at single digits in 2003/04 and 2004/05, accelerated by the end of 2006/07 and averaged 17.8%. Food inflation which is the main driving force was 11.8% and 7.7% in 2003/04 and 2004/05 respectively, and picked up to 18.8% by the end of 2006/07 (DPRD and MoFED, 2008).

Table 1.1 shows that the economic growth in the country during 2009/10 is comparable with the growth rate that is registered during 2005/06 and 2006/07 which is 10.1 %.

Table 1.1 Real GDP in 2009/10

Sector	(2009/10)
Agriculture and allied activities	6.0
Industry	10.2
Services	14.5
Real GDP	10.1

Source: Ministry of Finance and Economic Development (MoFED, 2010)

What we have seen above as a prelude is about the macroeconomic performance, specially the economic growth situation, of the country. The analysis below will take us through the poverty dynamics and condition of the country.

According to DPRD and MoFED (2008), Poverty remains widespread in Ethiopia. Using a consumption-based measure of poverty, 38.7 percent of Ethiopians were poor in 2004/05, implying that 27.5 million people were living below the poverty line. Poverty is slightly higher in rural areas (39.3 percent) than it is in urban areas (35.1 percent). The region with the largest number of poor people was Oromiya (9.3 million), accounting for one-third of all Ethiopians living in poverty in 2004/05. Large numbers of poor people were also found in Amhara (7.3 million) and the Southern Nations, Nationalities, and Peoples (SNNP) region (5.3 million). The number of poor people rose by 1.9 million between 1995/96 and 2004/05. But the incidence of povertyz declined markedly. The headcount poverty rate fell from 0.455 in 1995/96 to 0.387 in 2004/05 and the poverty gap reduced as did the severity of poverty. The document also revealed that the headcount poverty rate fell in rural areas from 0.475 in 1995/96 to 0.393 in 2004/05. Over the same period, in urban areas it rose slightly, from 0.332 to 0.351. Consequently, while the incidence of poverty remains higher in rural areas, the rural-urban poverty gap has narrowed appreciably.

Real per capita consumption averaged (at 1995/96 constant prices) 1,256 birr (US\$ 195) in 2004/05. Real per adult equivalent consumption in 2004/05 (at 1995/96 constant prices) was 1,542 birr, an increase over five and ten years ago of 16 percent and 17 percent, respectively.

Consumption has increased in both rural and urban areas but the rate of mean consumption growth was higher in urban areas. Growth reduces poverty in Ethiopia while increases in inequality increase poverty. The income-poverty elasticity for Ethiopia appears to lie in the range of -1.7 to -2.2. In rural Ethiopia, therefore, the increase in consumption has led to a reduction in headcount poverty. Growth has also occurred in urban areas but the rise in inequality in urban areas eliminated the poverty-reducing effect this growth might have had (DPRD and MoFED, 2008).

Reducing poverty in general and combating hunger and vulnerability in particular are policy concerns that demand government intervention. With regard to this argument, the Ethiopian government launched a social safety net program which is called productive safety net program (PSNP) since 2005.

The Productive Safety Nets Programme (PSNP) is one of the Government of Ethiopia's (GoE) flagship reform programmes and represents a significant transformation of the Government's strategy for meeting the Poverty and Hunger in Ethiopia. The PSNP represents a serious and innovative attempt on the part of the Government of Ethiopia to move away from responding to chronic hunger through emergency appeals towards a more predictable response with predictable resources for a predictable problem (R. Slater, 2006).

The purpose of the programme is to improve the efficiency and productivity of transfers to food insecure households, thereby reducing household vulnerability, improving resilience and promoting sustainable community development. This relates directly to the GoE's goal of

reducing vulnerability and attaining food security for approximately eight million food insecure people by 2009 through replacing emergency responses to chronic food insecurity with a multi-annual, predictable resource framework to protect households from shedding assets and eroding their chance of escaping poverty in the longer-term. As designed, the programme will address not only immediate food insecurity, but also contribute to addressing the underlying causes of food insecurity. Through the provision of cash transfers rather than food, it is intended that the programme will provide smallholders with greater flexibility over consumption decisions and stimulate the development of rural markets (ibid).

1.2 Statement of the Problem

Social safety nets are particular programs of social assistance or social protection that are linked to vulnerability and transient poverty. Devereux (2000) preferred to restrict social safety nets conceptually and operationally to consumption support following income shocks, which would extend to many social insurance and social assistance interventions but not to all categories of social policy (and certainly not to health care or education services).

When poor people encounter shocks, they suffer from the direct effect of poverty and hunger making them less productive and less able to earn a living. They are also forced to employ negative coping strategies such as reducing food consumption, selling productive assets, and removing children from school (Barret, 2001). These strategies further diminish their asset base and make them more vulnerable to the next shock, which leads them to further worse condition. This vicious cycle is referred to as “poverty trap”. It is difficult for the poor to escape the poverty

trap unaided. They require a combination of development activities complemented by social protection transfers such as safety nets (Yadete, 2008).

But some literatures in the area tried to look social safety net as programs that have broad aims beyond combating shocks and vulnerability. For example, according to the World Bank - 1996 version - social safety nets should include: (a) social services (health and education in particular), (b) social insurance programs such as pensions, (c) all publicly funded transfers (cash transfers such as family allowances, and in-kind transfers such as food subsidies), (d) income-generation programs targeted to the poor (such as public works)” (Subbarao *et al.* 1996). Thus, in line with this version, social transfers are perhaps also among social safety net programs.

Based on the above concept of social safety net we can discuss the following impacts of social safety net on chronic poverty and growth process.

Social transfer (safety net) can eradicate poverty by solving credit problems. The rural poor lack collateral to get loans. Thus social transfers (safety nets), if they are regular and reliable or combined with other programs can help to alleviate these credit constraints. The social transfer programs can also improve the productive capacity of households. More over Social transfers (safety nets) can improve household security (see Barrientos, A., and Scott, J., 2008).

Most importantly, if we look productive safety net program as a newly developed social safety net program, Barrett and carter (2006) discussed that the chronically poor who have the capacity to accumulate assets and reach a non-poor standard of living, but are trapped below a minimum

asset threshold needed to make an upward accumulation strategy viable and feasible can be ameliorated by cargo net asset transfer schemes that lift them over the threshold and productive safety net policies that prevent them from falling below the threshold in the first place.

On the contrary of what has been said above there are some literatures which talks about social safety net programs have adverse economy effects through their negative impact on labor supply and saving.

To benefit from the positive impacts of social safety net, to reduce poverty in general and to combat hunger and vulnerability in particular, the Ethiopian government lunched a social safety net program which is called productive safety net program (PSNP) since 2005 that has specific objectives of smoothing household consumption, protecting household assets and creating community level assets.

There are some empirical studies that have been worked by different researchers to assess the impact of PSNP in Ethiopia. Among these studies some of the works tried to assess the impact of the program one year after the onset of the program using cross sectional data - examples include Devereux et al. (2006) and Gilligan et al. (2006). But according to Devereux et al. (2006), since impact might not accrue in the short run, to fully and rigorously evaluate the PSNP, longitudinal data is needed. Even though some literatures did a panel data analysis they did not focus on welfare (poverty), for instance Anderson et al. (2009) and they saw only a change in beneficiary's status in time without taking the counterfactual situation, example Wheelers et al.

(2010)¹. More over there are some empirical evidences which focused on specific area of the country, example Yadete (2008).

Therefore this study is conducted to evaluate the impact of PSNP on welfare and labour supply using panel data approach of difference in difference method in combination with propensity score matching technique and fixed effect regressions in the rural part of the country in general.

1.3 Objectives of the Study

The general objective of the study is to evaluate the impacts of productive safety net program on the welfare of beneficiary households in the rural part of Ethiopia using panel data.

Specifically the study tried to:

- Investigate the impact of PSNP on households labour supply
- Show whether or not PSNP protected beneficiary households asset
- Identify whether or not PSNP improves participants food consumption
- Examine if PSNP crowded out private transfers of PSNP households
- Present some policy recommendations

¹ To measure the impact of a program, it is best to take the difference between the outcome after the intervention and that which would have resulted in without the intervention, a situation called the counterfactual. And according to R. khandker et al, (2009), the difference in difference method can do this.

1.4 Hypothesis

Based on the literature surveyed and personal view on the area, the following hypotheses are developed.

- PSNP improves welfare of participant households as compared to non-participant households
- It crowds out other transfers
- It has disincentive effect on labour supply
- It is able to protect beneficiaries asset holding

1.5 Limitations of the Study

The study uses the Ethiopian rural household survey data. The data is collected for different aspects and characteristics of rural households. But it is not particularly designed to collect data to evaluate PSNP on different economic outcomes. As a result it does not have deep information related to PSNP. For example it does not collect information whether or not those non-participants in 2009 were past beneficiaries.

Due to this reason we are forced to drop those households who are non-participants in 2009 if they are from PSNP woredas (woredas where PSNP operated), to evaluate the program impact correctly. But it would have been good for our analysis to have these households because they are from the same localities where the treated households are found and as a result they could serve as good comparison group.

1.6 Significance of the Study

The study provides some policy suggestions that would help both the Government and those Non-Governmental organizations in the program implementation. Since the study contains both theoretical and empirical issues, students who are interested on the area can get both aspects from the document. Furthermore the study can serve as a point of departure for further researches on the arena.

1.7 Organization of the Paper

The report is organized in to six chapters. The first chapter deals with introduction. Related theoretical and empirical literatures on public safety nets are contained in chapter two. Chapter three is about methodology. The fourth chapter includes the background of PSNP and how it is implementing in Ethiopia and analysis results and discussions are presented in chapter five. The last chapter contains conclusions and some policy suggestions.

Chapter Two

Review of Related Literature

2.1 Conceptual frame work

In his analysis of Can Social Safety Nets Reduce Chronic Poverty, Devereux (2002) identified the determinants of (involuntary) income or consumption poverty by disaggregating into three clusters:

- *Low productivity* – inadequate returns to labour and other productive inputs;
- *Vulnerability* – risks and consequences of collapses in income and consumption;
- *Dependency* – inability to generate an independent livelihood due to inability to work

He argued that, low productivity causes *chronic poverty* and is related to low returns to labour, land and capital, while vulnerability causes *transitory poverty*, following sudden collapses in returns to these inputs (precipitated, say, by drought or retrenchment). The third cluster of factors, *dependency*, arises from personal characteristics which render an individual incapable of earning an independent living: s/he is unable to generate adequate returns to their own labour because of physical or mental disability, extreme youth or old age.

Poverty caused by low productivity or vulnerability can be redressed through interventions that raise or restore returns to effort. Low productivity is best addressed through productivity-enhancing interventions, while vulnerability is best addressed in the short term through social safety nets – cash or in-kind transfers, attempts to restore livelihood systems, or the creation of

new livelihood opportunities. Conversely, dependency cannot be ‘solved’ by productivity enhancing interventions, and instead requires welfarist transfers (Devereux, 2002).

Poor households lack the income and resources to provide the collateral required by credit agencies. They are unable to invest in human capital or other productive assets. The same applies to rural households requiring a minimum level of assets, e.g. livestock, agricultural inputs, to move beyond subsistence agriculture. When Devereux (2002) says productivity –enhancing interventions, he may have wanted partly to imply that livelihood promoting strategies like micro credit that would give credit to the poor without requesting collateral. Specifically, the development of micro-credit institutions in developing countries is a policy response to the well documented barriers to access credit. However, according to Barrientos and Scott (2008), the literature on microfinance and micro-credit institutions also documents the difficulties involved in reaching the poorest households. In this situation, there are two ways in which social transfers could help lift credit constraints for poor and poorest households.

Firstly, social transfers, provided that they are regular and reliable, can encourage small scale saving and investment providing another route to lowering credit constraints². Secondly, social transfers could prove more effective, in combination with other interventions, in enabling access to credit. The author argued that the beneficiaries of transfers can obtain credit access from institutions by showing the card (it can be identity card) that identifies the individual as a beneficiary of a given transfer (ibid). Thus in this case the condition that the poor are among the beneficiaries of transfers is serving as collateral.

² This increase in saving and investment due to transfers might reduce the credit constraint from the demand side. The credit constraint can be affected by the supply and the demand side factors. If the poor can save and can get more income through investments that come from the transfers, they do not insist to get credit from institutions.

On the other hand, the theoretical and empirical literature finds that insurance markets seldom reach those in poverty, with the implication that they remain insufficiently protected (Dercon, 2005; Jalan and Ravallion, 1999, cited in Barrientos and Scott (2008)). Insufficient insurance protection has damaging effects on the ability of the poor and their households to exit poverty and benefit from economic opportunity. Insecurity leads to inefficient use of resources by those in poverty (Barrientos, 2007). It, for example, reduces growth opportunities by forcing rural poor households to opt for low-risk/low-return crops and production methods (Morduch, 1995). Insecurity also forces poor households to holding liquid but less productive assets (Dercon, 2003). It also leads to distortions in inter-temporal resource allocation, forcing a focus on current consumption in preference to investment. This is typically the case when households withdraw children from school or economise on health care in response to crises. In the absence of security, responding to short term shocks can lead to poverty persistence. Thus Regular and reliable social transfers can improve household security, firstly through supplementing household income, and therefore improving the impact of consumption shocks; and secondly through integrating insurance features protecting consumption, assets and investment(Barrientos and Scott, 2008).

Social transfers can also mitigate the adverse effects of policy change, such as agricultural liberalization. Social transfers can be designed so as to improve insurance protection, enabling recipients to engage in higher-risk, higher-return investment. For example, in Maharashtra, India, the insurance provided under the Employment Guarantee Scheme enabled farmers to plant high-yield crops, rather than the low-yield, drought-resistant varieties used elsewhere (ibid).

On top of the above, there is strong evidence demonstrating that conditional social transfer programmes deliver large improvements in school enrolment attendance among the poorest beneficiaries. The evidence on the capacity of social transfers to facilitate investment in human development is not limited to transfer programmes targeting human development or children. Studies on the impact of social pension receipt in South Africa and Brazil, for example, find that households with a pension beneficiary have higher enrolment rates among children of school age and improved health status (Barrientos and Scott, 2008).

Given what have been said above about social transfer, some literatures argue that there is difference between social transfers and safety net programs. To state specifically, Deverux (2000) argued, by citing world bank 1990, that transfers and safety nets are seen as two distinct sets of interventions addressing two discrete sets of people: *transfers* are directed at ~~those~~ "those unable to participate in the growth process", while *safety nets* are intended to support ~~those~~ "those who may be temporarily in danger when events take an unfavorable turn".

Thus it is important to look safety nets as particular programs of social assistance or social protection³.

³ But, according to the World Bank - 1996 version - social safety nets should include: ~~(a)~~ social services (health and education in particular), (b) social insurance programs such as pensions, (c) all publicly funded transfers (cash transfers such as family allowances, and in-kind transfers such as food subsidies), (d) income-generation programs targeted to the poor (such as public works)" (Subbarao *et al.* 1996). Subbarao *et al.* (1996) cited in Reddy,(1998) discussed also that safety net is a broad term, encompassing all informal family-based arrangements, all social security programs, and poverty-targeted interventions. Thus, in line with this version, social transfers are perhaps also among social safety net programs.

When poor people encounter shocks, they suffer from the direct effect of poverty and hunger making them less productive and less able to earn a living. They are also forced to employ negative coping strategies such as reducing food consumption, selling productive assets, and removing children from school (Barret, 2001). These strategies further diminish their asset base and make them more vulnerable to the next shock, which leads them to further worse condition. This vicious cycle is referred to as “poverty trap”.

