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The Impact of Cash Transfers on Labor Force Participation and Household Consumption: Evidence from Post-Apartheid South Africa

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The Impact of Cash Transfers on Labor Force Participation and Household Consumption: Evidence from Post-Apartheid South Africa

DISSERTATION

A dissertation submitted in partial
fulfillment of the requirements for the
degree of Doctor of Philosophy in the
College of Business and Economics
at the University of Kentucky

By
Steve M. M. Muchiri
Lexington, Kentucky

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Lexington, Kentucky 2016

ABSTRACT OF DISSERTATION

The Impact of Cash Transfers on Labor Force Participation and Household Consumption: Evidence from Post-Apartheid South Africa

The Old Age Pension (OAP) program for elderly South Africans puts a significant cash transfer in the hands of many poor households. This dissertation investigates its impact on labor force participation and consumption of selected household items. In the first half of the dissertation, we take advantage of a policy reform that lowered men's OAP eligibility age from 65 to 60 for men to match that of women for estimation identification. Using the General Household Survey data, we first demonstrate that both men and women respond to the eligibility age by dropping from labor force participation at the eligibility age, as expected. Using a difference-in-difference-in-difference estimator, we estimate that at the median predicted wage, age eligibility reduces men's probability of labor force participation by approximately 6.14 percentage points.

Previous studies show that not only is the OAP take-up rate high among the age-eligible, but its value is sufficiently high to generally make it a significant component of total household income for the majority of pensioners and their households. Other studies add that it is a dominant source of income in older households, such that it is often the sole source of income in these households, especially those in rural areas. In the second half of the dissertation, therefore, we examine the impact of age-eligibility status on a number of selected household outcomes, such as food security, sanitation, source of drinking water, and ownership of consumer durable goods. We also examine the extent to which gender influences its impact on household outcomes. We find positive effects on a select number of outcomes; however, we note this is more associated with females' age-eligibility status, but not that of males.

KEYWORDS: Social cash transfers; Old Age Pension; Apartheid; Labor force participation; Household well-being; South Africa

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Date: July 26, 2016

The Impact of Cash Transfers on Labor Force Participation and Household Consumption: Evidence from Post-Apartheid South Africa

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Date: July 26, 2016

To my late mother Anastasia, my wife Elisabeth, and my son Josiah.

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One of the features of the last decade has been the emergence of large social transfers in middle- and low-income countries aimed at providing direct cash to individuals or households in extreme and persistent poverty; rough estimates indicate that between 0.75-1 billion individuals have access to social transfers (Barrientos, 2012). These cash transfer programs show diversity in design. For instance, *Progresa* in Mexico is conditional on school attendance and primary healthcare utilization with the aim of reducing intergenerational poverty persistence, while others, like the South African Old Age Pension (OAP) program, our program of interest, are purely cash transfers. The significance of these cash transfers is highlighted by the fact that they are predictable and they provide recipients with the flexibility to meet their basic needs.

South Africa's social assistance program is exceptional among developing countries, and is a vital pillar in the country's highly re-distributive social policies (Van der Berg and Bredenkamp, 2002; Seekings, 2002). In South Africa, social assistance grants reach approximately half of all households (Barrientos, 2012). Through the OAP, for instance, the South African government provides a monthly cash transfer to older individuals that is substantially higher than the median per capita income (Ardington et al., 2009). Its relevance is also underscored by the fact that over two-thirds of the older population report receiving the pension (Sienaert, 2008; Woolard and Leibbrandt, 2013). Other studies find that the OAP accounts for more than 85% of total household income in households receiving the pension in urban areas, while 25% of households in rural areas that receive the pension report it as their only income. The size of the pension and the magnitude of its reach implies that it has the potential to impact both individuals and households significantly.

This dissertation works to examine the impact of such large cash transfers on labor force participation and household's consumption using the South African Old

Age Pension (OAP) program. We proceed with the dissertation as follows. Chapter 2 describes the South African social security system, including the Old Age Pension (OAP). We detail the eligibility criteria, including a change in the minimum age-eligibility requirement for males. Historically, the minimum age-eligibility requirement for women was 60 while that of men was 65. In 2008 a pension reform lowered, in steps, men's minimum age-eligibility from 65 to 60, during which the government extended pensions to men aged 63 and older in 2008, and later to those aged 61 and older in 2009, and finally to those aged 60 and older in 2010, thus equaling that of women. We exploit this phased-in reduction of pension age-eligibility for estimation identification.

Existing studies on the impact of South Africa's pension, while the program is primarily targeted to the elderly poor, has given little specific attention to the labor market behaviors of the elderly. Most of these studies have predominately focused on the outcomes of other household members typically due to the fact that the majority of the elderly live in three-generation and skip-generation households (Case and Deaton, 1998). For instance, as low as 7% of pensioners live without at least one 19-50 year old, while the percentage of children that live with a pensioner has historically been high, especially among poor households (Sagner and Mtati, 1999). These studies have focused on at least one of the following questions: first, the effect on child outcomes, such as child labor, school attendance and completion, and child nutrition–typically defined by some measure of height-for-age and weight-for-height, amongst others (Duflo, 2000; Edmonds, 2006). Secondly, studies have focused on the effect on household composition, resource allocation, decision making, and remittances (Hamoudi and Thomas, 2014; Case and Deaton, 1998; Ambler, 2015; Ranchhod, 2009). Finally, focuses on the effect on labor supply and employment of prime-aged adults that reside with the pensioners in these studies have provided mixed results (Bertrand et al., 2003; Posel et al., 2006; Ardington et al., 2007; Abel, 2013).

However, given the considerable focus on the effect of the pension on non-elderly outcomes, there is relatively less work on labor market behavior of the beneficiaries themselves, and we are aware of only two previous studies by Lam et al. (2006) and Ranchhod (2006) that examine potential labor force supply effect on elderly South Africans.

Overall, there is substantial literature that has examined the impact of social security benefits on labor force participation in developed countries. In the United States, for example, a host of these studies attribute the decline in labor force participation among older men over the past half-century to jobs covered by social security as well as its increasing share of household income among household heads aged 65 and older (Diamond and Gruber, 1999; Hurd, 1990; Burtless and Moffitt, 1984)[1] However, policy implication from these studies may have relatively limited relevance for developing countries due in part to the fact that these countries are different in a number of ways. For instance, they have low income levels, less-developed financial markets, their production relies heavily on labor, low life expectancy, and the structure of households–wherein family is the primary care provider for the elderly population (Kaushal, 2014). In the context of South Africa, most of the elderly population faces a complex set of challenges. For instance, they are less educated and the majority of the blacks spent most of their productive lives under the apartheid

[1] Hurd (1990) notes that a peak in the hazard rate of retirement at age 62, the earliest age of retirement, offers another piece of evidence that social security has a significant effect on retirement behaviors, also adding that there "are no other institutional or economic reasons for the peak"; similar spikes in retirement at age 62 in 1960, when men were not allowed to draw benefits before age 65, are not observed (Burtless and Moffitt, 1984). Gruber and Wise (2004), in a 12-country study (Belgium, Canada, Denmark, France, Germany, Italy, Japan, Netherlands, Spain, Sweden, United Kingdom, and United States) documents a strong association between pension eligibility and retirement behaviors, finding that Social Security reforms that delay benefits eligibility discourages retirement. Specifically, they find that reforms that delay eligibility age by 3 years reduce labor force participation of men aged 56-65 by between 23% and 36%. There are however other studies that offer other explanations for the observed early retirement in males. For instance, Costa (1998) discusses that since the downward trend in men's labor force participation was observed prior to the establishment of social security programs, it could have been the result of several factors, such as better social/economic conditions, leisure opportunities and economic development.

restrictions on employment. Therefore, they were not able to accumulate enough wealth to support themselves in their old age and are subjected to credit constraint (Edmonds, 2006). We explore this line of research further by examining the impact of pension age-eligibility on the labor force participation of elderly South African males in chapter 3.

Significant to this dissertation is the South African household structure wherein families tend to live in multi-generation or skip-generation household arrangements. Household structure, particularly among black South Africans, was historically relied upon for provision of care and food for the elderly. However, due to high cases of HIV/AIDS and high unemployment rates that have weakened prime-aged adults' ability to support their families, household structure has now taken on a new importance; roles have reversed so that the elderly now support the younger generation (Lam et al., 2006). Ambler (2015) and Case and Menendez (2007) observe that approximately 40% and 11% of children under 5 years live with women and men above 50 years old, respectively, and it is also estimated that more than 50% of elderly adults live with at least one younger women. As a result, evidence shows that the impact of these cash transfers tends to extend to other household members as well. Consequently, in Chapter 4, we examine the impact of OAP on food security for both adults and children.

We extend this analysis to examine age-eligibility impact on water, sanitation, and ownership of durable goods. While water and sanitation are not necessary areas of concern in the United States or in other western countries, study show they are severely deficient in developing countries, and consequently become major public health issues. While the correlation between the lack of water (improved), improved sanitation and health is complex, diseases transmitted through poor quality water or poor human waste disposal are well documented in literature (Esrey et al., 1991). A major constraint for households wanting to connect to improved water supply,

for example, is affordability, and we hypothesis that pension income may ease this constraint, therefore resulting in better access to improved water supply. Findings from this chapter indicate that females' age-eligibility has a positive impact on the selected number of outcomes, but we do not observe any significant impact from that of males.