It is difficult for the poor to escape the poverty trap unaided. They require a combination of development activities complemented by social protection transfers such as safety nets (Yadete, 2008). We can also find similar argument from Barrett, C. B. and McPeak, J. G., (2003) which is redistributive programs may only be effective in achieving sustainable, long-term reductions in chronic poverty when complemented by safety nets. Many people may exit chronic poverty due to pro-poor transfer policies, but new ones will enter chronic poverty just as quickly in the absence of effective safety nets and households teetering on the edge of chronic poverty will choose risk management strategies that predictably fail to stimulate asset and income growth. At a minimum, effective safety nets should block pathways into poverty (Barrett, C. B. and McPeak, J. G., 2003).

Safety nets differ from other anti-poverty interventions in their focus on the prior position of the target group. Specifically, safety nets are concerned with vulnerability rather than chronic poverty. While chronically poor individuals are unable to maintain a minimum living standard with the resources at their disposal, vulnerable individuals may be above the poverty line

initially, but face livelihood risks that could drop them below the line without an intervening safety net to cushion their fall (Devereux, 2002).

In a different analysis of poverty trap we found the discussion of Carter and Barrett (2007) which will help us to conceptualize productive safety net program as a particular form of social safety net program.

They identify a critical asset threshold around which behavior bifurcates. Below the threshold lie those who are “ruined,” who can do no better in expectation than hang on and whose pathways out of persistent poverty are blocked. By contrast, those above the threshold can be expected to invest productively, accumulate and advance. The bifurcation of behavior at the asset threshold creates divergent longer-term prospects and thus of welfare status for those above and below the threshold. Following Zimmerman and Carter (2003), Carter and Barrett label this critical threshold the ‘Micawber Threshold’ (Carter and Barrett, 2007).

From a social protection perspective, the Micawber threshold is important because it implies that temporary shocks can have permanent adverse consequences for those knocked below the threshold. Other households, who do not fall below the threshold, can be expected to recover fully from an objectively similar shock. These trapped agents suffer exclusion from the social and market mechanisms that mediate access to capital and insurance. If people could freely borrow to build up their stock of productive assets or insure themselves against their assets falling below the threshold, they would and there would be no discrete bifurcation of behavior around a particular threshold (ibid).

Barrett, Carter and Ikegami (2007), cited in Carter and Barrett (2007), explore the impact of a standard humanitarian assistance regime in which aid resources provide minimal transfers targeted to those most in need so as to ensure some minimum level of current consumption. They show how over time random events can steadily push ever greater numbers of people below the critical asset threshold, leading to ever increasing numbers of poor people and a corresponding “relief trap” for development assistance in which a fixed budget becomes increasingly absorbed by the demands of humanitarian response. Their results showed that an ever larger fraction of the international aid budget is consumed by emergency relief.

Given their simulation results Barrett, Carter and Ikegami then ask whether a more effective social protection program can be built up using the notion of a “productive social safety net.” A productive social safety net is staked out at the Micawber threshold, as a first priority transferring resources to households that would otherwise fall below the threshold and be expected to collapse into the poverty trap. Such a safety net is productive in the sense that it maintains households’ stock of productive assets, enabling them to pull themselves up by their own bootstraps, viably rebuilding assets and moving ahead over time. In BCI’s numerical analysis, modest productive safety net transfers in the wake of shocks generate large social returns in terms of increased future production and a far smaller subpopulation of persistently poor households.

In other insights of poverty analysis, according to Barrett and Carter (2006), the chronically poor can be those who:

1. Suffer a fundamental disability (e.g., low skill) or other characteristic (e.g., geographic locations) which prevents them from achieving a non-poor standard of living; or,
2. Have the capacity to accumulate assets and reach a non-poor standard of living, but are trapped below a minimum asset threshold needed to make an upward accumulation strategy viable and feasible. They denote this sort of poverty as a multiple equilibrium poverty trap⁴.

While these two types of chronic poverty can be discussed separately, there is no reason to think that they are mutually exclusive. That is, empirically we would expect chronically poor to be comprised of members of both groups. Distinguishing between them is potentially important because the policy remedies for the two types of chronic poverty are distinct. Redressing the poverty of the first may require permanent income maintenance grants, or the long term growth in the low-skill wages. The poverty of the second type can be ameliorated by cargo net asset transfer schemes that lift them over the threshold and productive safety net policies that prevent them from falling below the threshold in the first place (Barrett and Carter 2006).

Therefore safety net programs are also in a position to affect chronic poverty beside to transient poverty. That is why we find converging idea from Subbarao et al. (1996) which is Safety nets are programs which protect a person or household against two adverse outcomes in welfare: chronic incapacity to work and earn (*chronic poverty*); and a decline in this capacity from a marginal situation that provides minimal livelihood for survival with few reserves (*transient*

⁴ For closer information on this issue see Barrett and Carter (2006)

poverty). In addition Devereux (2002) discussed that the World Bank also extended its own definition to include interventions against chronic as well as transient poverty.

So therefore, Safety nets are a form of social transfers that usually involves cash or in kind payments to the most vulnerable (poor) section of a population either gratuitously or through public works (Mesfin. et al. 1997 cited in Yadete (2008)).

There is much variation in the meaning and scope of public works programs (also known as workfare programs) across countries. The term “public works” often creates the impression that the program is a government-run program to “create” jobs. Public works programs typically provide short-term employment at low wages for unskilled and semi-skilled workers on labor-intensive projects such as road construction and maintenance, irrigation infrastructure, reforestation, and soil conservation. Public works programs are now viewed as a means of providing income support to the poor in critical times rather than as a way of getting the unemployed back into the labor market. Public workfare programs are relevant for all risk-prone countries and for the countries of Sub-Saharan Africa and Asia particularly because of the programs’ considerable potential for helping the poor to cope with the co-variate risks associated with climatic and systemic shocks (Subbarao, 2003).

In low- income countries, public workfare programs are undertaken with the following four objectives:

First, these programs provide transfer benefits to the poor. The transfer benefit is equal to the wage rate minus any costs of participation incurred by the worker. In countries with high

unemployment rates, transfer benefits from a good workfare program can prevent poverty from worsening, especially during periods of adjustment or transition. Second, the programs, depending on their timing, may also confer consumption smoothing or stabilization benefits on program recipients. These stabilization benefits arise mainly from the reduction of the risk that poor households will face a decrease in their consumption during slack agricultural seasons. For example, if a program is implemented during these slack agricultural seasons when the market demand for labor is low, workers employed by the program will benefit from the resulting injection of income and consequential consumption smoothing. Third, these programs, if well designed, can help to build much-needed physical infrastructure and some of the durable assets created by the program have generated (or can generate) additional second-round employment benefits. Fourth, these programs can be targeted to specific geographic areas that have high unemployment and poverty rates. Poor areas and communities can directly benefit from the program (in terms of transfer benefits) and indirectly benefit in terms of the physical assets that the program creates and/or maintains. To this extent, well-designed workfare programs can enhance the growth potential of less endowed regions (ibid).

The impact of social safety net program is not delimited at house hold level. It has also community level or local economy impact. At the local economy level, social safety nets have the capacity to counter constraints on productivity and growth. In areas with high poverty incidence, household income growth can be constrained by community level factors, such as the absence of adequate infrastructure or the scarcity of liquidity and local trade. Public works programmes (social safety nets conditional on labour supply) could in principle have an impact on both these factors, by transferring income to households and thus enhancing liquidity and

upgrading available infrastructure (Barrientos and Scott, 2008). It also appears that well-designed workfare programs do have the potential to confer significant social gains. For example, India's Maharashtra Employment Guarantee Scheme was designed to encourage the participation of women (Subbarao, 2003).

On the contrary of what has been said above there are some literatures which argue that social safety net programs in general or productive safety net programs in particular have adverse economy effects. This is because they have negative impact on labor supply and saving and also they may crowd out private transfers to the beneficiaries.

To the side of labor supply, standard economics predicts a decline in labour supply among beneficiary households as a response to the transfer. In as much as households value activities outside paid work, a rise in income is likely to lead to rising demand for all valuable goods, including non-work activities (leisure). Given the time constraint the increase in leisure will decrease the labor supply. It also can be seen in another way round that there will be labor substitution among different jobs. There are some safety net programs that require labor as a condition to transfer cash or kind payment to the poor. This may force the households to substitute the labour for agricultural activity to the public work. The result is low agricultural output which is undesirable consequence of social safety net program.

With regard to crowding out effect of safety nets on private transfers, literatures like Heemskerk et al. (2004), Maitraa, and Ranjan (2002), Rubio and Soloaga (2003), and Dercon (2002), say public safety net crowd out private transfers and that of informal risk sharing arrangements.

In the poor societies there are several risk sharing arrangements and clubs that the poor households engaged with. Thus among those who are in the group or in the arrangement if one household is vulnerable to a given shock, the other members will share the risk. However, Dercon (2002) argued that some households covered by the safety net may have incentives to leave their informal risk-sharing arrangements, leaving other households less protected. As a result of the safety net, then, some households may be made more vulnerable. This may be considered as a specific type of crowding out.

2.2 Empirical Evidences on Impacts of Social Safety Net

2.2.1 Introduction

In this part of the chapter the researcher presented the review of empirical studies that are studied to evaluate different social safety net programs that are implemented by different countries in the world. The reviewed studies are classified under the regions of Europe, Asia, Latin America, Africa and Ethiopia.

2.2.2 The Social and Economic Impact of Social Safety Net in Europe

In European Union the impact of social transfer (safety net) on poverty is paramount. We can find an empirical evidence for this fact from Dafermos and Papatheodorou (2010). Their analysis is not delimited to see the impact of social protection on poverty and inequality alone rather it also comprised the impact of economic growth on poverty. This may help us to compare the impact of social protection and economic growth on poverty and inequality. They employed

panel data techniques in order to investigate the impact of economic growth and social protection on inequality and poverty in 14 EU countries over the period 1994-2007.

They verified the significant role of social transfers in cash, and especially of other social transfers, in reducing poverty and inequality. They also found that the role of social transfers in the decline of income inequality and poverty seems to be more decisive than the role of per capita GDP. Their results suggest that a 1 percentage point rise in other social transfers (as a percentage of GDP) brings about the same decline in inequality with a rise in per capita GDP by 3-5% and the same fall in poverty rate with an increase in per capita GDP by 8-10%.

Although the study found out that the significant impact of social transfer on poverty, it is a macroeconomic analysis and it did not focus on the impact of social transfers on poverty and welfare at household level (at micro level).

2.2.3 The Social and Economic Impact of Social Safety Net in Asian Countries

Subbarao, (2003) used the methodology of reviewing different empirical literatures to show the impact of public work programs on poverty, welfare and other social gains. He, in his analysis of the role and effectiveness of Public Works Programs, identified that 60 to 70 percent of households participating in India's nationwide program, the MEGS, and in Argentina's Trabajar program and almost 100 percent in Chile's public works program belonged to poor households. This indicates that these programs are highly targeted to the poor. Furthermore Subbarao, (2003) also reviewed the works of Datt and Ravallion (1992) who show the impact of MEGS on poverty. According to him they have quantified the impact of the program and found that the

severity of poverty has fallen from 5.0 percent to 3.2 percent owing to participation in the MEGS.

He also discussed that well-designed workfare programs do have the potential to confer significant social gains by providing example of India's Maharastra Employment Guarantee Scheme which was designed to encourage the participation of women. In this program employment was provided within 5 km from their places of residence, and male-female wage discrimination was eliminated. He pointed out that as a result of this which is close to half of all participants were women.

In addition to above, Dewen (2010) employed both descriptive and econometric analysis to see the impact of social safety nets in china. In his descriptive analysis he found that there is significant difference in the consumption and savings behaviors between urban households with social security coverage and those without.

In his econometric analysis, he found a proxy variable of social security coverage and introduced into a simple consumption function to examine the impact of social security on urban household consumption. He used quintile regression. In his model he included explanatory variables of per capita income, social security coverage ratio as a variable to represent the impacts of social security on household spending, the dependency ratio as a variable to represent household demographic burden, and household head characteristics (age, gender, education and marital status) as variables to control household characteristics. The result from the study demonstrates that in the lowest 25% income quantile group, a 1% increase of social security coverage ratio

will have a marginal effect of 13.37 yuan on per capita consumption, while its marginal effect in the 75% income quantile group is 10.37 yuan, indicating the provision of social security will produce significant impacts on household consumption.

Moreover, Sumarto et al. (2004) employed econometric analysis to demonstrate the impact of social safety net on poverty and welfare in Indonesia. He used consumption to approximate household welfare. In his estimation of consumption/ welfare, the change in log real per capita consumption is regressed on the change in log real per capita income (net of social safety net income), village cluster of mean change in log real per capita income (net of social safety net income), and household participation in the social safety net programs, controlled by household participation in various social organizations and household characteristics. In his analysis household participation in the social safety net programs are instrumented by their respective total number of households which participated in each social safety net program within each village, to solve endogeneity problem.

He found that participation in the social safety net programs helps households increase their consumption level by the magnitudes of the coefficients range from around 0.04 for the subsidized rice, medical services, and employment creation programs to around 0.1 for the scholarship program. On the other hand, to examine the impact of participation in the social safety net programs on the probability of a household to be in poverty, he estimated a probit model. And again the social safety net participation variables are also instrumented by the total number of households which participated in each social safety net program in each village, to solve endogeneity problem in this model. The result by Sumarto et.al, (2004) showed that a

household which participated in this program has a three percent lower probability to be currently in poverty than a household with similar characteristics but did not participate in this program

Similar with Sumarto et al. (2004) but with different methodology Walle, (2003) tested the welfare and poverty impact of Vietnam's public safety net by employing double difference method.

He found that Poverty fell quite dramatically in Vietnam between 1993 and 1998. Nevertheless, he concluded, that the government's safety net programs made only negligible contribution to that favorable outcome. The paper's findings indicate that these programs did not fulfill a genuine safety net role in protecting those who faced falling living standards during this period. Part of the reason is low overall spending on these programs. However, the evidence also suggests that poor targeting is a fundamental problem on top of low total outlays (Walle, 2003).

2.2.4 The Social and Economic Impact of Social Safety Net in Latin America

Washburn et al. (2000) used randomization technique of impact evaluation method and discussed the impact of PROGRESA, which is one of social safety net program in Mexico. And they concluded that the PROGRESA program appears to have sizeable and significant effects on the consumption of beneficiary households. Like the above research the study by Skoufias, (2001) found that consumption of PROGRESA households is higher when compared with comparable control households.

Skoufias et al. (2008) also evaluated the impact of in kind and cash transfer on consumption in rural Mexico by using difference and in difference method. The results from their paper show that approximately two years later the transfer has a large and positive impact on total and food consumption. There are no differences in the size of the effect of transfer in cash versus transfers in-kind on consumption which is unlike to Wheeler et al. (2010) study of PSNP. The study also says that the transfer, irrespective of type, does not affect overall participation in labor market activities but induces beneficiary households to switch their labor allocation from agricultural to nonagricultural activities. This may lead to reduction in agricultural output. Most importantly, the analysis finds that the program leads to a significant reduction in poverty.

Apart from consumption and poverty and regarding on crowding out/ in analysis the study by Rubio and Soloaga, (2003) used panel data with approximately 26,000 households to evaluate the impact of PROGRESA and they found no evidence of government transfers having an impact on private transfers. This means no crowding out effect of social safety net.

If we look the impact of safety net in another country of Latin America other than Mexico, we found the study by Armando Barrientos, (2003). The author, in his analysis of impact of non-contributory pensions on poverty, he found that Poverty headcount would be 4.2 percent higher for the Brazil if pension income is removed and there are no off-setting changes. In addition he also arrived to a finding that the poverty gap would be 40 percent larger for the Brazil sample if pension income is removed and there are no off-setting changes.

Furthermore a multivariate analysis of the impact of non-contributory pension programmes on the probability of members of a household being poor finds that belonging to a household with a pension recipient reduces this probability by 18 percent for the Brazil sample (Barrientos, 2003).

De Janvry,(2006), on the other hand, evaluated the impact of Bolsa Escola program on schooling which is another program in Brazil. The Results of the study shows that the bolsas were not targeted at children with lower pre-program performance in school attendance. In spite of this, the authors find that the CCT had a very strong impact on continuity in school attendance, inducing a 7.8 percentage points decline in drop out.

As far as the disincentive effect of social safety net on labor supply in Latin America is concerned, Alzúa et al. (2010), by applying difference –in- difference method, studied the effect of welfare programs of Mexico’s PROGRESA, Nicaragua’s *Red de Protección Social* (RPS) and Honduras’ *Programa de Asignación Familiar* (PRAF) on work incentives and the labor supply of adults. They found that negative but small and non-significant effects of the programs on the employment of adults, no reallocation of labor between agricultural and other sectors, and a reduction in hours worked by adults in eligible households in RPS. They say that the programs did not imply major disincentives to work, despite substantial transfers.

2.2.5 The Social and Economic Impacts of Social Safety Net in Africa

Devereux, (2002) assessed the impact of three social safety-net interventions in Southern Africa – namely- cash transfers in Namibia (social pensions) and Mozambique (cash payments to urban destitute), and public works in Zambia. The research, by using descriptive statistics and by

reviewing different researches on these areas, identified different poverty and other economic and social outcomes of these income transfers.

The research reviewed Low et al. (1998) which found that the number of beneficiary households living in absolute poverty had fallen from 71% to 65% as a result of GAPVU. The article discussed also that in western Zambia, where 86% of farming households survive below the poverty line, differential cash-for-work earnings by district resulted in differentiated poverty impacts by providing empirical evidences. When the programme ended in 1997, the proportion of participating households still below the poverty line had fallen to 74% in Kalabo District, was approximately equal to the provincial average at 86% in Mongu District, but remained at an extremely high 97% in Lukulu District, indicating that higher income transfers made the greatest difference to economic well-being in Kalabo.

The Zambian case provides evidence against the labour substitution argument⁵. Many cash-for-work participants used their income to hire labour to plough or weed their fields. This behavior had a number of positive features. Firstly, it provided income to a second group of workers – a significant multiplier effect. Secondly, since many hirers were women and many laborers were men, this freed women from the most demanding farming tasks. Thirdly, if investment in labour and other inputs increased as a direct result of cash-for-work income, agricultural output might have risen rather than fallen (Devereux, 2002). This result is an interesting result for those who fear social safety nets would result a reduction in agricultural production.

⁵ When poor rural people who are targeted under a public work program go to the public work program, they forgo the work in their farm land or other agricultural activity.

Maitraa, and Ranjan (2002) used household level data from South Africa and employed econometric method to examine the behavioral and welfare impacts of private and public transfers. Their results show that crowding out of private transfers as a result of the introduction of public pensions holds only for poor households and not for the non-poor. This result is similar with the result of the study by Rubio and Soloaga, (2003) in Mexico. They also found that both private transfers and public pensions significantly reduce poverty but private transfers have a larger impact on expenditure patterns.

In South Africa we can also find a similar conclusion with above regarding impact public transfers on welfare from the study of Armando Barrientos, (2003). In his analysis of impact of non-contributory pensions on poverty, he found that Poverty headcount would be 2.8 percent higher for the South Africa sample if pension income is removed and there are no off-setting changes. The poverty gap would be 81 percent larger for the South Africa sample if pension income is removed and there are no off-setting changes.

In Malawi the study by Miller et al. (2010) employed both descriptive and econometric techniques of difference-in-differences estimates to analyze the impact of this cash transfer on household food security or welfare. They also used separate regression models to examine, for instance, the differential impact of the transfer depending upon the gender of the household head.

The results from this study show that intervention households in Malawi allocated 62% of total expenditures to food purchases. The study also pointed that, although the evaluation was

relatively short-term in length, conducted over the course of one year, recipients were able to reach what they reported as an acceptable level of food security. According to the authors by end line, 13% of intervention versus 81% of comparison households reported that food consumption was less than enough. On average, cash recipients consumed a variety and adequate amount of foods per day, without experiencing many days of food shortages, which is in striking contrast to the comparison group.

2.2.6 Social and Economic Impacts of PSNP in Ethiopia

Gilligan et al. (2006) tried to assess the impact of Productive Safety Nets Program together with the Other Food Security Program on different household economic situations by using Propensity Score Matching and Nearest Neighbor Matching.

They find that access to the PSNP improves two measures of household food security: it reduces the likelihood that a household has very low caloric intake and it increases mean caloric availability. However, the study also came up with, relative to the control group; beneficiaries did not experience faster asset growth. But the work tried to assess the impact of the program one year after the onset of the program using cross sectional data.

Similarly the study by Alemtsehay Aberra et al. (2006) find that the PSNP, unlike to Vietnam's safety net program which is discussed by Walle, (2003), is (now) reaching the poor. This is an interesting finding that the paper came up with regarding the targeting of the program. The study identified that institutional structures for combined administrative and community targeting are

in place in most areas (though not all), and are functioning with varying degrees of success. Some major misinterpretations and confusions in targeting during the first year have now been corrected. No systematic corruption or large-scale abuse of the targeting system was found.

In addition to above Devereux et al. (2006) have done a paper on PSNP using cross sectional data set and by employing both qualitative and quantitative(both descriptive and econometric) analysis.

The study pointed the following findings among others. In line with the PSNP targeting issue the study says that the PSNP was well targeted, using labour constraints as targeting criteria. This result confirms with Aberra et al. (2006). They also found that ‘Cash only’ PSNP recipients report higher current asset values to ‘food only’ and mixed ‘food plus cash’ beneficiaries, for both male- and female-headed households. This is in contrary with Sabates-Wheeler et al. (2010). Regarding the PSNP’s ability of acting as safety net the study reveals the PNSP has stabilized household asset holdings, allowing them to retain assets and in many cases to increase assets.

Moreover, Hoddinott et al. (2009) by employing nearest neighbor matching (NNM) technique, investigated the impact of participation in the Public Works component of Ethiopia's Productive Safety Net Program on schooling and child labor⁶.

The study found that participation in Public Works leads to a moderate reduction in agricultural labor hours on average for boys age 6-16 years and a reduction in domestic labor hours for younger boys age 6-10 years. The paper also pointed that Boys in households receiving more regular transfers (at least 90 birr per member) show large increases in school attendance rates and, at the younger age, a significant reduction in total hours worked. Furthermore the paper also noticed that younger girls experience worse outcomes, with lower school attendance on average and increases in child labor in households participating in PW and the OFSP. Whereas older girls benefit, with a reduction in labor hours on average and an increase in school attendance in households receiving larger transfers.

Thus, all the three studies, Aberra et al. (2006), Devereux et al. (2006) and Hoddinott et al. (2009), have the same problems as the work of Gilligan et.al (2006) because they tried to assess the impact of the program one year after the onset of the program using cross sectional data. But Devereux, et al (2006) says that the literature on cash transfer programmes indicates that impacts will not accrue in the short-term and thus to fully and rigorously evaluate the PSNP, longitudinal data is needed.

⁶ The impact of public work on child labor and schooling can be either income from Public Works should reduce demand for child labor and increase schooling. Or, Public Works labor requirements may induce substitution of child labor for adult labor at home and in income-generating activities, possibly reducing schooling.

In fact there are also studies which used panel data in their analysis. For example Rachel Sabates-Wheeler et al. (2010) used the data that derived from a two-wave panel survey conducted in 2006 and 2008.

The result from their paper shows that income growth is higher with participation in the programme for food recipients and mixed payment recipients, relative to non-participants. Specifically they say that being a food payment beneficiary, mixed payment house hold and cash payment beneficiary increased income growth by 59%, 45% and 15%, respectively, relative to a non-beneficiary. In another models they identified that mixed payment households experienced significantly less asset growth than non beneficiaries and they found that that food payment households have experienced significantly 62% higher growth in livestock than non-beneficiaries. Furthermore, they pointed out that food payment households have significantly higher livestock growth than other payment types. Their regression findings confirm that food transfers or ‘cash plus food’ packages are superior to cash transfers alone – they enable higher levels of income growth, livestock accumulation and self-reported food security.

But, this research took a difference in outcome due to time change without taking the counterfactual situation. To measure the impact of a program, it is best to take the difference between the outcome after the intervention and that which would have resulted in without the intervention, a situation called the counterfactual.

However, a true counterfactual does not exist since a sample either gets the intervention or not and the treatment has not been randomly administered. In the absence of a true counterfactual, we simulate one with the help of a comparison group, and the most common and simplest method to do so is the so-called difference-in-differences (R. khandker et.al, 2009).

Andersson et.al, (2009) have also conducted a study on Impacts of the Productive Safety Net Program in Ethiopia on livestock and tree holdings of rural households using panel data. They evaluated the impacts of the Ethiopian Productive Safety Net Program (PSNP) on rural households' holdings of livestock and forest assets/trees. They found no indication that participation in PSNP induces households to disinvest in livestock or trees. In fact, households that participated in the program increased the number of trees planted, but there was no increase in their livestock holdings. They found no strong evidence that the PSNP protects livestock in times of shock. Shocks appear to lead households to disinvest in livestock, but not in trees. Their results suggest that there is increased forestry activity as a result of PSNP, and that improved credit access encourages households to increase their livestock holdings. In spite of the fact that the study employed panel data in its regression, it did not directly focus on welfare or poverty situation of the rural households.

Furthermore a study by Yadete,(2008) assess the impact of PSNP on one woreda of Oromiya region using cross-section data set. He concludes that the welfare of beneficiary households is significantly affected by PSNP in Adami Tulu Jido Kombolcha Wereda, Oromiya Region. But this study is delimited to a specific area of the country.

2.2.7 Conclusion

In the above analysis of different literatures we have seen the impacts of several safety net programs on social and economic variables. Some of the studies reviewed are outside Ethiopia and the papers on Ethiopia's PSNP program have the problems that are discussed above. So a new research should be undertaken to fill these gaps. Therefore, this study tried to evaluate the impact of PSNP on welfare, labour supply, asset holding, and food consumption of beneficiary households using panel data approach of difference in difference method in combination with propensity score matching technique and fixed effect regressions, in the rural part of the country in general.

Chapter Three

Data and Methodology

3.1 The impact of Safety Net/ Transfers on Household Welfare: Theoretical Explanation

Following the work of skoufias (2008) the researcher developed the following theoretical explanation regarding the impact of safety net/ transfer on house hold welfare.

The Simple Model

Assumptions of the model

1. Let our utility function which is the function of three arguments, namely, food consumption, non- food consumption and leisure, be separable in its arguments.
2. The transfer recipients of in kind transfer cannot sale the in kind transfer in cash or for other non- food items.

Given the above assumptions we can have utility function of

$$U(C_f, C_{nf}, L) \dots\dots\dots 3.1$$

and the budget constraint will be

$$P_f C_f + P_{nf} C_{nf} + WL = V + W\Omega \dots\dots\dots 3.2$$

Where, from the utility function, C_f designates the food consumption, C_{nf} designates the non-food consumption and L designates leisure.

In the budget constraint P_f is the respective price of food consumption and P_{nf} is the price of non food consumption and W is the price of time. Where as in the same equation, V represents the non labour income and that of Ω represents the time endowment.

The objective of the representative household is to maximize its utility $U(C_f, C_{nf}, L)$ subject to the budget constraint $P_f C_f + P_{nf} C_{nf} + WL = V + W\Omega$

Thus our Lagrangian function (equation) will be

$$L = U(C_f, C_{nf}, L) + \lambda (P_f C_f + P_{nf} C_{nf} + WL - V - W\Omega) \dots\dots\dots 3.3$$

... at optimum the maximization problem will yield:

$$\frac{U_f}{U_{nf}} = \frac{P_f}{P_{nf}}, \frac{U_L}{U_f} = \frac{W}{P_f} \text{ and } \frac{U_L}{U_{nf}} = \frac{W}{P_{nf}} \dots\dots\dots 3.4$$

Cash Transfer

Now let us have a look on what will happen when there is transfer (cash) to the house hold using graphical analysis. As it is depicted in figure 1 below a cash transfer of value T causes a parallel shift of the initial budget line by $\frac{T}{P_f}$ to the new dotted budget line to the right, and its impact on food and nonfood consumption is summarized by the shift of the optimum point from initial A to post-transfer point A*. One can deduce from figure 1 that the cash transfer is likely to increase the consumption of both food and non-food; while labor supply will decrease (assuming leisure

is a normal good). Mathematically after transfer also , that means at point A*, the first order conditions characterizing the optimal choice of food and nonfood consumption and leisure is given by the same ratio as which is given above before the transfer. That is, at point A* we can also have the following ratios;

$$\frac{U_f}{U_{nf}} = \frac{P_f}{P_{nf}}, \frac{U_L}{U_f} = \frac{W}{P_f} \text{ and } \frac{U_L}{U_{nf}} = \frac{W}{P_{nf}} \dots\dots\dots 3.5$$

In-kind Transfer

As it is depicted in the following graph 2 in the case of an in-kind food transfer of the same quantity that could be purchased with the cash transfer T (i.e $\frac{T}{P_f}$) the budget constraint also shifts to the right, but we cannot reach to the region in the upper left corner.

Before we see the impact of the in-kind transfer on the household welfare, let us see the two household types that are affected by the in kind transfer. The first group of households is those who initially consume more food than the in kind transfer. This group of households is called the infra-marginal households. The other group of households is those who initially consume less food than the in-kind transfer and this group of households is called the extra- marginal households.

Thus, in the case of in-kind transfer the effect of transfers on household welfare depends on whether the household is infra-marginal or extra-marginal and the preferences of the household. For households consuming initially more food than the in-kind transfer (i.e. infra-marginal households), such as for those households in the lower region of the budget line before the

transfer in figure (e.g. point A to the right of the vertical dotted line), the in-kind transfer will have exactly the same effect as a cash transfer.

For these households the in-kind food transfer shifts the budget constraint parallel and to the right thus having the same effects as the cash transfer discussed in figure 1.

Whereas for households consuming initially less food than the in-kind transfer (i.e., extra-marginal households), food is “over-provided” and the in-kind transfer acts as a constraint forcing them to consume more food and less nonfood compared to what they would consume had they received a cash transfer. In Figure 2 an example of a constrained household depicted by the pre-transfer point B and the post-transfer point B* is showed. In the same figure, the equilibrium point B** indicates the optimal choices of this household in the hypothetical case of a cash transfer instead of an in-kind transfer.