Finally, chapter 5 concludes the dissertation and discusses possible extensions for further research.

Chapter 2 The South Africa's Old Age Pension (OAP) Program

2.1 A Brief Background

South Africa's social security has three elements; Figure 2.1 provides a schematic: a statutory contributory system, a voluntary scheme and a social grant (social assistance grant). The statutory contributory system consists of employment-related funds and benefits are dependent on contributions: the Compensation Funds provide medical care and income benefits to workers injured at work or those who develop occupational diseases, the Unemployment Insurance Fund (UIF) pays benefits to its contributors in case of unemployment, illness, maternity, or adoption of a child, and also pays benefits to the dependents in case of death in service. It is mandatory for all private-sector/formal-sector workers and their employers. The Road Accident Fund provides compensation for loss of earnings and damages to victims of road accidents caused by negligent driving (Woolard et al., 2010). The voluntary system consists of private savings and is mostly used to supplement retirement income from other pension funds.

The State Old Age Pension, commonly referred to as the OAP, falls under the social grants prong. In South Africa, the term "social grants" is used to refer to means-tested programs that are provided by the government to vulnerable groups with no contribution requirements. Other major social assistance programs provided by the South African government include: the Disability Grant (DG)–intended for individuals aged 18 to 59 years who are temporarily or permanently unable to obtain gainful employment due to a disability or a chronic illness; the Child Support Grant (CSG)–for individuals under 18 that reside with low-income caregivers; the Foster Care Grant (FSG)–for children that have been placed under foster parents by order of the court; the Care Dependency Grant (CDG); the War Veteran Grant–for Second

World War and Korean War veterans; and the Grant in Aid–for OAP, Disability Grant or War Veteran Grant recipients who require full-time attendance.[1] These social assistance programs are financed out of general taxes revenues and therefore one does not need to contribute in order to receive benefits. Since only individuals with continued formal employment are covered by the contributory based programs, OAP plays a major role providing basic income support for the majority who do not have continued formal employment and therefore do not have access to the contributory social insurance programs.

As is often the case, demand for provision of social pensions is driven by poverty among the elderly as well the breakdown in living arrangements (multi-generation), wherein younger individuals are either no longer able or willing to provide care for their aging parents (Case and Deaton, 1998). However, forces behind social pension provision in South Africa are different from those observed in other developing countries. OAP is the most unique and important feature of the South African social assistance system and has an interesting history, having evolved from a grant that was exlusively paid to white South Africans to one that is now paid to all South Africans regardless of their race (Lam et al., 2006). However, Case and Deaton (1998) points out that OAP was a *"largely unintended consequence of the country's recent history"*. Since the majority of white workers were covered by private occupational pension schemes, OAP, a means-tested state pension, was originally introduced in 1928 with the primary objective of providing a safety-net for poor elderly whites who had reached retirement without sufficient provision from private occupational pension

[1]Implementation of social grants in South Africa is under the South African Social Security Agency (SASSA). A total of 15.7 million people were receiving some type of social grant from the government in 2011-2012, out of a total population of roughly 49 million, and over a half of these were children receiving the child support grant (Woolard and Leibbrandt, 2013). The Old Age Pension program has the highest expenditure; it accounts for 8% of the country's expenditure and the increasingly large number of of individuals achieving its eligibility age each year and claiming the pension benefits raises concern about its long-term sustainability (Ferreira, 2000).

schemes, and it was subject to both age and means test (Sagner and Mtati, 1999; Case and Deaton, 1998).

In 1944 the system was extended to Africans/blacks, but still pension amounts were legally determined by race and were not comparable to those of the white population, i.e., means-testing and benefit levels were different for different racial groups. The distribution system was different as well. Whites' pensions were distributed through the postal office, while Africans'/blacks' pensions were distributed through mobile pay points that did not reach most of the rural areas. In addition, officials would regularly and intentionally underestimate the age of prospective Africans/blacks or otherwise take beneficiaries off the benefits list in order to save on the cost of the pensions (Duflo, 2003).

By 1958, while the fraction of the African/black population that depended on the OAP made up the majority of the pensioners, their total receipt was only 19% of the total OAP spending (Van der Berg, 1997), despite benefits being independent of previous earnings. By the early 1980s, benefits for whites were approximately 10 times more than those for Africans/blacks (Lund, 1993). From the late 1970s and onwards, fiscal expenditure on social assistance rose faster in the effort to integrate all race groups into the system with similar levels of benefits. Fiscal spending on OAP increased from 0.6 percent of GDP in 1970 to 1.8 percent by 1993, but fiscal constraints restricted the government from increasing non-whites' benefits levels to those previously obtained by white pensioners. Consequently, as shown in Figure 2.2, non-whites' benefits rose rapidly in real terms between the early 1970s and 1993 while that of whites fell and eventually equaled that of the former. This period is marked by the Social Assistance Act of 1992 that did away with all discriminatory provisions and provided steps towards pension parity, which was finally achieved in 1993, a year before South Africa's first democratic elections (Ranchhod, 2009).

The expansion of the program made it more likely for qualifying blacks to receive

the pension and in 1993, approximately 80% of black men and women above 65 and 60, respectively received the pension while the rest either earned above the qualifying income threshold and therefore could not qualify or were unable to access the system. At this time the maximum benefit of R370 (approximately 90 U.S dollars per month) was about twice the median income per capita in rural areas where majority of the blacks resided (Duflo, 2000).

Whereas the minimum pension age-eligibility had historically been at 60 years for women and 65 for men, a 2008 pension reform lowered, in steps, men's minimum pension age requirement from 65 to 60 years. During that transition period, the government extended pensions to men aged 63 and older in 2008, and later to men aged 61 and older in 2009. In 2010, it had equaled that of women at 60 (Ambler, 2015; Lombard and Kruger, 2009). The reform in eligibility age was a result of a South African High Court case in which four male applicants succeeded in their argument that the difference in pension age requirements between men and women discriminated against them unfairly on the ground of age and gender (Lombard and Kruger, 2009). As per the South African Social Assistance Amendment Act, no. 6 of 2008, which made provision for a phased-in change, pension age requirements were amended as follows: One was deemed pension age-eligible if (i) after 1 April 2008, one had attained the age of 63 years; (ii) after 1 April 2009, one had attained the age of 61 years; or (iii) after 1 April 2010, one had attained the age of 60 years[2].

2.2 Eligibility Requirements

The Old-Age Pension is a non-contributory pension which, at the time of this analysis, paid a maximum amount of R1410 per month (roughly $100 US).[3] In principle, the pension is subject to both means and assets tests and a qualifying individual

[2]Consequences of this reform are evident in Figure 3.3 and 3.4

[3]1 U.S dollar for 13.69 South African Rand as per September 8, 2015.

receives the maximum amount if within a certain income/assets threshold–the "disregard level"–and thereafter the pension amount is gradually reduced to zero as other income and assets increase. The means and assets tests apply to couples as if their joint income is equally divided between two single persons; however, non-spousal income and assets do not count.

However, McEwen et al. (2009) explains that in practice, only income is assessed due to difficulties with the valuation of assets. Additionally, it seems more likely that the means test is only used to determine whether one qualifies to receive the pension, and those who qualify tend to receive the maximum amount (Case and Deaton, 1998; Ranchhod, 2009; Ardington et al., 2009).[4] This is also evident in Figure 2.3, which plots the distribution of pension amount received in 2008, 2010, and 2012 using data from the National Income Dynamics Survey (NIDS).[5] As is visible in the Figure, the distribution of pension benefits seems to be concentrated at certain amount–around R900 in 2008, R1,100 in 2010, and R1,200 in 2012. These are approximately the maximum benefit amounts in the month and year of the survey.

Multiple members of the same household can receive pensions simultaneously; therefore, there are no direct incentives to change the composition of the household or to change non-spousal employment activities in order to be pension-eligible. Further, eligibility requirements do not stipulate that recipients are not allowed to work. In fact, Ranchhod (2009) finds that the majority of individuals who are age-eligible for the pension would probably continue to work and still be under the income eligibility threshold, as they are less educated and have low earning potential. It may therefore

[4]Using the 2000 Income and Expenditure Survey, Hamoudi and Thomas (2014) also find that although the amount of the benefits is designed to vary with the means of the recipient, the generosity of the means test made it that among those who reported any positive pension income, over 90% reported receiving the maximum allowable amount.

[5]NIDS is a nationally representative longitudinal data conducted by the South African Labor and Development Research Unit (SALDRU). It collects data on a wide range of indicators such as labor outcome, household composition, education and health, economic activities, welfare participation, and household expenditures, and uses the same sampling design as the GHS.

be desirable to continue working even when receiving the pension.

The South African Department of Social Welfare also stipulates that applicants have to be South African citizens, or permanent residents, who live in South Africa and are not cared for by any state institution such as a rehabilitation center, prison, or state old age home. One also needs to not be receiving any other government grant. It may take up to 3 months to process pension applications, but if approved, one gets paid from the application date. The pension is paid each month by cash at a designated location on a particular day (primarily due to limited access to the banking system in rural areas) or through electronic transfers into a bank or Postbank account if the recipient has a bank account, or through other institutions (e.g., old age homes). The pensioner continues to receive the pension for as long as s/he is alive and continues to satisfy the means test.