For a household described by the point B* in figure 2, the first order conditions is given by

$$\frac{U_f}{U_{nf}} > \frac{P_f}{P_{nf}}, \frac{U_L}{U_f} = \frac{W}{P_f} \text{ and } \frac{U_L}{U_{nf}} < \frac{W}{P_{nf}} \dots\dots\dots 3.6$$

We have said above that the equilibrium point B** indicates the optimal choices of this household in the hypothetical case of a cash transfer instead of an in-kind transfer. i.e if the house hold would have given cash instead of in-kind he would have end up with point B** rather than point B*. Thus the level of welfare would be higher than the case where transfers are in the form of cash instead of in-kind, since point B** lies on a higher indifference curve compared to point B*.

Implications from the Simple Model

1. The above simple model explains that the welfare of house hold is increased in both cases of transfers (i.e household welfare is positive function of transfers) even though the welfare of extra marginal households would have increased more had they been given cash instead of in-kind transfer. This implies that transfers (safety nets), whether they are in-kind or in cash, they will enhance welfare of households.
2. Cash transfer is more welfare enhancing than in-kind transfers for those households who are extra-marginal. But this hypothesis is highly dependent on assumption number 2 given above.
3. From the above model we can understand that, for empirical analysis, we can use consumption expenditure (total consumption expenditure) for measuring welfare. i.e total consumption expenditure can be a proxy of household welfare.

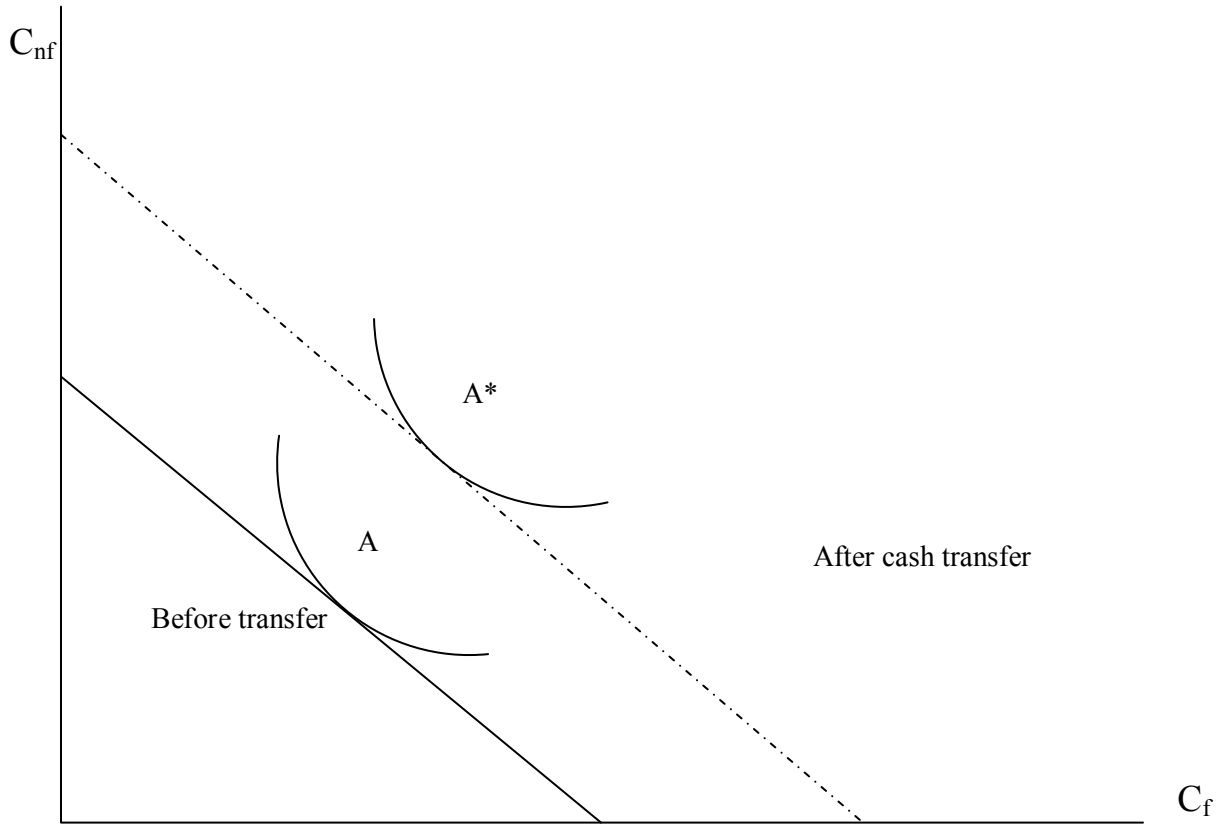


Figure 1(adopted from skoufias, (2008)): cash transfer

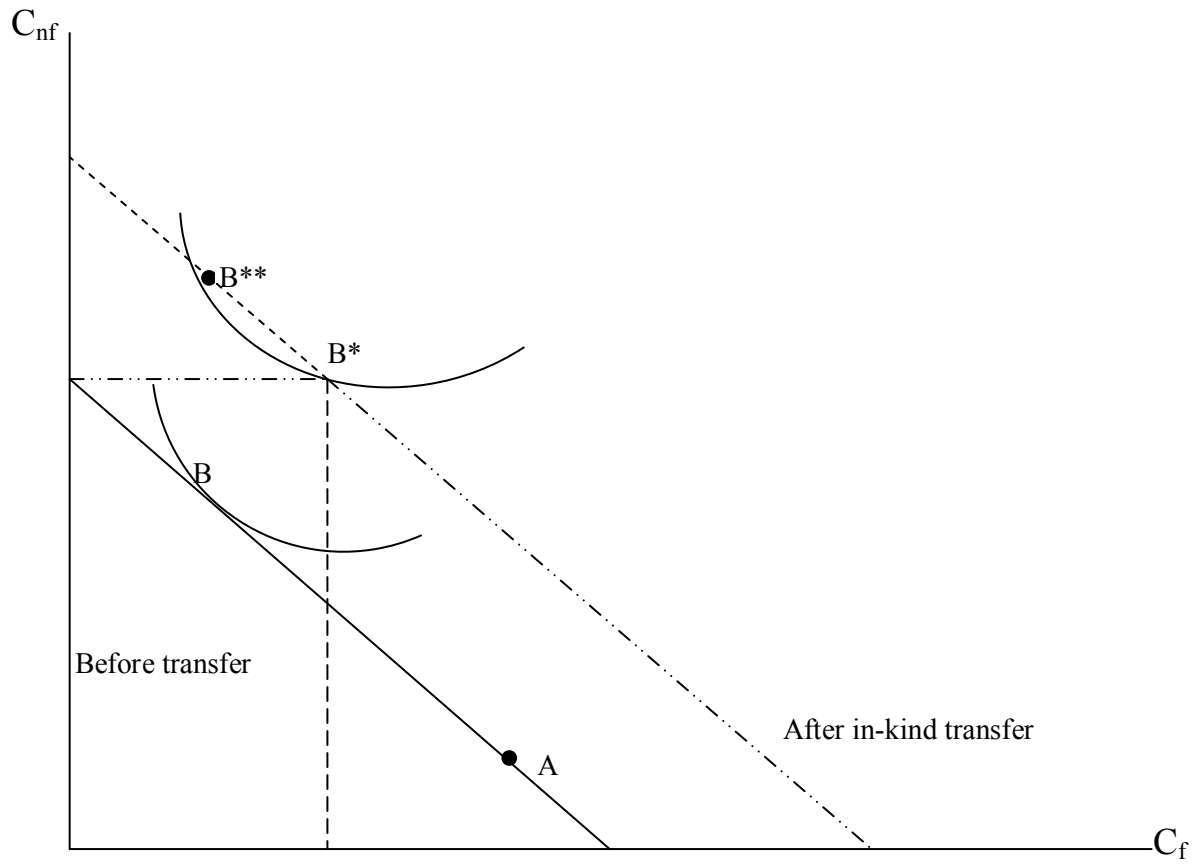


Figure 2(adopted from skoufias, (2008)): In-kind transfer

3.2 Econometric Estimation of Impacts of PSNP on Household Welfare Indicators

In the above analysis we have seen theoretically that the impact of safety net (it can be also PSNP) on household welfare. Particularly we found that welfare indicators of household are positive functions of transfers or safety nets.

Thus to estimate the impact of PSNP on welfare indicators in rural part of the country, we can specify the following regression equation provided that we have panel data set;

$$Y_{ijt} = \alpha + \delta T_{ijt} + \varepsilon_{ijt} \dots\dots\dots 3.7$$

Where i ; represents household

j ; represents community

t ; time

Y ; designates a given outcome

T ; a dummy variable which represents treatment; i.e participation in PSNP, thus $T=1$ is for those who are participated and $T= 0$ for those who are not participated.

And ε_{ijt} the error term

But there is no universe in which only two variables work together. Thus we must include other variables that would affect the outcome Y which are other covariates. Then the econometric specification will be;

$$Y_{ijt} = \alpha + X'_{ijt} \beta + \delta T_{ijt} + \varepsilon_{ijt} \dots\dots\dots 3.8$$

However such specification has several problems and cannot be used for evaluating the impact of PSNP on welfare indicators. It has problem of bias.

Among the problems the following can be listed;

1. We will face overt bias. This means if the control group differs from the treatment group in 'X', then the difference in 'X', rather than the difference in treatment, can be the real cause for the difference in the expected outcome.
2. We may face also hidden bias. This means that if the control group differs from the treatment group in 'un observed characteristics', then the difference in these characteristics, rather than the difference in treatment, can be the real cause for the difference in the expected outcome.
3. Looking the other way round, the treatment variable and the outcome variable can be determined by the same observed and unobserved characteristics.

i.e

$$T_{ijt} = \alpha + X'_{ijt} \beta + \varepsilon_{ijt} \dots\dots\dots 3.9$$

$$\text{Where } \varepsilon_{ijt} = \eta_{ij} + \mu_j + e_{ijt} \dots\dots\dots 3.10$$

Where η_{ij} and μ_j are, respectively, household and commune level unobserved determinants of the outcome, and e_{ijt} is the non-systematic error uncorrelated with other error terms or

regressors. In this case, both participation in PSNP (T_{ijt}) and Y_{ijt} are determined by the systematic unobserved commune and household characteristics. Since η and μ are unobserved, any influence of it on the outcome cannot be determined and the estimated impacts of PSNP would be biased because of omission of relevant explanatory variables. That means the key assumption of OLS which is independence of regressors from error term is violated. In that case, household's decision to participate in PSNP may be correlated with the error term, ε , giving rise to possible endogeneity. i.e in the outcome equation 3.8, T_{ijt} and ε_{ijt} are correlated. During this event the problem of endogeneity will appear in the outcome regression. Therefore there will be problem of bias. Thus, we need to find a way to estimate the impact of PSNP from on outcome variables without bias.

3.2.1 How can we evaluate the Impact of PSNP without bias?

The main problem of an impact evaluation is to determine what would have happened to the beneficiaries if the program had not existed. That is, one has to determine the welfare of beneficiaries in the absence of the intervention. Or one has to find what would be the condition of the beneficiaries if the program had not been there. A beneficiary's outcome in the absence of the intervention would be its counterfactual (Khandker et al. 2010).

In principle, one would like to compare the situation of the same household or individual with and without an intervention or treatment of the program. But it is difficult to do so because at a given point in time a household or an individual cannot have two simultaneous existences. i.e a household or an individual cannot be in the treated and the control groups at the same time. Thus

impact evaluation is the problem of missing data. Finding an appropriate counterfactual constitutes the main challenge of an impact evaluation.

Because we cannot get a household with and without the treatment at the same time, we may compare treated and non treated households. This will create the above problems of overt or hidden bias or both of them.

3.2.2 How can we deal with this problem?

In observational data a true counterfactual does not exist due to the reason that a sample either gets the intervention or not and the treatment has not been randomly administered. In the absence of a true counterfactual, we simulate one with the help of a comparison group, and the most common and simplest method to do so is the so-called difference-in-differences or double difference (DD) method that combines a ‘with and without’ approach with a ‘before and after’ approach using baseline (assumed pre-intervention) and follow-up data (assumed post-intervention) (Khandker et al. 2009).

3.2.3 Evaluating the Impact of PSNP using Difference –in- Difference

According to Khandker et al. (2010) with panel data setting⁷, DD estimation resolves the problem of missing data by measuring outcomes and covariates for both participants and nonparticipants in pre and post intervention periods. DD essentially compares treatment and comparison groups in terms of outcome changes over time relative to the outcomes observed for

⁷ It is not only in the case of panel data that we can apply DD but with repeated cross section also. See Khandker et al. (2010) for more information.

a pre intervention which is the baseline. That is, given a two-period setting where $t = 0$ before the program and $t = 1$ after program implementation, letting Y_t^T and Y_t^C be the respective outcomes for a program beneficiary and non treated units in time t , the DD method will estimate the average program impact as follows:

$$\mathbf{DD} = E(Y_1^T - Y_0^T \setminus T_1 = 1) - E(Y_1^C - Y_0^C \setminus T_1 = 0) \dots \dots \dots 3.11$$

Where T_1 denotes the presence of the program in time $t=1$ and $T_1=0$ represents for the non-treated samples.

The DD method can be also analyzed in regression framework as follows:

Bertrand, Duflo and Mullainathan, (2004) uses the following regression frame work to evaluate impact econometrically.

$$Y_{igt} = \beta T_{gt} + A_g + B_t + \varepsilon_{igt} \dots \dots \dots 3.12$$

Where T_{gt} be a dummy for whether the intervention has affected group g at time t , A_g is fixed effects for groups of treated and non- treated and B_t is fixed effects for years, respectively⁸. In this specification A_g represents the unobserved difference between the treated and the non-treated groups.

⁸ But according to Green, (2003) the correct functional form of an equation with time and group fixed effects is with a constant. That is why the equation by Khandker et al. (2010) and Khandke et al. (2009) includes the constant term.

The above specification is elaborated by Khandker et al. (2010) and Khandker et al. (2009) in such a way that it can be estimated by OLS.

$$Y_{ijt} = \alpha + \beta T_{ij1} t_{ijt} + \rho T_{ij1} + \gamma t_{ijt} + \varepsilon_{ijt} \dots\dots\dots 3.13$$

Where i; represents household

t; time

j; represents community

Y; designates a given outcome

T_{ij1}; post-program treatment variable

And ε_{ijt} the error term which is defined above

In the above equation the coefficient β on the interaction between the post-program treatment variable (T_{ij1}) and time ($t = 1 \dots T$) gives the average DD effect of the program. Whereas ρ gives the fixed effect for treated and non-treated groups (the unobserved difference between treated and non-treated groups which is constant over time⁹) and that of γ gives the time fixed effect.

By using equation 3.11 we can show how equation 3.13 gives us DD impact.

$$\mathbf{E}(Y_1^T - Y_0^T | T_1 = 1) = (\alpha + \beta + \rho + \gamma) - (\alpha - \rho) \dots\dots\dots 3.14$$

⁹Thus the unobserved heterogeneity between the treated and the non-treated that would affect both participation in PSNP and outcome variable is separated through such formulation and this means program effect will be estimated without bias.

And that of

$$E(Y_1^C - Y_0^C | T_1=0) = (\alpha + \gamma) - \alpha \dots \dots \dots 3.15$$

We know from equation 3.11 that

$$DD = E(Y_1^T - Y_0^T | T_1=1) - E(Y_1^C - Y_0^C | T_1=0)$$

$$\text{Thus; } DD = (\alpha + \beta + \rho + \gamma) - (\alpha - \rho) - (\alpha + \gamma) - \alpha \dots \dots \dots 3.16$$

$$\text{Which yield that } DD = \beta \dots \dots \dots 3.17$$

Therefore in the following sections we are going to use DD in place of β to show the estimated impact.