2.3 Data

Our data are taken from two sources: (1) South Africa's General Household Survey (herein referred to as GHS) and (2) National Income Dynamics Study (NIDS). The GHSs are general-purpose nationally representative household survey conducted annually by the statistics South Africa (Stats SA). It is a multi stage stratified sample, which interviews approximately 47,000-51,000 individuals spanning across all nine provinces of the country. The GHS master plan sample is drawn from the 1995 Census data. While it is representative of the country, persons in collective living quarters such as in student hostels, nursing homes, hospitals, prisons and military barracks are not surveyed; however, it does cover residents in workers' hostels. GHS began in 2002 as a replacement for the South Africa's October Household Survey (OHS) which had been conducted since 1993, but terminated in 1999 due to financial constraints. The introduction of GHS was meant to meet the subsequent need that was felt for a survey which collected data on the effect of government programs as well as the level

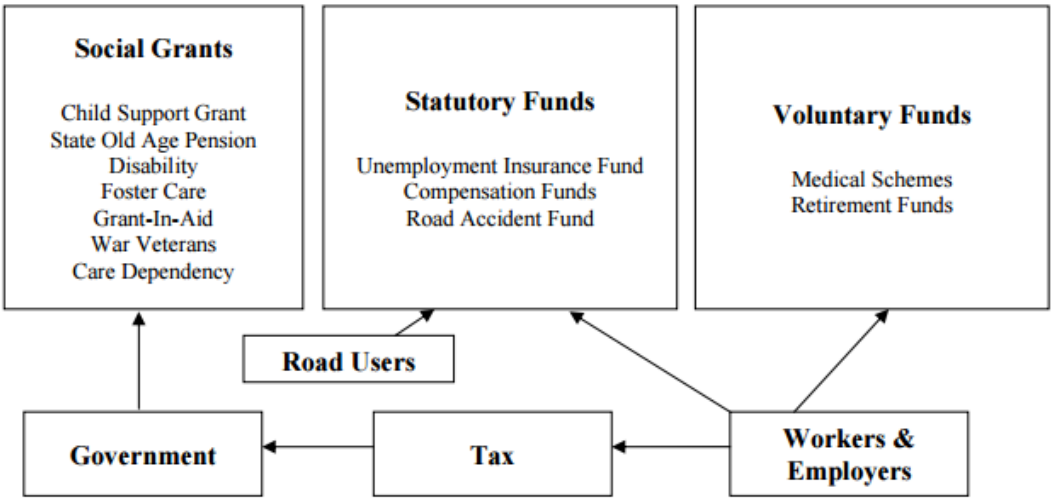
of development across the country (Eyal and Woolard, 2013).

We pool 7 cross sections (2006-2012) of the GHS data. Annual GHS are in two files namely: (1) person file, and (2) House file. The Person file contains standard demographic characteristics such as gender, marital status, age, race, education attainment, unemployment status, province of residence, access to social services, and health. Households characteristic data, such as household size, head of household, household expenditure, family composition, dwelling type, access to water and sanitation, access to services, transport, and household assets, and main source of income are contained in the House file. These different files are easily linked on the basis of a unique record identifier. The primary purpose of the survey is to measure the living circumstances of South African households.

NIDS is South Africa's first nationally representative panel data. The first wave was conducted in 2008 with a sample of about 28,000 individuals and 7,3000 households. The survey collects data on a wide range of indicators such as labor outcome, household composition, education and health, economic activities,welfare participation, and household expenditure. Information at the household level and individual level is collected through household questionnaires as well as an individual adult question are for all people aged 14 and over, as well as a child survey for children under 14. For household members not available for interviewing but residing at the household, a proxy questionnaires is administered. Attrition can occur if household members leave previous household. In this case, these individuals are allocated a new ID, and are followed to their location where the adult questionnaire is administered to them.

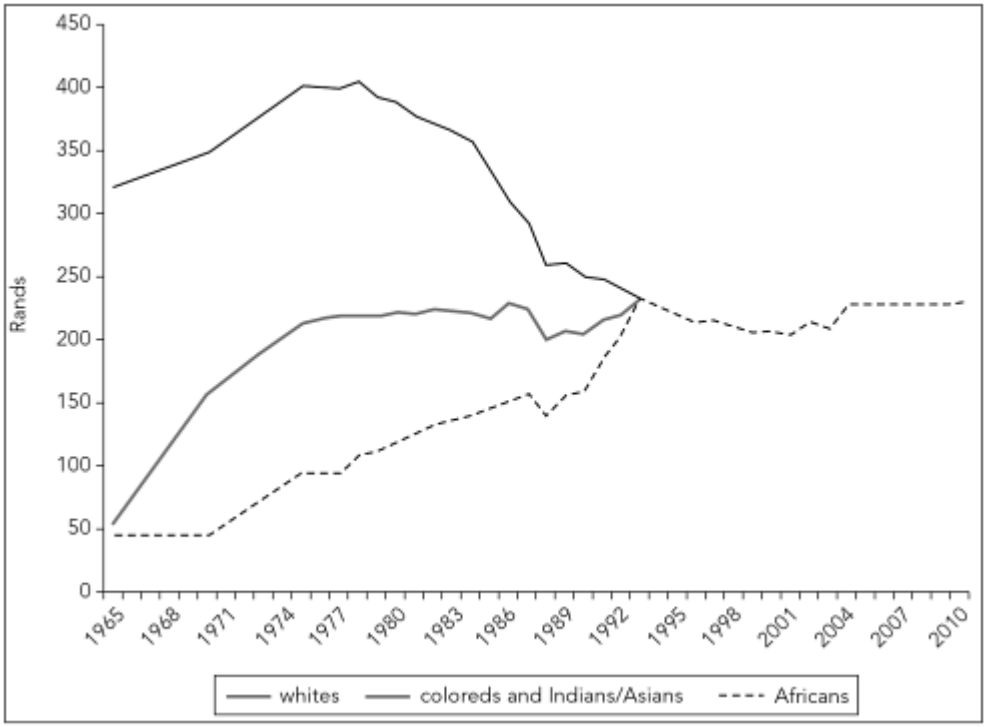
2.4 Figures

Figure 2.1: Social Security in South Africa



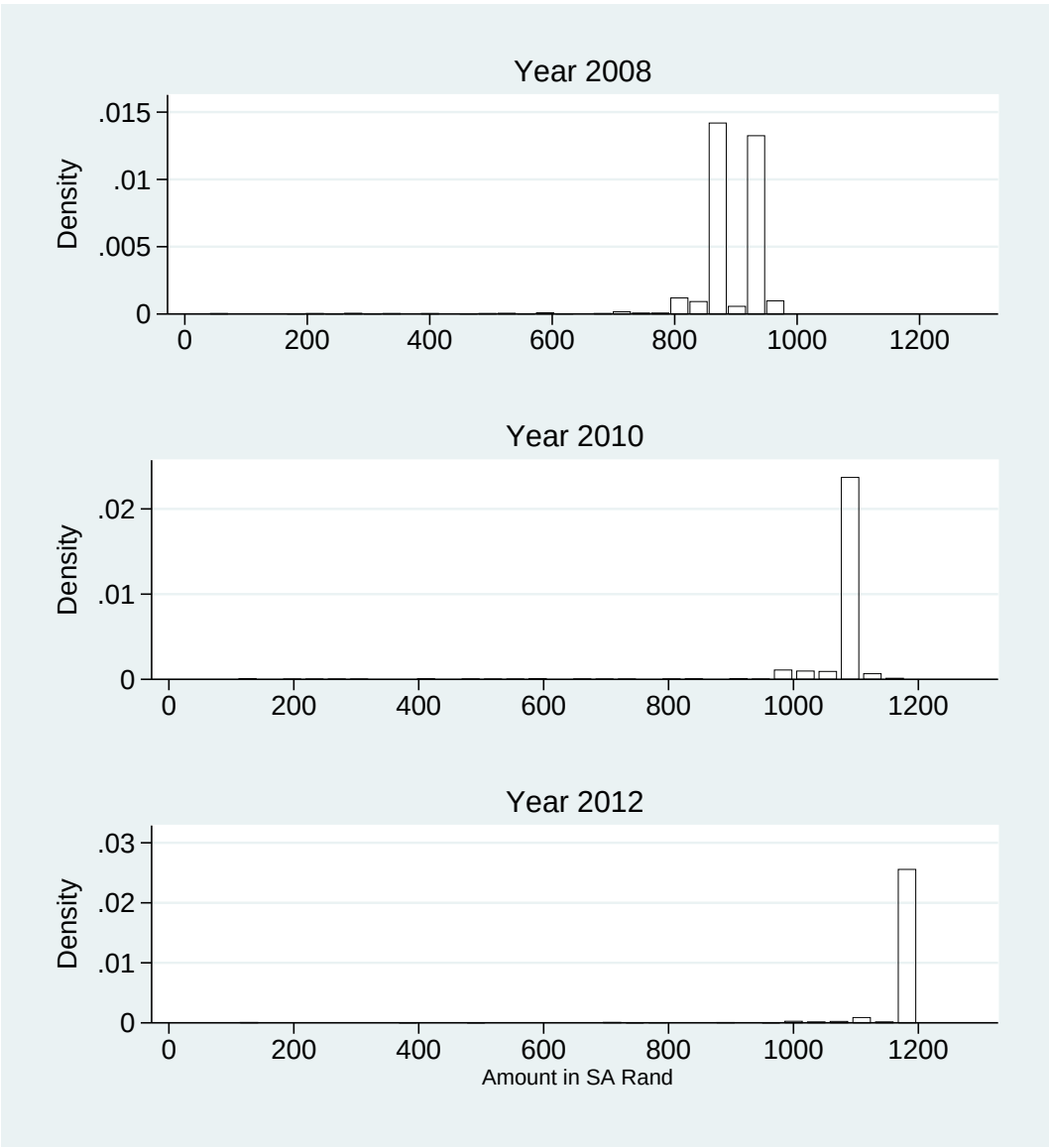
Source: Woolard et al. (2010)