However, for DD to work correctly the following assumptions must hold

1. The model in outcome equation should be correctly specified.
2. $Cov(\varepsilon_{it}, T_{1t}) = 0 \dots \dots \dots 3.18$

$$Cov(\varepsilon_{it}, t) = 0 \dots \dots \dots 3.19$$

$$Cov(\varepsilon_{it}, T_{1t}) = 0 \dots \dots \dots 3.20$$

3.2.4 How DD works for our data?

The researcher applied the panel data of the 2004 and 2009 collected by the Department of Economics at the Addis Ababa University in collaboration with Center for the Study of African Economics at Oxford University and the International Food Policy Research Institute, Washington.

In this data the 2004 data set represents the data set before the program, since the PSNP is implemented in 2005. Thus it is pre program or base line data. Whereas, the 2009 data set consists of the data of different covariates and outcomes after the program. Thus it is the post treatment data set.

Let the given outcome for the participants in PSNP before they participated in PSNP, that means in 2004, is Y_{2004}^T and the outcome for those comparison groups in 2004 is Y_{2004}^C .

But the outcome of the treated and the comparison groups in 2009, after the program, is Y_{2009}^T and Y_{2009}^C respectively.

Based on the above given we can compute DD as:

$$DD = (Y_{2009}^T - Y_{2004}^T) - (Y_{2009}^C - Y_{2004}^C) \dots\dots\dots 3.21$$

As a matter of fact, in case of impact evaluation, we know that, one has to deduct the true counterfactual from $(Y_{2009}^T - Y_{2004}^T)$ to get the impact without bias. The true counterfactual can be designated by $Y_{2009}^{T'} - Y_{2004}^T$, where $Y_{2009}^{T'}$ would be the outcome for those who participated in PSNP program had the PSNP would not be there.

Thus the impact would be

$$PSNP \text{ impact} = (Y_{2009}^T - Y_{2004}^T) - (Y_{2009}^{T'} - Y_{2004}^T) \dots\dots\dots 3.22$$

$$= (Y_{2009}^T - Y_{2009}^{T'}) \dots\dots\dots 3.23$$

But in the DD analysis it is assumed that the household and community level unobserved heterogeneities that makes difference between the average counterfactual outcome of the treated and comparison group is time invariant so that the difference in treated and comparison groups in 2004 will remain also the same in 2009 had the PSNP program not been there.

$$\text{i.e } (Y_{2004}^C - Y_{2004}^T) = (Y_{2009}^C - Y_{2009}^{T'}) \dots\dots\dots 3.24$$

...and in equation 3.21 we have seen that DD can be computed as follow;

$$\begin{aligned} \text{DD} &= (Y_{2009}^T - Y_{2004}^T) - (Y_{2009}^C - Y_{2004}^C) \\ &= (Y_{2009}^T - Y_{2009}^C) + (Y_{2004}^C - Y_{2004}^T) \dots\dots\dots 3.25 \end{aligned}$$

But from equation 3.24 we have that $(Y_{2004}^C - Y_{2004}^T) = (Y_{2009}^C - Y_{2009}^{T'})$

Thus we can substitute equation 3.24 in equation 3.25

$$\text{DD} = (Y_{2009}^T - Y_{2009}^C) + (Y_{2009}^C - Y_{2009}^{T'}) \dots\dots\dots 3.26$$

$$= (Y_{2009}^T - Y_{2009}^{T'}) = \text{PSNP impact} = \text{equation 3.23} \dots\dots\dots 3.27$$

Therefore from above we can conclude that DD method can simulate counterfactual. But for the DD method to evaluate impact correctly the unobserved household and community level heterogeneities should be time in variant.

3.2.5 Difference-in- difference with fixed effect

Simple DD controls for time invariant unobserved characteristics but does not control for various observed household and commune characteristics that may influence the impacts. With panel data, we therefore implement a household-level fixed effects (FE) regression technique that controls for both the observed and unobserved characteristics that possibly influence the outcomes (Khandker et al. 2009, Khandker et al. 2010).

Thus the equation that will serve us to evaluate PSNP impact can be;

$$Y_{ijt} = \alpha + \rho T_{ij1} + \gamma t_{ijt} + DD T_{ij1} t_{ijt} + \delta X_{ijt} + \lambda V_{jt} + \varepsilon_{ijt} \dots\dots\dots 3.28$$

where, the subscript t denotes time of survey (0 for baseline and 1 for follow-up), Y is the welfare or any other outcome of the i^{th} household in the j^{th} community, X and V are vectors of household and commune characteristics, T is the treatment variable indicating household's participation to PSNP (with a value 1 when household is participated in PSNP, or 0 when it does not), $\alpha, \rho, \gamma, \lambda, \delta$ are parameters to be estimated, DD gives the treatment effect as before, and ε_{ijt} is the composite error term which is defined before. Because of the reason that the errors are assumed time-invariant, a household fixed-effects estimate would get rid of bias due to unobserved heterogeneity.

3.2.6 Propensity score matching with double difference (PSM-DD)

As shown above, the key assumption for the FE regression or simple DD is that the unobserved factors remain fixed over time. However, due to certain reasons, the unobserved characteristics

may change over time and that the FE does not control for time varying heterogeneity (Khandker et al. 2009, Khandker et al. 2010).

According to Ravallion, (2007), cited in Khandker *et al.* (2009), the major cause that makes the error structure (i.e the un observed heterogeneity) to vary over time is the differential initial condition. Thus controlling the initial conditions will solve this problem. Khandker *et al.* (2009), Khandker et al. (2010), proposed PSM in combination with DD as a solution. Therefore the bias that would arise due to the varying of the unobserved heterogeneity through time can be mitigated by combing propensity score matching (PSM) technique along with the DD method.

PSM is a one of the methods in impact evaluation which can better match control and project units on pre-program characteristics. Thus in this case we apply PSM to mach treated and non-treated units on pre-program characteristics based on baseline data. That means the propensity score can be used to match participant and control units in the base (preprogram) year, and the treatment impact is calculated across participant and matched control units within the common support¹⁰.

3.3 Estimable equations of PSNP outcomes

So far we have seen that how we can evaluate the impact of PSNP using DD method and also we have seen that how we can tackle the problems that DD method faces. Now we are going to specify the estimable equation for the impact of PSNP on different outcomes. Thus, our first step is to identify outcome variables.

¹⁰ To know more about PSM see Khandker et al. (2009), Khandker et al. (2010) and Lee, (2008)

Based on the objectives that are specified in chapter one, the researcher has identified the following outcome variables:

1) Per capita total consumption: this variable is used as a useful summary measure of household welfare. i.e different researchers use this variable as a proxy of household welfare in empirical analysis. Therefore this variable is employed to identify whether PSNP is welfare enhancing or not.

2) Per capita food consumption: to see the impact of PSNP on food consumption we employed this variable

3) Assets: to see whether or not PSNP could protect beneficiary's asset, we employed this variable.

4) Off- farm labor market participation: one of the discussion regarding safety net (as we tried to discuss in the literature part) is it has disincentive effect on labour supply. Thus this variable is used to investigate whether PSNP has disincentive effect or not.

5) Transfers and remittances: the other concern regarding safety net is it crowds out other transfers to the household. Thus this variable is used as an outcome to measure the crowding out effect of PSNP if any.

However, in this study the researcher took PSNP participant households from PSNP woredas and those non-participant households from non-PSNP woredas for the reason explained in the next

chapter. However these two areas where these two groups are drawn might have difference. Thus the two groups may have differences in their observed characteristics even during the baseline survey which is prior to PSNP intervention. So it may bias the result if we use the whole non-participant members that are obtained from non-PSNP woredas as a comparison group for those that are treated and apply DD. Therefore we must find non-participant households from non-participant sample that observationally match with participants. To do this we applied propensity score matching (PSM) on the baseline (2004) data. We have seen above that PSM can be used with DD when one might expect initial differences. So we have employed PSM technique in the first place and then we used DD method without including other covariates and we also applied DD with fixed effect analysis technique by including other covariates that would affect the outcomes on the sample of matched participant and non participant households. Matching participants with non-participants based on observed characteristics and applying DD method on the common support is also an appropriate technique, since participation in to PSNP program is claimed as it is based on observed characteristics.

3.3.1 The Impact of PSNP on Welfare/ Total Consumption

The impact of PSNP on household consumption can be investigated by the following estimable equations.

Using DD method

Using DD method we estimated the following regression model to evaluate the impact of PSNP on household per capita consumption

$$\ln C_{it} = \alpha + DDT_{i1}t_{it} + \rho T_{i1} + \gamma t_{it} + \varepsilon_{it} \dots \dots \dots 3.29$$

Where $\ln C_{it}$; represents the natural logarithm of per capita consumption for household \underline{i} at time \underline{t} and T_{i1} is a post treatment variable that takes value of 1 for those who participated in PSNP and 0 otherwise. The parameters α , DD (that is the coefficient of the interaction term and which shows impact of PSNP), ρ , γ are to be estimated.

Using DD and fixed effect model

Under DD in combination with fixed effect model the following regression equation is estimated in order to evaluate the impact of PSNP on per capita total consumption

$$\ln C_{it} = \alpha + \rho T_{i1} + \gamma t_{it} + DDT_{i1}t_{it} + \delta X_{it} + \varepsilon_{it} \dots \dots \dots 3.30$$

Where $\ln C_{it}$; represents the natural logarithm of per capita consumption for household i at time, t , and α , β , γ , δ , and DD are parameters to be estimated. In this case also it is DD which shows impact of PSNP.

Where X_{it} Consists of household level characteristics which are reported in Table 3.1. We did not include commune level characteristics.

Table 3.1: variables that are included in fixed effect regression and in the extended DD model for the case of off-farm labour market outcome

Household demographic characteristics		Other variables
Household size		Off- farm labour market participation status
Age of household head		Credit market participation status
Marital status of household head		Land holding
Education of household head	From formal education	Number of Month that the household faces problem of food shortage
	From informal education	
Number of adults in the household		
Squared value of household size		

3.3.2 The Impact of PSNP on Food Consumption

To measure the impact of PSNP on household food consumption we estimated the above regression equations that are used for estimating welfare impact of PSNP which are depicted by equation 3.29 and 3.30. But in this case the dependent variable is natural logarithm of per capita food consumption of households not that of natural logarithm of per capita total consumption of households.

3.3.3 The Impact PSNP on Household Asset holding

To investigate the impact of PSNP on household asset growth, a variable of natural logarithm of household asset is used as dependent variable. Therefore the two equations are developed as follow.

Using DD method

$$\ln A_{it} = \alpha + DDT_{i1}t_{it} + \rho T_{i1} + \gamma t_{it} + \varepsilon_{it} \dots\dots\dots 3.31$$

Where all things are the same with the regression of welfare outcome except here DD measures the impact on Asset growth.

Using DD and fixed effect model

$$\ln A_{it} = \alpha + \rho T_{i1} + \gamma t_{it} + DDT_{i1}t_{it} + \delta X_{it} + \varepsilon_{it} \dots\dots\dots 3.32$$

Where all things are the same with the regression of welfare outcome, except here DD measures the impact on Asset growth and \underline{X} consisted the arguments which possibly affects asset among the variables reported in the Table 3.1.

3.3.4 The Impact of PSNP on Household Labour Market participation

To see the impact of PSNP on household off-farm labour market participation we employed the DD model that we have seen in our consumption or asset outcomes above but the dependant variable here is dummy variable taking 1 if the household participated in off-farm activities and 0 otherwise. Therefore here all the three models, namely, logit, probit, and LPM are conducted. However in this case we did not use fixed effect model for the logit and probit models due to its complications in estimation and hence we included those variables that would explain the likelihood of off- farm labour market participation and extend the DD model for all the three models, namely, LPM, logit, and probit models .

3.3.5 The Impact of PSNP on household on private transfer

To see the impact of PSNP on household remittance; whether it crowded out or crowded in the private transfer to the household we employed the DD model that we have seen in the above outcomes but with different dependent variable. In this case our dependent variable is dummy variable taking 1 if the household has positive net transfers (transfers received minus transfers given by the households) and 0 otherwise. Therefore here again all the three models, namely, logit, probit, and LPM are conducted.

3.4 Data

This paper employed panel data which was collected by the Department of Economics at the Addis Ababa University in collaboration with Center for the Study of African **Economics** at Oxford University and the International Food Policy Research Institute, Washington. The surveys were conducted in seven rounds - two in 1994, and the remaining in 1995, 1997, 1999, 2004 and 2009.

Even though the panel survey contains data sets of seven rounds, the researcher only used the data from round six (2004 survey) and round seven (2009 survey). Since the paper's objective is evaluating impact of PSNP on different outcomes using double difference method two panel surveys are enough to accomplish this objective-one before the implementation of PSNP and the other after the implementation of PSNP. Based on this fact the 2004 data set is considered as the data set before the PSNP program-since PSNP is implemented in 2005. Whereas that of the 2009 data set is considered as the data set after the program implementation and it contains data set on PSNP participation and PSNP outcome variables.

Chapter Four

Review of PSNP Program Implementation Manual

4.1 Origins of the PSNP

In 2003, the Government of Ethiopia together with development partners aimed to formulate an alternative to crisis response to support the needs of chronically food insecure households and to develop long-term solutions to the problem of food insecurity. And finally this created a Food Security Programme (FSP) that aimed at shifting households out of the emergency relief system while also enabling them to ‘graduate’ to sustainable food security. It is under the FSP, in 2005, the Government started a major new initiative - the Productive Safety Net Programme (PSNP PIM, 2010).

4.2 phases of PSNP

The PSNP is now in its third phase. Previous phases are as follows:

- ***Phase 1:** from January 2005 to December 2006. This established PSNP processes and delivered transfers to 4.84 million food insecure people in Ethiopia.*
- ***Phase 2:** from January 2006 to December 2009. During this phase the PSNP scaled up significantly to cover 7.57 million people.*
- ***Phase 3:** from January 2010 to December 2014. The phase will further strengthen implementation of the PSNP to achieve the objectives in all programme areas and maximise linkages with other elements of the FSP to promote graduation from food insecurity (PSNP PIM, 2010, p.5).*

4.3 PSNP Objectives

Generally speaking PSNP has the following objectives:

To assure food consumption and prevent asset depletion for food insecure households in chronically food insecure woredas, while stimulating markets, improving access to services and natural resources, and rehabilitating and enhancing the natural environment(PSNP PIM, 2010, p.5).

We can also see the (scope) and the specific objectives of PSNP in its implementation as follows:

- *It focuses on chronically food insecure woredas;*
- *It focuses on food insecure households – primarily chronically food insecure households but also those who are transitory;*
- *It aims to assure food consumption, so that chronically food insecure people have enough food to eat throughout the year;*
- *It aims to prevent asset depletion, so that food insecure households do not have to lose their assets in order to provide food for themselves;*
- *It aims to address underlying causes of food insecurity by rehabilitating the natural resources base;*
- *It aims to have a positive impact by stimulating markets and injecting cash into rural economies and,*
- *While doing that it also aims to contribute to the creation of an enabling environment for community development by increasing access to services, such as health, education, roads and market infrastructure (ibid).*

From the above discussion we can understand that it is improvement of food consumption which is the aim of PSNP not total consumption. So evaluating impact of PSNP on food consumption may not be appropriate.