Figure 2.2: Monthly Value of Pension Benefits, by Race 1960-2010



Source: Woolard et al. (2010).
Note: Data is expressed in 2010 prices using PPP$ exchange rate of 4.67 in 2010

Figure 2.3: Distribution of Monthly OAP Received (Amount in SA Rand)



These figures present the observed distribution of OAP amount received for individuals who report to be on OAP. Maximum benefits in 2008: Jan-April=R870, May-Oct=940, Oct-Dec=960. In 2010: Jan-April 1st=1010, April 1st-Dec=1080. In 2012: Jan-April 1st=1140, April 1st-Dec=1200. The distributions are derived using National Individuals Dynamics Survey (NIDS) for 2008, 2010, and 2010.

Chapter 3 Measuring the Impact of Old Age Pension on Retirement Decisions

3.1 Introduction

A race-based public pension plan was a vestige of colonial and apartheid South African governments. As steps were taken to make it more race neutral at the end of the apartheid era, it became clear that the pension was a very large positive wealth shock for low-wage black South Africans as compared to many others.[1] While this makes it more likely to alleviate poverty in this group, it is also more likely to distort labor supply. This paper investigates the latter.

Given that means-based social benefits are not randomly assigned, one of the challenges in the empirical literature is to obtain an exogenous variation to identify its behavioral impacts, and some of the studies that have attempted to study the impact of old age pensions on labor supply are based on cross-sectional variation. One limitation of this approach is that other factors such as previous income may be correlated with both pension receipt and labor supply decisions leading to biased estimates. Use of panel data could mitigate these issues; however, another potential solution is to exploit a natural experiment and study behavioral responses around the policy change. An advantage of this approach is that the policy reform generates some exogenous variation in eligibility. With a suitable control group, to control for common trends, we can isolate the behavioral impact of the eligibility reform. South Africa's Old Age Pension (OAP) system reforms in 2008 provide this natural

[1]While racial classifications are largely associated with South Africa's colonial and apartheid period, they are still in use in the country, particularly to monitor progress towards establishment of equality. Four discrete categories are commonly used: "whites" (people of European descent), "coloured" (mixed races), "Indians or Asians" (settlers from the Indian subcontinent) and "Africans" (people of African descent). In some cases, the distinction is only made between "white" and "black" South Africans where the latter includes "coloureds", "Indians or Asians" and "Africans" (Van Zyl, 2003). This paper refers to the four racial groups as used in our data set.

experiment and an opportunity to examine the impact of pension age-eligibility on labor force participation

Through the OAP, the South African government provides a monthly cash transfer to older individuals that is conditioned on age with a means test that is very generous to some income levels. This program is one of the most expansive cash programs not only in South Africa, but also in developing countries (Lam et al., 2006), and consequently there is substantial literature addressing its behavioral effects. The empirical work on this program, however, has generally used 1989-1993 data,[2] a period characterized by the expansion of the pension benefits to previously disadvantaged race groups (Legido-Quigley, 2003), and are based on cross-sectional variation for identification. To our knowledge, our study is the first to explore the variation in pension eligibility brought about by the South African OAP reform of 2008 to study the impact of pension eligibility on labor force participation of the recipients. The reform in question reduced men's minimum eligibility age from 65 to 60, thus extending coverage to previously uncovered men. We rely on a recent dataset from the General Household Survey (GHS), which begins 12 years after the apartheid era ended and when the pension's benefits were extended equally to all race groups.

The relevance of OAP to South Africans is underscored by, first, its high recipiency rate. Approximately two-thirds of older South Africans report receiving the pension grant (Woolard and Leibbrandt, 2013; Sienaert, 2008).[3] Second, the pension is generously high by world standards, such that it provides a cash transfer that is almost twice the median per capita African/black income (Ardington et al., 2009).[4]

[2]See (Duflo, 2000, 2003; Bertrand et al., 2003)

[3]The rate is higher among Africans/blacks, such that 9 out of every 10 age-eligible black South African men and women report that they receive the pension grant (Ambler, 2015). Approximately 4.1 million South Africans are 60 years and older (about 7.8% of the South African population (SSA, 2013)) and 2.7 million of them receive the pension.

[4]Woolard and Leibbrandt (2013) states that the monthly amount of 1080 South African Rand (R1080) corresponds to about 175% of median per capita monthly wage in South Africa. Møller and Ferreira (2003) show that the pension is a significant source of income in older households, such

Hamoudi and Thomas (2014) find that it also accounts for more than 85 percent of total household income in African/black households receiving the pension in urban areas, and in rural areas more than 25 percent of the African/black households receiving a pension report it as their only income. As such the pension has potential to influence behavioral changes in important ways.

To briefly review the results,we find that not surprisingly there is a sharp discontinuity in pension receipt at the eligibility age. We also find a strong and significant negative effect of pension age eligibility on labor force participation. Specifically, our preferred difference-in-difference (DD) and difference-in-difference-in-difference (DDD) estimator indicate that, at the median predicted wage, pension age eligibility reduces the likelihood of labor force participation in males by approximately 10.09 and 6.14 percentage points, respectively from a base of approximately 45 percent. Our findings compare well with the previous studies that also find older individuals choose to retire the higher the generosity of the pension program.

The rest of the paper proceeds as follows: Section 3.2 summarizes previous findings from South Africa and other countries, and section 3.3 describes the theoretical model and predicted effects, while sections 3.4 and 3.5 describe the data used and our empirical strategy, respectively. Section 3.6 discusses the results and finally section 3.7 concludes.

3.2 The Literature

There is substantial literature on social security benefits and their effect on labor force participation in developed countries. A part of these examines the effect of the age eligibility on labor retirement behaviors. Gruber and Wise (2004), for example, in a 12-country study (Belgium, Canada, Denmark, France, Germany, Italy, Japan,

that it is often the only source of income in these households, particularly those in rural areas.

Netherlands, Spain, Sweden, United Kingdom, and the United States) document a strong association between pension-eligibility and retirement behaviors, finding that government retirement plan reforms that delay benefits eligibility reduces retirement. Specifically, they find that reforms that delay eligibility age by 3 years reduce labor force non-participation of men aged 56-65 by between 23% and 36%. Hurd (1990) notes that a peak in the hazard rate of retirement at age 62, the earliest age of retirement, offers another piece of evidence in that the US Social Security has a significant effect on retirement behaviors, also adding that there "are no other institutional or economic reasons for the peak"; similar spikes in retirement at age 62 in 1960, when men were not allowed to draw benefits before age 65, are not observed (Burtless and Moffitt, 1984).[5]

However, despite these findings, these studies may offer relatively limited guidance for developing countries because they are different in a number of ways: income levels are much lower; credit constraints may be more stringent due to undeveloped financial markets; labor intensity is higher; life expectancy is lower; and the structure of household is one wherein the family is the primary care provider for the older population (Kaushal, 2014). Nonetheless, there is relatively less research on the impact of pensions on beneficiary's labor supply in developing countries. In the context of South Africa, for example, most older persons likely face a complex set of conditions as noted above, i.e., low income, credit constraints, family connections.

Many studies of South Africa's OAP focus on the outcomes of other household members and not on the pension recipients, primarily due to the prevalence of multigenerational households. These studies tend to focus on school attainment and child

[5]There are, however, other studies that offer other explanations for the observed early retirement in males. For instance, Costa (1998) discusses that since the downward trend in men's labor force participation was observed prior to the establishment of social security programs, it could have been a result of several factors, such as better social/economic conditions, leisure opportunities and economic development.

labor (Edmonds, 2006); children's nutrition (Duflo, 2003); household composition, resource allocation, decision making, and remittances (Hamoudi and Thomas, 2014; Case and Deaton, 1998; Ambler, 2015; Ranchhod, 2009); and labor supply of prime-age co-residents (Bertrand et al., 2003; Posel et al., 2006; Ardington et al., 2009).

However, for OAP, there is relatively less work on labor market behavior of the beneficiaries. We are aware of two recent studies that address this issue (Ranchhod, 2006; Lam et al., 2006). Both find that labor force participation rates fall sharply at the eligibility age. The latter of the two applies a regression discontinuity design and conservatively estimates that access to pension decreases the probability of labor force participation by 8.4 percentage points for African/black elderly men and 12.6 percentage points in African/black women.

Many Studies of South Africa's Old-Age pension focus on the outcomes of household members.[6] In regard to children living with the pensioners, (Edmonds, 2006) finds that pension eligibility enhances school attainment and significantly reduces child labor. Similarly, Duflo (2003) finds a positive impact on child nutrition, typically defined by some measure of height-for-age and weight-for-height. Specifically, she observes that girls living with pensioner-eligible females have substantial improvements in nutritional indicators, but does not have observable effects on boys nor any effect on a child's health when males receive the pension. Both studies provide evidence in support of intra-household resources transfer, and that control of household

[6]This could be because the majority of the elderly live in three-generation and skip-generation households (Case and Deaton, 1998). As low as 7% of pensioners live without at least one 19-50-year old and the fraction of children living with a pensioner has historically been high, especially among households whose per capita incomes are in the lower percentile (Sagner and Mtati, 1999).

resources plays a key role on how these resources are allocated.[7]

Other studies focus on household composition, resource allocation, decision making, and remittances[8] Ambler (2015) finds that women are more likely to be primary decision-makers in their households when they become pension eligible. She attributes this as evidence of a shift in bargaining power within the household due to the increase in women's personal income and the fraction of household income they control. There are a host of studies on labor force participation of prime-aged adults that reside with pensioners, but results are mixed. Bertrand et al. (2003) compares households that have an age-eligible household member to those that do not and finds a sharp decline in employment and labor supply responses by prime-age individuals residing in households containing pension-eligible individuals. These effects are larger when the pension is received by a woman rather than a man, but the labor supply effects is significantly stronger for prime-age males in households with female pensioners. The authors find larger effects on middle-aged men than younger men. They attribute these results to bargaining power within the households, in which dominant men with greater power in the household capture a larger share of the pension income than when the pensioners is a female.

However, in more recent work, evidence suggests that the negative labor supply response is strongly conditioned in how a household is defined. Posel et al. (2006) show that the negative effect of pension receipt on prime-aged labor force participation disappear when temporary migrant workers (absent household members) are considered in he definition of a household. In particular, they find that rural African/black

[7]Edmonds (2006) finds that pension benefits have a positive effect on children's education attainment and a significant reduction on child labor with a particularly strong effect when the pensioners is male. He interprets these findings as evidence of liquidity constraint, and thus the need for social assistance to overcome these constraints as well as in making human capital investments. In addition to providing proof of intra-household resources transfer, the results provide some convincing evidence that control of the household resources matters and plays a key role on how productively these recourses are reallocated.

[8]See (Ambler, 2015; Hamoudi and Thomas, 2014; Case and Deaton, 1998; Ranchhod, 2009).

women are significantly more likely to be migrant workers when a member of their household, especially a woman, is in receipt of a pension. Similarly, Ardington et al. (2009) examines households before and after a gain/loss of the pension and find an increase in employment among the prime-aged members when a household member receives the pension. They attribute there findings to the notion that the pension income received by women not only allows them to overcome credit constraints and allows the prime-aged individuals to migrate in search of work, but also allows the elderly to retire and provide childcare for female household members.

Studies of the effect of public pension eligibility on other developing countries have similar findings. For example, de Carvalho Filho (2008) exploits a 1991 Brazilian pension reform that reduced the minimum eligibility age for payment of benefits and increased the minimum benefits. While the beneficiaries are not subject to an earning test nor are required to retire, findings indicate a large negative response due to the policy intervention. A larger effect is observed among rural men, where the pension benefits decrease the probability of labor force participation by approximately 38 percent. Similarly, Kaushal (2014) examines the impact of India's National Old-Age Pension Scheme (NOAPS) on employment and well-being of the elderly poor population, but finds a modest effect on elderly employment. She explains that this modest result could partly be because the pension benefit under NOAPS is too small to encourage large scale retirement in order to attain or maintain eligibility.

3.3 Basic Model: Predicted Effects

For simplicity, one can think of the impact on labor supply within the framework of a static model, where an individual has well-behaved preferences over consumption goods (C) and leisure (L) and maximizes his utility, $U = u(L, C)$ subject to a budget constraint. An individual earns a constant wage, W, in the labor market if he chooses to work.

Figure 3.1 shows how the introduction of a pension shifts the budget constraint of an otherwise unpensioned individual. Consumption goods are on the vertical axis, hours worked on the horizontal axis (moving left to right). Without OAP, the budget constraint is ABJ with slope W and intercept B. AB is individual's non-labor income. With OAP, BC is the pension guarantee (i.e. the maximum amount given to those with zero income or those under the exempted income level). In principle, beyond D, the pension amount is gradually adjusted to zero as earned income increases, therefore creating the budget segment given by$ACDGJ$. In practice, however, the income test tends to apply in binary fashion, such that everyone who qualifies for the pension tends to receive the maximum amount (Case and Deaton, 1998; Ranchhod, 2009; Ardington et al., 2009). This creates the budget set given by $ACEGJ$.[9]

Because individuals typically view the trade-off between consumption of composite goods and leisure differently, indifference curves vary quite significantly, where those who attach a high value to leisure tend to work less relative to those that do not value leisure as highly. Thus, while we expect individuals to respond by reducing labor supply or exiting the labor force upon pension age-eligibility, these considerations suggest that the impact should vary by wage rate and interpersonal differences in "tastes for work". In addition, the impact of pension on labor supply also depends on which region of the budget constraint an individual was in before qualifying for the pension.

All else equal, we would not expect labor force non-participants to re-enter labor force once they become pensioned because they could have already done so in the absence of the pension–their consumption opportunities increase by the OAP amount BC and they relocate to C from B as in Figure 3.1. Those located on segment BG have two types of responses: they either reduce hours or withdraw from the labor

[9]Yelowitz (1995) examines a similar "notch" when analyzing the effect of Medicaid on labor supply and welfare participation among potential welfare participants in the United States.

force; however the change in labor supply depends on their initial location on BG, such that those closer to B are more likely to relocate to C (withdraw from labor force) while those close to G are less likely to withdraw but rather are more likely to reduce their hours.

Those located on segment GJ are not mechanically eligible. However, the notch created by the discrete drop in pension benefits (from E to G), makes segment GH non-favorable to a utility-maximizing individual, encouraging workers in segment GH to engage in pension participation while reducing their labor supply. Those located on segment HJ have sufficiently high earnings, and unlike those on GH, they are less likely to respond to the pension benefits, though it is possible someone on this segment would reduce hours enough to be eligible. Therefore, all else equal, we would expect: those furthest "southeast" in the budget constraint around BF to drop out of labor force; those furthest "northeast" near HJ to be unaffected and those between to reduce hours of work.

The effects of OAP on labor supply also depends on the wage rate of the individual. We illustrate this in Figure 3.2, where we graph consumption goods against hours worked for high wage earners (individuals with a steeper wage line) and low wage earners whose budget sets are given by $ACEGJ$ and $ACegj$, respectively. AB is non-labor income and BC is the pension "guarantee" as defined above. As shown in the figure, a high wage earner (low wage earner) continues to receive pension until s/he reaches the income threshold, point E (e), where s/he loses the pension. In the diagram, as drawn, it requires low wage earners to work up to $h2'$ before reaching the income threshold, and subsequently losing the pension compared to $h2$ for high wage earners ($h2' > h2$). This indicates that, all else equal, high wage earners are less likely to qualify for OAP benefits, and those that do qualify, are more likely to reach the income threshold faster and as a result lose the pension. For high wage the slope of the budget constraint line is more likely to be steeper than the indifference

curve at the zero hours corner implying that LFP is more likely for higher wage.

3.4 Data

We use the GHS data. While this data provides a large sample size, particularly important for the older demographic, one of its limitations is the lack of information in the number of hours worked. As a consequence, we focus on examining labor force participation. The sample consists of repeated cross-sections spanning 2006-2012 of individuals aged 56 through 68, around the pension eligibility ages.

3.4.1 Predicted Wage

As mentioned above, due to lack of work hours in our data, we cannot control for actual wages. However, we use the NIDS data, which consistently collect information on weekly hours and earned monthly income, to predict wages used in this analysis. Using the NIDS data we estimate:

$$\ln w_{i,t} = Z'_{i,t}\beta + \epsilon_{i,t} \tag{3.1}$$

where $w_{i,t}$ is hourly wage (earned monthly income divided by monthly hours) for individual i at year t; $Z_{i,t}$ is a vector of individual controls and ϵ_i is an error term. Using corresponding variables, we then use the coefficients obtained from equation (3.1) to predict hourly wages in GHS. [10]

3.4.2 Descriptive Statistics

As noted above, the pension reform reduced men's minimum age-eligibility from 65 to 63 in 2008, 63 to 61 in 2009, and finally from 61 to 60 in 2010 and beyond, while leaving

[10] Right-hand side variables include, race, education, age, age squared, province, gender, and marital status. Because identification of the predicted wage is an issue, we rely on predicted wage being a quadratic in age but Labor force participation depending on age dummies.

female's minimum age-eligibility requirement unchanged. Therefore, we present the summary statistics in Table 3.1 by age-groups. Overall, this is generally a poorly educated subsample; men are relatively more educated at all age-groups, averaging approximately 6 years of formal education versus 5 years for women. For both men and women, labor force participation declines with age, although men are more likely to participate in labor force at all ages.