4.5 PSNP Coverage

According to PSNP PIM, (2010), the Productive Safety Net Programme is implemented in woredas defined by the Government as chronically food insecure. Their eligibility for the PSNP was defined by the frequency with which they required food assistance in the ten years preceding the design of the PSNP (the ten years up to 2004). Within each woreda, only kebeles that are chronically food insecure are included for regular PSNP transfers, but all kebeles in a PSNP woreda are eligible for transitory support through the Regional Contingency Budget and Risk Financing. Woredas that are not included in the PSNP receive support for food shortages through the emergency relief system. PSNP woredas may receive support from the Government or through NGOs.

Therefore the researcher in his analysis used the participants from the PSNP woredas and the non- participants from the non-PSNP woredas. This means those who responded by saying “we are not participants” when they are asked at the time of 2009 survey of ERHS while they are from PSNP woredas are excluded from the control group in the analysis. This is because they

might participate earlier and graduated by self graduation or excluded by any other reason¹¹. The paper by wheeler et.al, (2010) showed the number of past participants is significant.

4.5 Is the transfer by PSNP conditional?

The PSNP is conditional for certain households and circumstances and unconditional for others. It is conditional for households who are chronically food insecure and that have members who are able-bodied (fit and healthy) and above 16 years of age. Such households receive transfers on condition that their able-bodied members (both male and female) contribute labour to Public Works (PSNP PIM, 2010).

But it becomes unconditional for households that face regular food shortages but who have no other means of support, and no labour to contribute to Public Works. Such households receive unconditional transfers through Direct Support, without the need to contribute labour of any kind to any activities. PSNP also provides Transfers for households affected by shocks either conditionally or unconditionally (ibid).

4.6 Targeting

PSNP follows a combination of both administrative and community targeting approach in its targeting process.

¹¹ See PSNP PIM, 2010 for more information about graduation and self graduation.

Criteria for selection of households

The following basic criteria define eligibility for the PSNP and are applied during the targeting procedure:

- *The households should be members of the community;*
- *Chronically food insecure households who have faced continuous food shortages (3 months of food gap or more per year) in the last 3 years;*
- *Households who suddenly become more food insecure as a result of a severe loss of assets (financial, livestock, means of production, assets), especially if linked to the onset of severe chronic illness, such as AIDS, and are therefore unable to meet their food needs even during periods of normal rain; and,*
- *Households without adequate family support and other means of social protection and support (PSNP PIM, 2010, p.22-23).*

Supplementary criteria to assist in the refinement of the client list:

- *Status of household assets: land holding, quality of land, labour availability, etc;*
- *Income from agricultural and non-agricultural activities; and,*
- *Specific vulnerabilities such as female-headed households, households with members suffering from chronic illness, such as AIDS, elderly headed households caring for orphans, etc(PSNP PIM, 2010, p.23).*

The researcher tried to include these characteristics with other household level characteristics for the purpose of matching participants with non-participants.

4.7 Size of transfers

Food transfer calculation

PIM, (2010) says that the basis for the level of transfers is a minimum cereal allocation to each household member to allow them to have sufficient food each month and therefore to guarantee food consumption. This is considered to be 15kg of cereals per person per month. For recipients of conditional transfers, the level of food transfer provided per day of work is calculated on the basis that 5 days should be worked for each person receiving transfers. Women may work less for the same transfer. So the daily food transfer is equals 3kg of cereal per day which is calculated as 15kg of food divided by 5 days. PSNP clients entitled to unconditional transfers receive the same transfer. This amount is paid for six months. The amount in a household is equal to the payment multiplied by number of household members included in PSNP.

Cash transfer calculation

The cash transfer is calculated on the basis of the cost of buying 3kg of cereal in the market. The daily wage rate per person is the cost of 3kg of cereal in the market. At May 2010 this is 10 Birr per day. PSNP clients entitled to unconditional transfers receive the same transfer. The PSNP provides a cash transfer to households that can purchase 3kg of the cheapest cereals on the market. The cash wage rate does not vary to allow for the purchase of oil and pulses. This amount is paid for six months. The amount in a household is equal to the payment multiplied by number of household members included in PSNP (ibid).

4.8 Public Works under productive Safety Net Programme

Public works are labour-intensive community-based sub-projects designed to address underlying causes of chronic food insecurity through the provision of employment for chronically food insecure people who have “able-bodied” labour.

Timing of Public Works

The PSNP is not limited to specific months of the year, in order to meet client needs. PSNP Public Works can therefore be implemented at any time of the year.

The two main considerations for timing of Public Works are:

- *To correspond with the times when transfers are needed in specific localities, including addressing transitory needs.*
- *To avoid competition with cropping seasons and other important times when competition for client labour might interfere with client livelihoods. The bulk of public works sub-projects should be implemented during the agricultural slack season to avoid interfering with the peak period of labour demand in the agricultural cycle (PSNP PIM, 2010, p.41).*

A transfer to rural farmers may reduce the supply of labour by these farmers to their farm areas.

Due to the fact that the public work is undertaken during agricultural slack season, PSNP public works may not affect agricultural works adversely-if we look it from labour competition point of view. Thus we did not see the impact of PSNP on supply of labour to agricultural activities. But the researcher employed off-farm labour market participation variable to see the effect of PSNP public work on off-farm labour supply.

Chapter Five

Analysis Results and Discussion

5.1 Definition and Description of Variables

Before we proceed to the detail analysis part, it is very indispensable to define and describe the variables which are employed for the analysis. This study focused on rural households of Ethiopia. Thus the variables employed here are household level characteristics or the characteristics of the heads of households. First the outcome variables (variables used as dependent variable) are defined and described. Next those variables which are used as explanatory are defined. In welfare analysis, per capita consumption is employed as a dependent variable. To compute per capita consumption, first, the total amount of food consumed from different sources and non-food consumptions are changed in to value by using price of those commodities. Then the figure is changed in to monthly amount. Finally the amount is divided by household size to get its per capita equivalent. For the case of food consumption the same procedure is undertaken while in this case it is only food consumption which is considered. In case of asset holding by households, total value of assets is computed by summing total tools values and that of total livestock values. All per capita consumption, food consumption and asset values are changed in to their real value by using CPI to control for change in price level. With regard to off-farm labour market participation, a dummy variable is employed (it took 1 if the household participated in off-farm labour activities and 0 otherwise). In case of private transfer, all private transfers that are received by the household and given by the household to others are computed and then net transfer (total received from others minus total given to others) is calculated. After that a dummy variable is used (1 if the net private transfer is greater than zero and 0 otherwise).

As far as explanatory variables are concerned, the most important variables for difference-in-difference analysis which are year (dummy variable taking 0 for the baseline survey/ 2004 and 1 for final year survey/ 2009), a group dummy which is fixed over time and shows PSNP participation status for both years, and an interaction dummy variable which is the interaction of participation and year are included. The other explanatory variables which are employed as a control variables include, age of household head, marital status of the household head (dummy of taking 1 if the head is married and 0 otherwise), household size, squared value of household size (to see scale of economy at household level), educational status of the head (first, educational status is divided in to three categories which are literate from formal education, literate from informal education and illiterate, then category illiterate is put as a benchmark and only the dummy variables of literate formal (1 if a household is in this group and 0 other wise) and literate informal (1 if a household is from this group and 0 otherwise) is included in the analysis to alleviate the problem of perfect multicolliniarity), the household composition represented by child size (number of children in a household), adult size (number of adults) and old size (number of old people in the household), land holding by households, and households self reported number of months in which they face food shortage (months of food gap) are also incorporated in the analysis. The other very important thing that should be explained here is the normality of total consumption per capita, food consumption per capita and asset value is checked both at level and at their logarithmic equivalent and they are normally distributed in both cases. But the logarithmic value is applied in the econometric analysis, because it can minimize hetroschdasticity problem as it is depicted in verbeek, (2004).

5.2 Descriptive Analysis

The descriptive statistics presented below are for both groups of PSNP beneficiary and non-beneficiary households. The analysis is carried out after PSNP participants are matched with non-participant households on their observed pre-program characteristics. The matching procedure is done based on propensity score matching (PSM) technique. The full description of PSM is organized below under econometric analysis part.

5.2.1 Demographic Characteristics of Households

Table 5.1: Demographic characteristics

Variable		PSNP Participants	Matched PSNP non-participants
Average age	2004	49.8961	52.47443
	2009	53.07468	54
Average household size	2004	5.295455	5.62963
	2009	5.428571	5.654321
Average size of children	2004	2.918831	3.068783
	2009	2.983766	3.045855
Average size of adults	2004	1.834416	1.917108
	2009	1.837662	1.931217
Average size of old	2004	.512987	.6313933
	2009	.6071429	.675485

Source: Author's computation from ERHS

As we can see from Table 5.1, which shows demographic characteristics of households, the average age of the participants in 2004 and 2009 is 49 and 53 respectively. However that of the non-participant is 52 and 54 during the baseline and that of the final survey respectively. When we look at the size of a household, it is almost the same for participants and non- participants both in 2004 and 2009.

As far as household composition is concerned, from Table 5.1, one can infer that the average number of children in 2004 and in 2009 for those participants is almost the same. This is also true for non- participants sample. With regard to number of adults, size of adults is also similar for both years and for both participants and non-participants.

5.2.2 Marital Status of Household Heads

Table 5.2: Marital status

Variable			PSNP Participants (in percentage)	Matched PSNP non- participants (in percentage)
Marital status	2004	Married	53.57	72.31
		Not	46.43	27.69
		Total	100	100
	2009	Married	51.30	67.72
		Not	48.70	32.28
		Total	100	100

Source: Author's computation from ERHS

Regarding the marital status of the heads of the households in the sample, in 2004, 53.6 % of beneficiary household heads are married and that of 46.4 % are not. But in 2009 the proportion of household heads that were married has declined to 51.3%. If we see the status of non-beneficiaries 72.3% of the heads were married in 2004. However this figure has reduced to 67.7% in 2009.

5.2.3 Educational Status of Household Heads

Table 5.3: Household's education status

Variable			2004 (In percentage)	2009 (In percentage)
Literacy from formal education	PSNP participants	Literate	15.91	18.51
		Not	84.09	81.49
		Total	100	100
	Matched PSNP non-participants	Literate	23.10	30.69
		Not	76.90	69.31
		Total	100	100
Literacy from informal education	PSNP participants	Literate	17.86	17.21
		Not	82.14	82.79
		Total	100	100
	Matched PSNP non-participants	Literate	16.23	27.51
		Not	83.77	72.49
		Total	100	100

Source: Author's computation from ERHS

Table 5.3 shows that in the sample, in the year 2004, 15.9% and 23.1% of household heads were literate from formal education system among beneficiary and non beneficiary household heads

respectively. In 2009 these figures have increased to 18.5% for participants and 30.7 % for non-participants.

With regard to the other type of education 17.9% of participant heads and 16.2% of non-participants were educated in 2004 from informal educational system. The educational status of non-beneficiary heads has shown an increasing trend from 16.2% in 2004 to 27.5% in 2009. The other important issue that is noticed here is that the smaller proportions of household heads that are educated from both formal and informal systems indicate that much of the household heads in the rural Ethiopia are illiterate.

5.2.4 Total Consumption per Capita/Welfare

Table 5.4: Per capita total consumption

Variable		PSNP Participants	Matched PSNP non-participants
Average real per capita consumption expenditure (food plus non-food)	2004	103.6506	105.3597
	2009	120.9454	155.4694

Source: Author's computation from ERHS

Average real per capita total consumption is used as proxy of welfare as it is explained repeatedly. Table 5.4 shows that the average value of real per capita total consumption has

produced an increasing trend over the course of the five years for both beneficiary and non-beneficiary households. When we look the values specifically, average value of real per capita total consumption of beneficiaries has improved from 103.6506 in 2004 to 120.9454 in 2009. Whereas the average value of real per capita total consumption of non-beneficiaries has increased from 105.3597 in 2004 to 155.4694 in 2009.

5.2.5 Food Consumption per Capita

Table 5.5: Per capita food consumption

Variable		PSNP Participants	Matched PSNP non-participants
Average real per capita food consumption expenditure	2004	84.75299	84.56944
	2009	100.8787	141.1984

Source: Author's computation from ERHS

It is presented in Table 5.5 that food consumption, from 2004 to 2009, has increased for both participants and non-participants. However food consumption for non-participants increased more than for participants. To state specifically participant's average real food consumption per capita has improved from 84.75299 in 2004 to 100.8787 in 2009. While average real food consumption per capita of non-participants has also increased from 84.56944 in 2004 to 133.4456 in 2009.

5.2.6 Asset holding of Households

Table 5.6: Value of assets

Variable		PSNP Participants	Matched PSNP non-participants
Average real total asset	2004	521.213	570.6097
	2009	632.2485	837.5012

Source: Author's computation from ERHS

Asset holding by households is another very important outcome that we use to evaluate the impact of PSNP. As it is clearly demonstrated in Table 5.6, the average value of real asset holding by households that are beneficiary of PSNP improved from 521.213 to 632.2485 during the course of the five years. The value of real asset accumulated by those non-beneficiaries also improved from 570.6097 to 837.5012.

5.2.7 Credit Market Participation by the Households

Table 5.7: Credit market participation

Variable			PSNP Participants (in percentage)	Matched PSNP non-participants (in percentage)
Credit market participation status	2004	Yes	57.47	53.09
		No	42.53	46.91
		Total	100	100
	2009	Yes	65.58	55.20
		No	34.42	44.80
		Total	100	100

Source: Author's computation from ERHS

Around 57.5% of PSNP beneficiary households participated in credit market in 2004 while this figure increased to 65.6% in 2009. As far as non-beneficiaries are concerned 53% of households were participants in credit market during the baseline survey. However participation in credit market by non-beneficiaries increased to 55.2 % during 2009.

5.2.8 Off- farm Labour Market Participation by the Households

Table 5.8: Off- farm labour market participation status

Variable			PSNP Participants (in percentage)	Matched PSNP non-participants (in percentage)
Off- farm labour market participation status	2004	Yes	69.37	37.62
		No	30.63	62.38
		Total	100	100
	2009	Yes	86.94	43.76
		No	13.06	56.24
		Total	100	100

Source: Author's computation from ERHS

In 2004 approximately 69.4 % of PSNP beneficiaries and 37.6% of non-beneficiaries were participated in off- farm activities. In 2009 while 86.9% of PSNP beneficiaries and 43.8% non-beneficiaries participated in off-farm activities.

5.2.9 Private Transfer status by Household

Table 5.9: Private Transfer status

Variable			PSNP Participants (in percentage)	Matched PSNP non-participants (in percentage)
Net transfer status	2004	Positive net transfer	19.16	21.16
		Negative	80.84	78.84
		Total	100	100
	2009	Positive net transfer	19.48	38.62
		Negative	80.52	61.38
		Total	100	100

Source: Author's computation from ERHS

During 2004 around 19.2 % of PSNP beneficiaries and 21.2% of non-beneficiaries were net receivers of private transfer. In 2009 while 19.5% of PSNP beneficiaries and 38.62% non-beneficiaries were net receivers of private transfer.

5.3 Econometric Analysis

5.3.1 Matching PSNP Participants with Non-participants

As we have tried to discuss in previous chapter, the researcher took PSNP participant households from PSNP woredas and those non-participant households from non-PSNP woredas for the reason explained in the previous chapter. However these two areas where these two groups are drawn might have difference. Thus the two groups may have differences in their observed characteristics even during the baseline survey which is prior to PSNP intervention. So it may bias the result if we use the whole non-participant members that are obtained from non-PSNP woredas as a comparison group for those that are treated. Therefore we must find non-participant households from non-participant sample that observationally match with participants. To do this or specifically to make certain the comparison group is similar to the treatment group, we applied propensity score matching (PSM) on the baseline (2004) data. This way, the observable heterogeneity in the initial condition can be dealt with.