Women are more likely to be widowed and to live alone than men. These differences in marital status between men and women is consistent with women's longer life expectancy, age differences between spouses with women tending to marry older men, as well as men's greater likelihood of remarrying once widowed (Cohen et al., 2006). The average household size is about 5 with a high likelihood of children, suggesting that older individuals continue to live in large households as earlier noted in Case and Deaton (1998).

3.4.3 Graphical Analysis

As a first step of our analysis, we plot some of the basic patterns in the data. In Figures 3.3 and 3.4, we plot pension receipt by age for 2006-2009, the period before the reform and the transition period, and for 2010-2012, the period after the reform.[11] For men, Figure 3.3 shows that the proportion of those receiving pensions has a substantial upward shift at the age of 60 and 65, as expected. The shifts in profile corresponds to the change in their minimum pension age requirement. For women, Figure 3.4 shows that the proportion of those receiving pension benefits follows a similar pattern in both periods with a clear upwards shift at 60 years of age, the age at which they attain the minimum age-eligibility requirement. Both figures imply a

[11] To identify grant recipients, the survey specifically asks "Does [anyone] receive a [grant]?" Those answering "Yes" are prompted to specify grant type from which we can observe individuals who are drawing old-age pension.

substantial take up of the OAP upon eligibility.

While we observe that the fraction of the sample receiving pension benefits increases from the eligibility age onwards and plateaus at approximately 90 percent for females and 80 percent for males, there are some individuals who report receiving pension benefits prior to the eligibility age. This is may be attributed to measurement error and misreporting of age to the authorities (Ambler, 2015). Nonetheless, the discontinuity at eligibility age is unmistakably clear for all years.

To provide some evidence on the effect of age-eligibility on labor force participation, we plot the fraction of individuals that report to be receiving the pension in panel A and those in the labor force in different time periods, by age in panel B of Figures 3.5 and 3.6. Note, however, that panel A in both figures is basically a repeat of Figures 3.3 and 3.4 but with "before" and "after" collapsed into one graph each. We use the same split for labor force participation in Panel B. In line with our hypothesis that eligibility generates an exogenous incentive to reduce work effort, the discontinuity in the labor force participation observed at the eligibility ages strongly suggests a correlation between age-eligibility and labor force withdrawal. Males' labor force participation rates are significantly higher than that of females. Their LFP follows a downward decline, but with a significant spike downwards at the eligibility age. For instance, we observe that the LFP declines steadily before age 59, but then drops by approximately 14 points (from about 52 to 38 percent) between ages 59 and 60, post reform. Thereafter it declines steadily until it reaches around 12 percent. For women aged 55-59, the labor force participation rates declines steadily from around 40 to 30 percent, then dropping by over 10 percentage points at the eligibility age, and thereafter it declines steadily until it reaches around 10 percent.

Importantly, we observe a substantial drop in labor force participation at the minimum eligibility age. Figures 3.5 (Panel B), estimates this drop in labor force participation as approximately 10 percentage points for males aged 59-60 after the

pension reform and for 64-65 before the pension reform. The effect on women is of approximately the same magnitude for 59-60 in both periods, as shown in Figures 3.6 (Panel B). We, however, note that these effects are not as big as the increase in the take up of the OAP. This is likely due to the fact that many in this age group were out of the LFP prior to OAP eligibility because of, for example, receipt of a disability grant. Once these individuals reach 60 years they are eligible for the OAP, and since they do not work they are reflected in the OAP receipt (Panel A) but not on the drop in labor force participation (Panel B). One can also think of a situation wherein individuals did not previously participate in the labor force, but were not pension age eligible as well. Upon reaching the eligibility age and participating in pension, they are likely to impact the pension trend, but not the a labor force participation trend. Also, another possible explanation is that some individuals who take up the OAP may only reduce their work hours when they start receiving the pension instead of dropping from the labor force entirely. As such they would only be reflected in Panel A, but not in Panel B.

3.5 Empirical Strategy

3.5.1 Basic Estimation strategy

Because the reform directly affects only men of a specific age and not others, the impact of the reform on labor force participation can be identified by comparing changes in the labor force participation of the affected men (i.e., men aged 60-64 years who become pension age-eligible as a result of the lowered age-eligibility requirement) with those not "directly" affected by the the reform (i.e., those aged 56-59 & 65-68 years), over time relative to when the reform was introduced. If subscripts T, C, PRE, and $POST$ denote the treated age-group, the control age-group, before, and after the reform respectively, then equation 3.2 gives the change in labor force

participation by treatment group.[12]

$$\Delta LFP_T = LFP_{T,Post} - LFP_{T,Pre}$$
$$\Delta LFP_C = LFP_{C,Post} - LFP_{C,Pre} \tag{3.2}$$

The difference between the two then gives us the estimated impact of pension age-eligibility on labor force participation. This is basic the difference-in-difference (DD) approach.

$$DD = \Delta LFP_T - \Delta LFP_C. \tag{3.3}$$

We recognize that there may be some underlying trends in labor force participation or economic shocks common to all workers, including women, that affect labor market outcomes. We therefore address this by then subtracting from the above DD a similar statistic for women, thus obtaining a difference-in-difference-in-difference (DDD) estimator. The idea is to use the trend for the women's labor force participation as a counterfactual to the reform for men, and therefore difference away any relative trend between the two that has nothing to do with the policy or are due to country-specific changes in economy that affect everyone's labor force participation. While we use the same notation (T, C) for the women, we emphasize that their "age-eligibility", unlike the men's, does not change.

$$DDD = DD_{Male} - DD_{Female} = \Delta LFP_{Male} - \Delta LFP_{Female} \tag{3.4}$$

An alternative approach would be to use pension receipt itself as driving labor supply changes. Unfortunately pension take-up conditional on age-eligibility is endogenous, but the eligibility age is not because it is imposed by the government and therefore exogenous to individual outcomes. For this reason, we eliminate this bias and

[12] For expositional ease we estimate this using a restricted subsample that excludes 2009. Restricting the pre-reform period to 2006-2008 and the post-reform period to 2010-2012 seems more appropriate in order to have a clear-cut before and after period.

the problem of unobserved heterogeneity by using age-eligibility rather than actual pension receipt. The age-eligibility variable is closely correlated with actual pension receipt and we recognize that our coefficient of interest yields the intention-to-treat (ITT) effect which we expect to be smaller than the average treatment effect (ATE) because primarily not all age-eligible individuals choose/are granted access to the pension.

Given that individuals closer to the age eligibility threshold are more likely to behave differently from those further away and therefore confound our results, it seems reasonable to focus the analysis on a close range of age-groups. We therefore start by comparing the estimates of the just-made-eligible (treated group between 60 and 61) with the soon-to-be-eligible (untreated group between 58 and 59 years). Table 3.2 presents our results from the labor force participation means. In each panel, the second column contains mean labor force participation rates before the reform; the third column contains rates after the reform; and the forth contains the difference between the two periods. The difference-in-difference estimates of labor force participation is in bold. Panel A compares the change in labor force participation for males. There was a 11.5 percentage points (from 46.7 percent to 35.2 percent) fall in labor force participation rate for the 60-61 year olds (treated age group) over the two periods, compared to a 1.3 percentage points (from 58.6 percent to 59.9 percent) increase for the 58-59 year olds (untreated age group). This corresponds to a (statistically significant) 12.8 percentage points (-11.5 percentage points to +1.3 percentage points) relative fall in labor force participation of 60-61 year olds after the the reform. This is the difference-in-difference estimate of the reform.

However, if there was a common labor market shock to both genders over this period, these estimates will not identify the effect of the law. We examine this in panel B by performing the same exercise for females. We find a fall in labor force participation for the 60-61 year olds, relative to the 58-59 year olds of 1.7 percentage

points, though not statistically significant. Taken together, these figures imply a DDD estimate (difference between panel A and B) of 11.1 percentage points fall in labor force participation due to age-eligibility.

As part of sensitivity analysis, we further analyze how the labor force participation means of 63-64 year olds (these are also among the just-made-eligible) compare with those that are not directly "affected" by the reform (individuals between 65 and 66 years, who would have been age-eligible regardless of the reform). Results are illustrated in Table 3.3. The estimates show a statistically significant 6.4 percentage points decrease in labor force participation for the 63-64 year old males relative to their 65-66 year old males, before and after the reform. The same statistics for the women was only 2.3 percentage points (not significant). Therefore, the difference-in-difference-in-difference estimates show a statistically significant 8.7 percentage points fall in labor force participation, a little smaller in magnitude relative to the estimates in Table 3.2 for the younger group. So far, the evidence from the DD and DDD estimates provides some preliminary evidence supporting the hypothesis that labor force participation responds to pension age-eligibility. Below we formalize these in a regression framework.

3.5.2 Statistical Model

Because the groups differ in demographic characteristics and the observed results may reflect the underlying differences, we extend this framework in a regression setting in the remainder of this section to account for these variations. In addition, these demographic controls help to produce more efficient estimates.

We first estimate a DD model of the form:

$$Y_{i,t} = X'_{i,t}\beta_1 + \alpha ELIG(Age, Year)_{i,t} + \beta_2 AGE_{i,t} + \beta_3 YEAR_t + \epsilon_{i,t} \tag{3.5}$$

where i and t represents individual and year, respectively, and $Y_{i,t}$ is an indicator

variable that is equal to 1 if individual i at year t is in the labor force. The vector X_i is a set of individual and household controls which includes education, predicted wage, race, marital status, health status, urban residence, household size, number of children, province of residence, and material used for the walls and roof (as a proxy for social economic status); $ELIG_{i,t}$ equals 1 if an individual is pension age-eligible, otherwise zero; $AGE_{i,t}$ are age dummies to capture age trends while $YEAR_{i,t}$ are year dummies and controls for secular trend. See Table 3.4 for the description of the variables used in the regression. The coefficient α identifies the impact of attaining pension age-eligibility on individual i at time t: we expect it to be negative if pension age-eligibility decreases the likelihood of labor force participation, even after controlling for the other observable characteristics.

We introduce a hypothetical age-eligibility variable for women and extend equation 3.5 to a difference-in-difference-in-difference (DDD) specification by including women. This model specification is given by:

$$\begin{aligned} Y_{i,t} =& X'_{i,t}\beta_1 + \alpha_1[ELIG_{i,t} * MALE_i] + \alpha_2 ELIG_{i,t} + \\ &+ \alpha_3[YEAR_t * MALE_i] + \alpha_4[AGE_{i,t} * MALE_i] + \\ &+ \alpha_5 MALE_i + \beta_2 AGE_{i,t} + \beta_3 YEAR_t + \epsilon_{i,t} \end{aligned} \tag{3.6}$$

where the variable $MALE_i$ equals to 1 for males, otherwise zero. The key variable of interest is the $ELIG_{i,t}$ x $MALE_i$ interaction which captures DDD estimate of the effect on LFP.

The identifying assumptions that we make are (1) there are no contemporaneous shocks to the relative labor force participation of the treated and control groups during the reform period, other than the change in pension eligibility age for men. But, while we note that the existence of other factors during the period is possible, there is no reason to think that they would have the observed effects exactly at the gender-specific pension-age threshold; and (2) in the absence of the pension reform, changes in labor force participation of the treated age group and control age group

would have been the same, conditional on observables–'common trends' assumption.

3.6 Empirical Results

3.6.1 Main Results

Table 3.5 presents the marginal effects from the logit estimation of the DD estimator in equation 3.5. In column (1), the estimation includes only age and year dummies, and not any other individual or household level controls. As discussed previously, the impact of OAP should get smaller as the wages rises. To assess this we include Age-eligbility x Predicted wage interaction along with the individual controls in Column (2); and in column (3), we further add household controls as noted in the the previous section. Column (1) shows that pension age-eligibility decreases the probability of labor force participation by 10.97 percentage points, which is significant at 1 percent. Additional controls in Columns (2) and (3) do not change the estimate by much; the coefficient on age-eligibility is estimated at -10.38 and -10.39 percentage points, respectively. These coefficients remain statistically significant at 1 percent.[13] Importantly, as predicted in section (4), our results indicate that the observed negative effect of pension age-eligibility decreases with wage, such that, pension age-eligibility is less likely to discourage high wage workers from the labor force.

Table 3.6 reports the difference-in-difference-in-difference estimates from equation 3.6 above. In column (1), we observe that the coefficient on age-eligibility is significantly negative, and the coefficient on male is positively significant. The interaction, Age-eligbility x Male, which captures the impact of pension age-eligibility for men relative to women, is negative and statistically significant at the 1 percent level. Our results show that pension age-eligibility, on average, reduces the probability of

[13]The median predicted wage for the age group in this analysis is (R10) per hour while the mean is R17 per hour.

labor force participation in men by 7.02 percentage points. Columns (2) and (3) adds control for individual, household, predicted wage, and age-eligbility x predicted wage interaction. Focusing on Column (3), we observe that the sum of age-eligibility x male and age-eligibility x predicted wage x male, which captures the difference-in-difference-in-difference impact of pension age-eligibility controlling for predicted wage is 6.14 when computed at the median predicted wage.

3.7 Caveats

A property of the above regression specification (equation 3.5) is that it imposes restrictions that pension age-eligibility has the same effect in each age and year. We relax this assumption by allowing the effects to vary by age and year. Overall, this findings support our basic results.

One concern with our identification is that whereas the system is universal, take-up rate is not completely conditional on age-eligibility; some do not qualify by virtue of having significantly high income, and we suspect that others may select not to participate regardless of their qualification. We also note that the fraction of those that report as receiving the pension increases with age even beyond the eligibility age, which may suggest that either some individuals choose not to participate right away or they simply qualify later on. Lastly, while age discontinuity in pension receipt is unmistakable, we observe that some age-ineligible individuals find ways to receive the pension.

One would also be concerned with the possibility of "age-heaping": rounding up ages to end in 5 or 0 and thus creating a problem with our identification strategy, which relies on age for identification. We plot the age profiles for men and women, and while the distribution is not smooth, we do not find evidence to support the idea that this may be an issue.

We also note that our inference relies on the assumption that there is no po-

tential for anticipatory effect of individuals close to the pension-eligibility age. If this group is able to smooth consumption by borrowing against potential future income or consuming current assets, then labor supply effect may be potentially underestimated because individuals may reduce their labor supply in anticipation of their future pension benefits. However, if the individuals are credit-constrained or discount their future pension benefits heavily, we would expect to observe changes in their labor supply only upon actual receipt of the benefits. In the context of South Africa, Edmonds (2006) points out that the majority of the older population is credit-constrained; therefore we expect the impact of consumption smoothing in this paper to be limited.[14] However, to the extent that consumption smoothing occurs, our estimates will be biased downwards.

3.8 Conclusion

The reform in South Africa's Old-Age Pension system in 2008 provides a unique opportunity to identify the effect of a non-contributory old age pension on labor force participation. In particular, the South African OAP reforms reduced, in steps, the minimum pension eligibility age for men from 65 to 60. The modification provided us with a natural experiment and an opportunity to evaluate potential effects of such a large cash transfer on the basis of a policy intervention rather than relying on cross-individual variation in eligibility/pension receipt, which is likely to be biased by unobserved characteristics. We use a difference-in-difference and difference-in-difference-in-difference specification to exploit this reform.

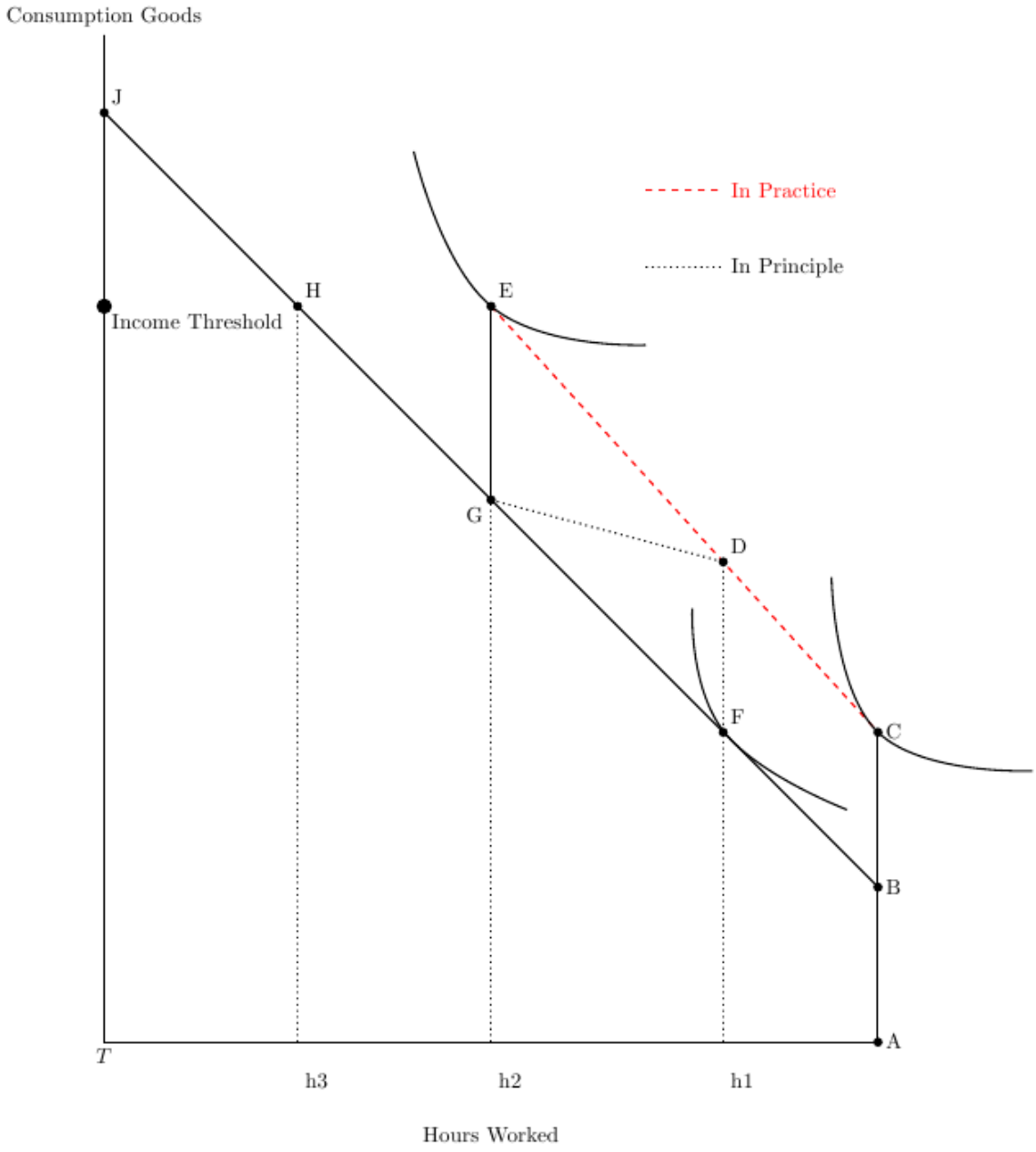
We observe that pension eligibility is conditional almost exclusively on age, with the fraction of men and women that report to be receiving the pension increasing dramatically at the eligibility age. While pension eligibility does not stipulate that the

[14]Lund (1993) finds no descriptive evidence of individuals borrowing in advance of their eligibility status.

recipients should not work, we also find that age-eligibility appears to have a strong negative impact on labor force participation. Using the median predicted wage, our preferred DDD estimator estimates an approximately 6.14 percentage points fall in labor force participation among the pension-eligible male. We observe that the OAP creates incentives for workers to withdraw from the labor force and that the pension reform made it even easier for younger working males to withdraw from labor force. Thus, while poverty reduction is the primary objective, and while similar pension programs may be attractive to poor countries who face similar social problems, countries should take into account its impact on labor force participation.