In the estimation of PSM the variable that shows participation in both years (group dummy) is used as dependent variable and variables that would affect participation (these variables can be those which are listed as selection criteria in the previous chapter) and outcomes are employed as explanatory variables. The result from PSM is presented in the annex part. The result shows the probit estimation of participation variable, whether or not balancing property satisfied, and the matched participants and non-participants. Unless the balancing property is satisfied, the result from PSM cannot be applied for the purpose we need. As it is demonstrated in the annex part, the balancing property is satisfied and 567 non-participant households are matched with those 308 participant households. The sum of this matched participants and non-participants produced 875

households. This result is from the baseline, thus we found the same 875 households from the subsequent survey and formed panel data. Therefore both the descriptive and econometric analysis results are based on these matched non-participant and participant households that produced a panel of 1750 observations. With regard to outcome variables such as, total consumption per capita, food consumption per capita, and value of assets, the analysis is carried out after the data is corrected for possible outliers.

5.3.2 Welfare Impact of PSNP

Previously we have discussed that per capita consumption can be used as a proxy to welfare of households. Thus to see the impact of PSNP on household's welfare outcome, the researcher has used this variable. As we can see from the DD result, in Table 5.10, the impact of productive safety net program on welfare is negative. That means participating in PSNP program has significantly reduced the welfare of the households. To state more specifically, the welfare of PSNP beneficiary households has reduced significantly by 41%. Similar negative result, yet insignificant, is found in Gilligan et.al, (2008).

Table 5.10: Results of the Difference-in-Difference regression

Dependant variable: logarithm of real per capita total consumption expenditure

Variables	Coefficient	t-value
Participation variable (group dummy)	.0113063	0.22
Participation in PSNP X year	-.4144614 ***	-5.62
Year	.436453 ***	9.92
Constant	4.439962 ***	142.79
R –squared	0.0753	

Where *** means significant at 1% level of significant

The other very important thing we can see here is that, as it is depicted in Table 5.11 and in the descriptive analysis above, the real value of per capita total consumption expenditure of both non-treated group and treated group in the course of the five years has increased by 43.6% and 2% respectively. But, since the real value of per capita total consumption expenditure for non-treated group is larger than that of the treated group, the impact of PSNP on household's welfare became negative.

Table 5.11: Difference-in-Difference using t-statistics for welfare

Group	Mean	t-value = 6.6584	
Non-participant	.436453	diff = mean(non-participants) - mean(participants) Ho: diff = 0	Ha: diff < 0 Pr(T < t) = 1.0000
Participant	.0219916		Ha: diff != 0 Pr(T > t) = 0.0000
Difference	.4144614		Ha: diff > 0 Pr(T > t) = 0.0000

The increase in total consumption expenditure of PSNP beneficiaries across the five years may tell us one fascinating thing with regard to another impact of PSNP on areas where PSNP is implemented. Increase in total consumption expenditure of beneficiaries might show the development of market in the area. To be specific, provided that the beneficiaries are acquiring cash as a safety net transfer, the increase in beneficiary's total consumption expenditure compared to the time when there is no PSNP can be an indication of the development of market in the area. This is because PSNP beneficiaries purchased that increased amount from the market place and this points out that a market is developed in that area. This is an interesting result for PSNP planners whose one objective is developing market in rural part of the country by injecting cash in the area.

The fundamental assumption of the above DD method is other covariates do not change across the years. But since these variables change over time, they should be included in the regression and controlled by using fixed effect regression, to get the net effect of the program.

In this fixed effect analysis the interaction variable (treatment and year) which shows the impact on welfare is significant at one percent significance level. Thus this time also we found the same negative impact of PSNP on household welfare. However in this one, other things being equal, the beneficiaries' welfare is reduced by 33.8% which is lower than the above DD result which is 41%.

Among the arguments included in the fixed effect model households self reported number of months of food gap and household size are significant at 1 % significant level and at 5% level of significant respectively. Months of food gap, the number of months in which the household faces food shortage, is negatively affecting household welfare. The sign of months of food gap is intuitive. The higher the number of months of food gap, the smaller is the level of consumption in that household. i.e a household with higher months of food gap is the one that faces the problem of food security. Thus when the number of months that the household faces food shortage increases by one unit, household's welfare decreases by 7%, other things being equal. As far as household size is concerned, the result says welfare will decrease when size of household increases. *Ceteris paribus*, an increase in household size by one unit leads to a 10.9% reduction in real per capita total consumption. This result explains the downward pressure of family size on welfare especially if the majority of household members are children.

As it is expressed above value of household size squared is included in the analysis to see the scale of economy at household level. Thus, a negative sign means the presence of scale of economy in the household. i.e as household size increases further, consumption expenditure is to decline. But in our case its sign is positive which is an indication of there is no scale of economy

at household level and indicating diseconomies of scale. But it is not significant. So there is no significant diseconomy of scale at the household level.

The signs of other arguments such as land holding, off farm labor participation, credit, age of household head, number of adult in the household, both formal and informal education of head, and marital status of the head are as expected, though they are not significant.

In spite of the fact of what we have seen above, the use of total consumption per capita as a proxy of welfare and evaluating the impact of PSNP on household welfare has its own limitations. To state more specifically, as we can see from the program implementation manual, (2010), PSNP is directed towards securing (improving) food consumption for those chronically food insecure households. Thus it might be not good enough to evaluate the impact of PSNP on total consumption while its objective is to focus on food consumption.

Table 5.12: Results of the fixed effect regression

Dependant variable: logarithm of real per capita total consumption expenditure

Variables	Coefficient	t-value
Participation variable (group dummy)		
Participation in PSNP X year	-.337976***	-5.51
Year	.439515***	11.60
Off-farm market participation	.0230274	0.49
Credit market participation	.0778847	1.64
Age –head	-.0010184	-0.36
Household size	-.1093631**	-2.04
Marital status-head	.0370116	0.53
Head literate-formal	.0411033	0.51
Head literate-informal	.0493698	0.77
Size of adults in a household	.0222125	0.71
Number if months of food gap	-.070314***	-8.35
Logarithm of land size	.0490551	1.14
Household size squared	.0030301	0.77
Constant	4.997698***	22.98
R – squared	Within	0.2502
	Between	0.2319
	Overall	0.2382
	sigma_u	.49770007
	sigma_e	.55735725
	Rho	.44363618

Where *** means significant at 1% level of significant and ** means significant at 5% level of significant

5.3.3 Impact of PSNP on Food Consumption

It is pointed out above that because the objective of PSNP is to improve food consumption rather than total consumption, we need to use food consumption as an outcome to evaluate PSNP program impact.

Based on this argument a separate analysis which focuses on food consumption is made. Table 5.13 shows that PSNP has also an adverse effect on food consumption per capita. The interaction variable (treatment and year) is significant at 1% level of significant. The food consumption of PSNP households (beneficiaries) has declined by 41.6 %.

Table 5.13: Results of the difference-in- difference regression

Dependant variable: logarithm of real per capita monthly Food consumption expenditure

Variables	Coefficient	t-value
Participation variable (group dummy)	.0277283	0.47
Participation in PSNP X year	-.4156749***	-5.03
Year	.5357706 ***	10.94
Constant	4.14503 ***	119.74
R –squared	0.0814	

Where *** shows significant at 1% level of significant

However, like the case of total per capita consumption, Table 5.14 depicts that the value of per capita food consumption expenditure of both PSNP beneficiaries and non-beneficiaries has grown by 12% and 53.6% respectively. It is due to the reason that the per capita food

consumption expenditure of non-beneficiaries grew faster than that of PSNP beneficiaries which resulted the negative impact. This result can show us how before and after approach of evaluating a program impact produces bias. This is because it produced a positive program impact while the impact is negative.

Table 5.14: Difference-in-Difference using t-statistics for food consumption

Group	Mean	t-value= 5.6329	
Non-participant	.5357706	diff = mean(non-participant) - mean(participant) Ho: diff = 0	Ha: diff < 0 Pr(T < t) = 1.0000
Participant	.1200957		Ha: diff != 0 Pr(T > t) = 0.0000
Difference	.4156749		Ha: diff > 0 Pr(T > t) = 0.0000

The increase in food consumption in 2009 when it is compared to the level in 2004 may show how the nutrition level in rural Ethiopia is improving through time. This would further improve the health situation of households in these areas. As a result, these times, one might expect human development in rural part of Ethiopia.

As we have said above DD assumes that other covariates that would affect food consumption do not change across the years. But since these variables could change over time, they should be included in the regression and controlled by using fixed effect regression to get the net effect of the program.

Among the arguments included in the fixed effect model of food consumption it is only household's self reported number of months of food gap which is significant. It is negatively affecting household food consumption. The higher the number of months of food gap, the smaller is the level of food consumption in the household. i.e a household with higher months of food gap is the one that faces the problem of food security. Thus when the number of months that the household faces food shortage increases by one unit, household's food consumption decreases by 8.2%, other things being equal.

Table 5.15: Results of the fixed effect regression

Dependant variable: logarithm of real per capita Food consumption expenditure

Variables	Coefficient	t-value
Participation variable (group dummy)		
Participation in PSNP X year	-.3475326 ***	-4.68
Year	.5482254 ***	12.06
Off-farm market participation	.0147326	0.26
Credit market participation	.0840301	1.48
Age –head	.0006413	0.19
Household size	-.0875906	-1.38
Marital status-head	.0665118	0.78
Head literate-formal	.0411412	0.42
Head literate-informal	.0470022	0.60
Size of adults in a household	.0508218	1.36
Number if months of food gap	-.081894***	-8.02
Logarithm of land size	.0725838	1.40
Household size squared	.0013292	0.28
Constant	4.493219***	17.21
R – squared	Within	0.2465
	Between	0.1766
	Overall	0.2107
	sigma_u	.56252044
	sigma_e	.67526027
	Rho	.40966716

Where *** shows the variable is significant at 1% level of significant.

Impacts of PSNP both on total consumption per capita and food consumption per capita is unpleasant, as we have seen in such two analyses. The possible explanations for the negative outcome of PSNP on household food consumption expenditure as well as welfare may be:

- The PSNP beneficiaries might use the transfer for saving which is one direction where transfer income is channeled.
- PSNP beneficiaries might not use the transfer for consumption in general and food consumption in particular. They probably employed the transfer for undertaking business or petty trade activities. Here the transfer might serve as a solution for solving the liquidity constraint that the poor face. The significant positive impact of PSNP on household's likelihood of off- farm labour market participation could be an evidence for this specific reason¹².
- Another very indispensable reason regarding these negative outcome impacts could be the inflationary situation that the country has experienced in between 2004 and 2009. It is well known and published story that the country has experienced a high level of inflation after 2005/6. The food price level was sky-rocketing during that time. When we look the amount of cash transfer to beneficiaries, it is small compared to, for example, the payment from other off-farm labor activities. So with this small amount of money, unless the transfer is linked with general price movement in general and food price level in particular, the transfer by PSNP program will be eroded by the increase price level. Beneficiaries could not purchase the food they need due to higher prices.

¹² It is demonstrated in the impact of PSNP on household labour market participation analysis that PSNP has increased the probability of off-farm labour market participation.

- Most importantly as we have showed above the food consumption of non-beneficiaries has grown higher than that of the beneficiaries. This might indicate that those non-beneficiaries might work hard to improve their consumption level by exploiting different sources since they are not getting any assistance. But beneficiaries may be unlikely to do so. This means, had beneficiaries been non-beneficiary they would have had the same level of consumption as non-beneficiaries. Thus because of this dependency belief beneficiaries might put less effort on their agricultural farm and hence the PSNP beneficiaries experienced this lower level of consumption compared with non-beneficiaries.

5.3.4 Impact of PSNP on Household's Asset holding

If we see the program implementation manual, another objective of PSNP is to protect asset holding of the beneficiaries from depleting. The idea is when households become food insecure they are forced to sale their asset and fill their food expenditure. This circumstance eventually would worse the poverty situation of these poor households. Thus, it is to protect the assets from depleting that the program offers food and cash transfers.

Therefore in this section the researcher showed whether or not the program protected the asset holding by beneficiary households. As we can see the sign and significance of the interaction variable in the Table 5.16, PSNP has negative impact on asset too. Asset holding of PSNP beneficiaries has significantly decreased by 36.7%. The same significant negative impact on asset is also found by Gilligan et.al, (2008) and Wheeler et.al, (2010).

This result could be argued that in the one hand, households couldn't sustain their assets. The data used in this research including assets of households are self reported by household members. Thus on the other hand, since beneficiaries of PSNP suspect that improved in their asset status might discard them from PSNP membership, they might under report their asset level while it is actually higher than reported.

Table 5.16: Results of the difference-in- difference regression

Dependant variable: logarithm of total value of assets

Variables	Coefficient	t-value
Participation variable (group dummy)	-.0452275	-0.77
Participation in PSNP X year	-.3669599***	-4.43
Year	.4237765***	8.57
Constant	6.064451 ***	173.37
R –squared	0.0629	

Where *** means significant at 1% level of significant

But like the above two outcomes the asset holding of both PSNP beneficiaries and non-beneficiaries have grown by 5.6 % and 42% respectively. However, since the growth in asset holding by non- beneficiaries is higher than that of the beneficiaries, the program impact became adverse.

Table 5.17: Difference-in-Difference using t-statistics for asset

Group	Mean	t-value = 5.6398	
Non-participant	.4237765	diff = mean(non-participant) - mean(participant) Ho: diff = 0	Ha: diff < 0 Pr(T < t) = 1.0000
Participant	.0568166		Ha: diff != 0 Pr(T > t) = 0.0000
Difference	.3669599		Ha: diff > 0 Pr(T > t) = 0.0000

The above DD method considers no change in other covariates that would affect asset of the household over the course of the five years. Thus similar to the welfare and food consumption analyses the researcher has run another fixed effect regression by including other covariates that affects the asset holding by households.

The result from this analysis shows that the impact of PSNP on household asset holding has decreased to 32.7%. The asset holding of households is significantly reduced by 32.7% in this case.

Along with this result we can see also credit, household size, and number of months the household faces food shortage are significant at 10%, 10% and 1% level of significant respectively and their respective sign is quite intuitive. Credit is positively related to asset holding as it is expected. In this specific result participating in credit activities (taking loan) will increase the asset of households by 8.5 %, other things being equal. This is an interesting result which shows that credit can be a source of growth at household level, since higher asset means higher level of income.

The number of months in which a house hold faces food shortage is negatively related to asset holding. This means the higher the number of months that the households are with a problem of food shortage the lower the asset that they can accumulate. This is due to the fact that either the households deplete the asset level that they already have for the sake of purchasing food for consumption or they use the income that might be directed for accumulating asset for food consumption. Therefore, *ceteris paribus*, a decrease in household food shortage problem by one month increases the asset holding of households by 7 % in this particular analysis. With regard to relationship of household size and asset the result found that a one unit increase in household size leads to an 11.5% increase in value of assets, other things being equal.

Other explanatory variables like land holding by households, number of adults in the household, off-farm participation, age of the household head, marital status of the head, and both formal and informal education by household head have signs as expected, though they are not significant.

Table 5.18: Results of the fixed effect regression

Dependant variable: logarithm of value of total asset value

Variables	Coefficient	t-value
Participation variable (group dummy)		
Participation in PSNP X year	-.3273418 ***	-5.22
Year	.4359931 ***	11.26
Off-farm market participation	.0254689	0.53
Credit market participation	.0847453*	1.75
Age –head	-.0016066	-0.56
Household size	.1145867 ***	6.03
Marital status-head	.0992178	1.40
Head literate-formal	.0357281	0.43
Head literate-informal	.057982	0.88
Size of adults in a household	.0242392	0.76
Number if months of food gap	-.0701209 ***	-8.15
Logarithm of land size	.0577842	1.31
Constant	5.429727***	30.93
R – squared	Within	0.2679
	Between	0.3714
	Overall	0.3369
	sigma_u	.52441991
	sigma_e	.56964373
	Rho	.45873487

Where *** shows significant at 1% level of significant

5.3.5 Impact of PSNP on Off-farm Labour Market participation

A paper by Ai and Norton, (2003) presented that the magnitude of the interaction effect in nonlinear models, like logit and probit, does not equal the marginal effect of the interaction term. The difference-in-differences analysis is one that uses interaction term in its analysis. Thus according to Ai and Norton, (2003) it is not appropriate to use logit or probit model to estimate the impact of PSNP on off-farm labour participation.

But Puhani, (2008) discuss that Ai and Norton, (2003) focus on cross differences which is not equal to the treatment effect and thus not an interesting parameter in a nonlinear “difference-in-differences” model. He also demonstrated that the sign of the treatment effect in a nonlinear “difference-in-differences” model with a strictly monotonic transformation function of a linear index (like probit, logit or tobit) is equal to the sign of the coefficient of the interaction term. Thus, according to him, researchers carrying out “difference-in-differences” estimates in nonlinear models like probit, logit or tobit are correct to focus their attention on the coefficient of the interaction term of the group and time dummy.

Therefore by following Puhani, (2008) the researcher employed both logit and probit models to estimate the impact of PSNP on off-farm labour market participation. The linear probability model is also run for the sack of comparison.

The result from the probit model depicts that PSNP has significantly increased the probability of off-farm participation of the beneficiary households. The same result is found by Skoufias, (2008) from rural Mexico. This may be due to the reason that participants switch their labour

supply from farm to off-farm activities and the transfers from PSNP results very low income effect.

Table 5.19: Difference-in- Difference probit regression

Dependant variable: dummy of off-farm labour market participation

Variables	Coefficient	Z-value
Participation in PSNP(both years)	.8219192***	7.91
Participation in PSNP X year	.4585112 ***	2.89
Year	.1585562**	2.05
Constant	-.3155715***	-5.73
Pseudo R –squared	0.0998	

Where *** shows significant at 1% level of significant and ** shows significant at 5% level of significant

However the likelihood of household’s off-farm labour market participation could be affected by other explanatory variables. Thus, the researcher has included those variables that would explain the dependent variable and run all the three models, namely, LPM, logit, and probit models. To minimize the problem of hetroschedasticity, the researcher run a robust regression and reported the result with the robust standard error. When we see the impact of PSNP on the likelihood of household’s off-farm labour market participation after including these explanatory variables, we found also the same positive impact.

As it is clearly seen in the result from Table 20, additional variables, such as credit, age of the household head, the level of education by household head which is informal education of the head, size of adults in a household and land holding are significantly related with the probability of off-farm labour market participation. Participating in credit activities improves the likelihood of off-farm participation. This output is intuitive. Among others, small petty trade is one of the activities that can be considered as off-farm labour participation. Money is needed for undertaking this trade activity. It is known that access to credit can solve this liquidity constraint. Thus increase in probability of participating in off-farm activities is expected and consistent with participation in credit services.

Household head age is the other variable which is significant at 1% level of significant and related with probability of off-farm labour participation negatively. This means as a person's age increase his participation to any off-farm labour activities will decrease. This is due to the reason that most of the labour activities in rural part of (Ethiopia) are labour intensive and invite only those who are strong enough not the old who have exploited their energy and labour power. It is only informal education which is significantly related to off-farm labour activities not formal education. This indicates that most of the rural area off-farm activities do not require education by the participants from formal education system.

With regard to size of adult members in a household, it is significant at 1% significant level and has positive sign. It shows that the more the number of adults, the more the likelihood of participating in rural off-farm activities by the household. This might be due to the reason that rural off-farm activities are undertaken by adult level worker. As far as land holding is concerned it is also positively related to the probability of off-farm labour market participation with 1%

level of significant. However one can expect households with more land to invest their time on their land against to this result. But, we can also see in other way that households with more land are expected to have more income and they might employ labour in their land and they might employ themselves in off- farm labour market.

Table 5.20: Difference-in- Difference probit regression with other variables included and robust standard error

Dependant variable: dummy of off-farm labour market participation

Variables	Coefficient	Robust standard error	Z-value
Participation in PSNP (group dummy)	.8702285***	.1076201	8.09
Participation in PSNP X year	.4565114***	.1631533	2.80
Year	.152973 **	.0805093	1.90
Credit market participation	.1958927***	.0699627	2.80
Age –head	-.0079054***	.0026282	-3.01
Household size	-.0148677	.0183441	-0.81
Marital status	.0574032	.0822668	0.70
Head literate-formal	.003809	.0934383	0.04
Head literate-informal	.3752808***	.0937449	4.00
Size of adults in a household	.1298144***	.0396242	3.28
Logarithm of land size	.1656894***	.0618147	2.68
Constant	-.4740869**	.1880244	-2.52
Pseudo R-squared	0.1348		

Where *** shows the variable is significant at 1% level of significant and ** shows the variable is significant at 5% level of significant.

5.3.6 Does PSNP crowded out private transfer to participants?

This section of the analysis reported whether or not PSNP crowded out the private transfer that beneficiaries can collect. Thus a negative outcome indicates PSNP has reduced the private transfer that those beneficiaries would collect.

Similar to the case of off-farm labour participation impact analysis, the researcher here also followed Puhani, (2008) and applied logit and probit models in the regression.

One can infer from Table 5.21 that participating in PSNP has significantly reduced the likelihood to be net beneficiaries of private transfer. Therefore PSNP has crowding out effect on private transfers of beneficiary households.

Table 5.21: Difference-in- Difference probit regression

Dependant variable: dummy of net private transfer

Variables	Coefficient	Z-value
Participation in PSNP(both years)	-.0577959	-0.54
Participation in PSNP X year	-.5611733 ***	-3.76
Year	.5478677***	6.45
Constant	-.8177169***	-12.93
Pseudo R –squared	0.0369	

Where *** shows significant at 1% level of significant and ** shows significant at 5% level of significant

Chapter Six

Conclusions and Recommendations

Ethiopia's Productive Safety Net Program is the largest social protection program operating in sub-Saharan Africa except in South Africa. It operates in the rural parts of the country where food insecurity is prevalence. It provides transfers to the ultra-poor both in cash and in kind with cash priority principle. PSNP intends to improve food consumption of households, protecting asset level of beneficiaries and creating community level assets, among others.

This study tried to evaluate the impact of PSNP on welfare, food consumption, asset holding, and labour supply of beneficiary households and also on private transfers to these households. The study used double difference in combination with propensity score matching (PSM) and fixed effect regression methods to evaluate the impact. We employed the panel data which was collected by the Department of Economics at the Addis Ababa University in collaboration with Center for the Study of African **Economics** at Oxford University and the International Food Policy Research Institute, Washington. The researcher used only the 2004 and 2009 data sets out of the seven round data sets. This study focuses only on the impact of PSNP at household level, though it could have effects on the community in general.

The results from the analysis presented that PSNP reduces the total consumption/welfare, food consumption, and assets of beneficiary households. PSNP also crowd out the private transfers to the beneficiary households. But PSNP increases the supply of labour by beneficiaries towards off-farm activities.

The negative impact of PSNP on household welfare and food consumption might be because of the inflationary situation that the country has experienced which erodes the purchasing power of the transfer. Or it might be due to the dependency behavior (that may develop as a result of PSNP) of beneficiaries which discourage them to put efforts on their agricultural activities.

Therefore the program implementers, both GoE and NGOs, should have to link the payment of PSNP with general price movements in general and food price movements in particular. With regard to the dependency behavior of participant households, program implementers should have to educate beneficiary households so that they could avoid their dependency feeling. This can be done by development agents (DA) who live in rural areas and provide agricultural extension services to farmers.

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Annexes

Annex 1: Propensity score matching (PSM) result

In the estimation of PSM the dependent variable is the one which shows participation in to PSNP which takes 1 if the household is participant and 0 otherwise. The explanatory variables include land holding, dummy variable which shows net transfer status, months of food gap, age of household head, house hold size and its square, marital status, dummy of education of head from informal education, dummy of education of head from formal education and number of adults in the household.

Algorithm to estimate the propensity score

The treatment is DPSNPpws09

DPSNPpws09	Freq.	Percent	Cum.
0	616	66.67	66.67
1	308	33.33	100.00
Total	924	100.00	

Estimation of the propensity score

Iteration 0: log likelihood = -588.13909
 Iteration 1: log likelihood = -463.41354
 Iteration 2: log likelihood = -448.59871
 Iteration 3: log likelihood = -446.80323
 Iteration 4: log likelihood = -446.78831
 Iteration 5: log likelihood = -446.78831

Probit regression

Number of obs = 924
 LR chi2(10) = 282.70
 Prob > chi2 = 0.0000
 Pseudo R2 = 0.2403

Log likelihood = -446.78831

DPSNPpws09	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]
lntotplots~e	-.7010027	.0960843	-7.30	0.000	-.8893246 -.5126809
dnettransf	-.0363792	.1297618	-0.28	0.779	-.2907077 .2179492
hhsiz2	-.0109281	.0071361	-1.53	0.126	-.0249147 .0030585
mfoodgap	.259435	.0244484	10.61	0.000	.211517 .307353
ageH	-.007284	.0036269	-2.01	0.045	-.0143925 -.0001755
hhsiz	.1025084	.0892478	1.15	0.251	-.072414 .2774309
dmstatusH	-.3932615	.1146301	-3.43	0.001	-.6179325 -.1685905
dlitraforH	-.2085726	.1355755	-1.54	0.124	-.4742957 .0571504
dlitrainfH	.261098	.1361312	1.92	0.055	-.0057142 .5279102
adultsize	.095306	.0585277	1.63	0.103	-.0194063 .2100183
_cons	-.184324	.3315566	-0.56	0.578	-.834163 .4655151

Note: the common support option has been selected
 The region of common support is [.01379991, .99710035]

Description of the estimated propensity score
 in region of common support

Estimated propensity score

	Percentiles	Smallest		
1%	.023341	.0137999		
5%	.0426245	.0165886		
10%	.0636817	.0176562	Obs	875
25%	.1370223	.0194735	Sum of wgt.	875
50%	.3162197		Mean	.3498422
		Largest	Std. Dev.	.2407105
75%	.5221479	.9797645		
90%	.6954289	.980856	Variance	.0579416
95%	.8156436	.9858821	Skewness	.584978
99%	.9307809	.9971004	Kurtosis	2.452046

Step 1: Identification of the optimal number of blocks
 Use option detail if you want more detailed output

The final number of blocks is 5

This number of blocks ensures that the mean propensity score is not different for treated and controls in each blocks

Step 2: Test of balancing property of the propensity score
 Use option detail if you want more detailed output

The balancing property is satisfied

This table shows the inferior bound, the number of treated and the number of controls for each block

Inferior of block of pscore	DPSNPpws09		Total
	0	1	
.0137999	271	23	294
.2	170	82	252
.4	85	93	178
.6	29	74	103
.8	12	36	48
Total	567	308	875

Note: the common support option has been selected

End of the algorithm to estimate the pscore

Annex2: Difference-in- Difference logit regression

Dependant variable: dummy of off-farm labour market participation

Variables	Coefficient	Z-value
Participation in PSNP(both years)	1.323308***	7.75
Participation in PSNP X year	.8229281***	2.98
Year	.2550213 **	2.05
Constant	-.5058628***	-5.68
Pseudo R –squared	0.0998	

Where *** shows significant at 1% level of significant and ** shows significant at 5% level of significant

Annex 3: Difference-in- Difference LPM regression

Dependant variable: dummy of off-farm labour market participation

Variables	Coefficient	t-value
Participation in PSNP(both years)	.3175298 ***	8.52
Participation in PSNP X year	.1142232 **	2.17
Year	.0614525 **	2.16
Constant	.3761639 **	18.66
R –squared	0.0998	

Where *** shows significant at 1% level of significant and ** shows significant at 5% level of significant

Annex 4: Difference-in- Difference logit regression with other variables included and robust standard error

Dependant variable: dummy of off-farm labour market participation

Variables	Coefficient	Robust standard error	Z-value
Participation in PSNP (group dummy)	1.412825 ***	.1773984	7.96
Participation in PSNP X year	.8431485***	.2854759	2.95
Year	.2464592 *	.1311768	1.88
Credit market participation	.3165851 ***	.1152263	2.75
Age –head	-.0132848 ***	.004402	-3.02
Household size	-.0273468	.0301067	-0.91
Marital status	.093989	.1368326	0.69
Head literate-formal	.0201419	.1547423	0.13
Head literate-informal	.634306 ***	.154184	4.11
Size of adults in a household	.2102825 ***	.0655816	3.21
Logarithm of land size	.2743105 ***	.1012456	2.71
Constant	-.7372319**	.3132563	-2.35
Pseudo R-squared	0.1350		

Where *** shows the variable is significant at 1% level of significant and ** shows the variable is significant at 5% level of significant.

Annex 5: Difference-in- Difference LPM regression with other variables included and robust standard error

Dependant variable: dummy of off-farm labour market participation

Variables	Coefficient	Robust standard error	t-value
Participation in PSNP (group dummy)	.3205002***	.0370843	8.64
Participation in PSNP X year	.1113817**	.0484449	2.30
Year	.0569022 *	.0297836	1.91
Credit market participation	.0639175***	.0247327	2.58
Age –head	-.0027668 ***	.0009079	-3.05
Household size	-.0048944	.0062934	-0.78
Marital status	.0203735	.0275085	0.74
Head literate-formal	.0011931	.0327571	0.04
Head literate-informal	.129776 ***	.0319013	4.07
Size of adults in a household	.0431176 ***	.0133822	3.22
Logarithm of land size	.0535301 **	.0209128	2.56
Constant	.3363049 ***	.0665019	5.06
R-squared	0.1692		

Where *** shows the variable is significant at 1% level of significant and ** shows the variable is significant at 5% level of significant.

Annex 6: Difference-in- Difference logit regression

Dependant variable: dummy of net private transfer

Variables	Coefficient	Z-value
Participation in PSNP(both years)	-.1012379	-0.54
Participation in PSNP X year	-.9360086 ***	-3.60
Year	.9125258 ***	6.38
Constant	-1.344571***	-12.21
Pseudo R –squared	0.0369	

Where *** shows significant at 1% level of significant and ** shows significant at 5% level of significant

Annex 7: Difference-in- Difference LPM regression

Dependant variable: dummy of net private transfer

Variables	Coefficient	t-value
Participation in PSNP(both years)	-.016112	-0.50
Participation in PSNP X year	-.1904758***	-4.19
Year	.1868787***	6.90
Constant	.2067594***	10.79
R –squared	0.0421	

Where *** shows significant at 1% level of significant and ** shows significant at 5% level of significant