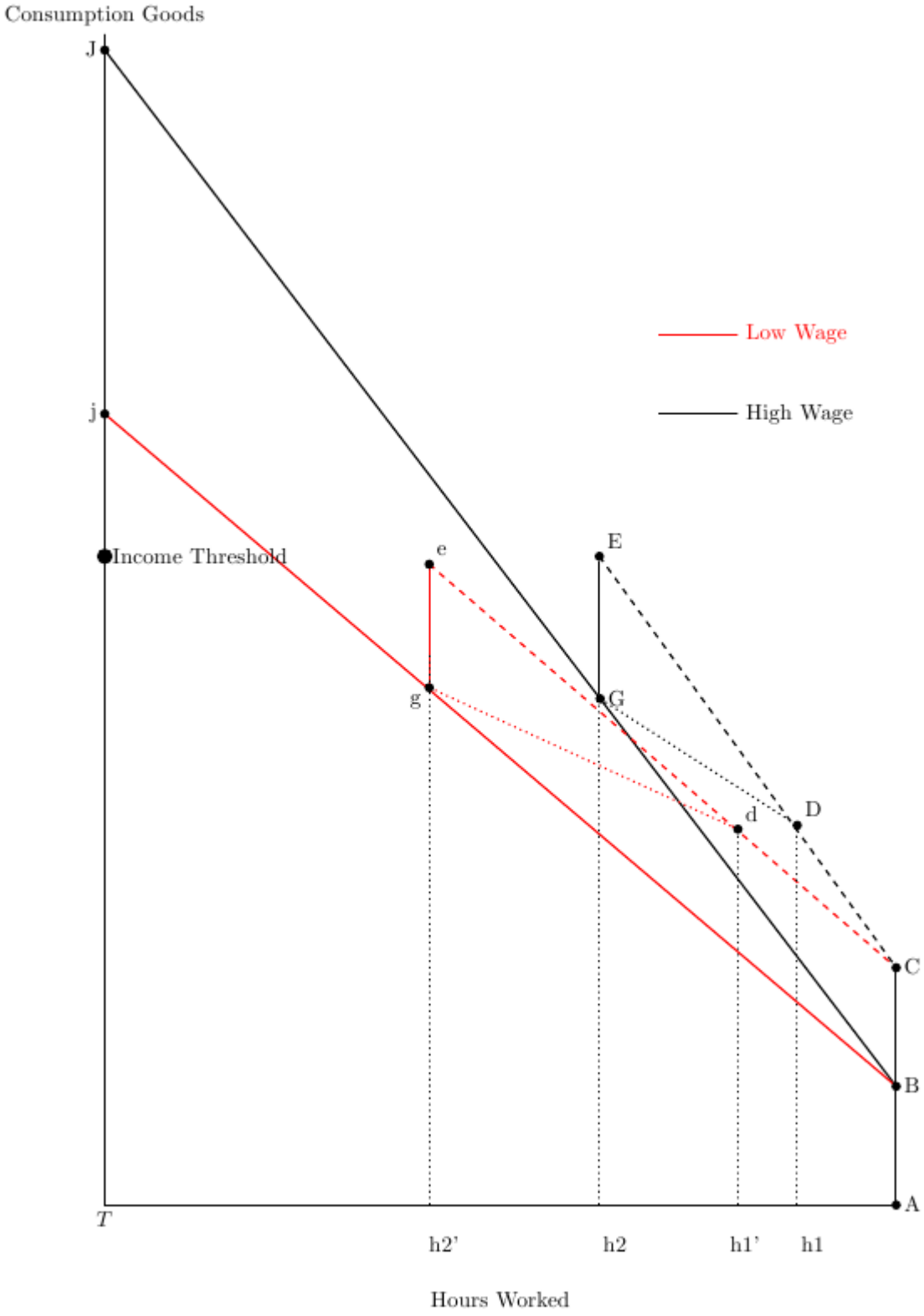
3.9 Figures

Figure 3.1: Stylized Budget Constraint



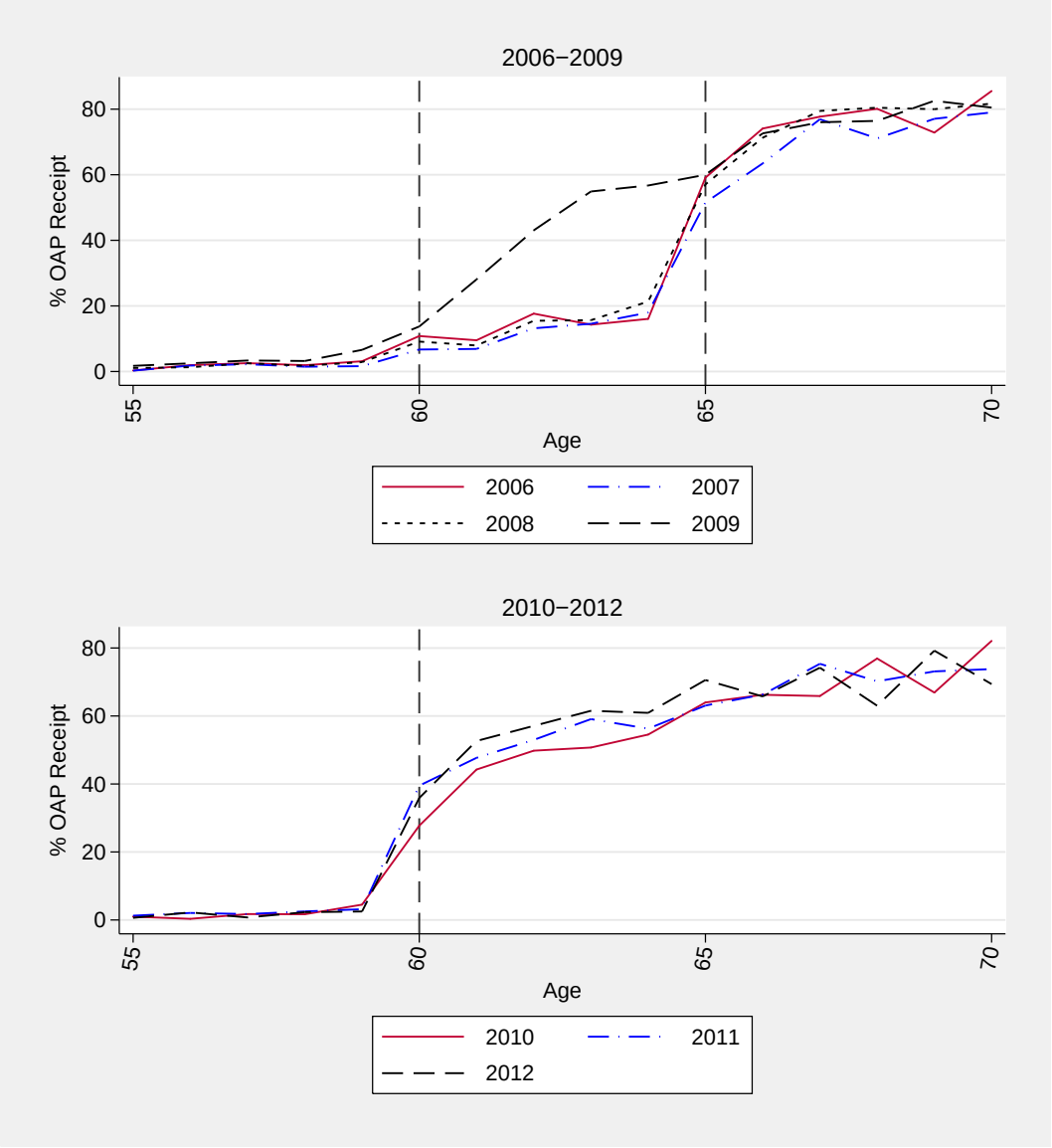
Note: Hours of work increase as you move left to right (A to T)

Figure 3.2: Stylized Budget Constraint: Low Versus High Wage



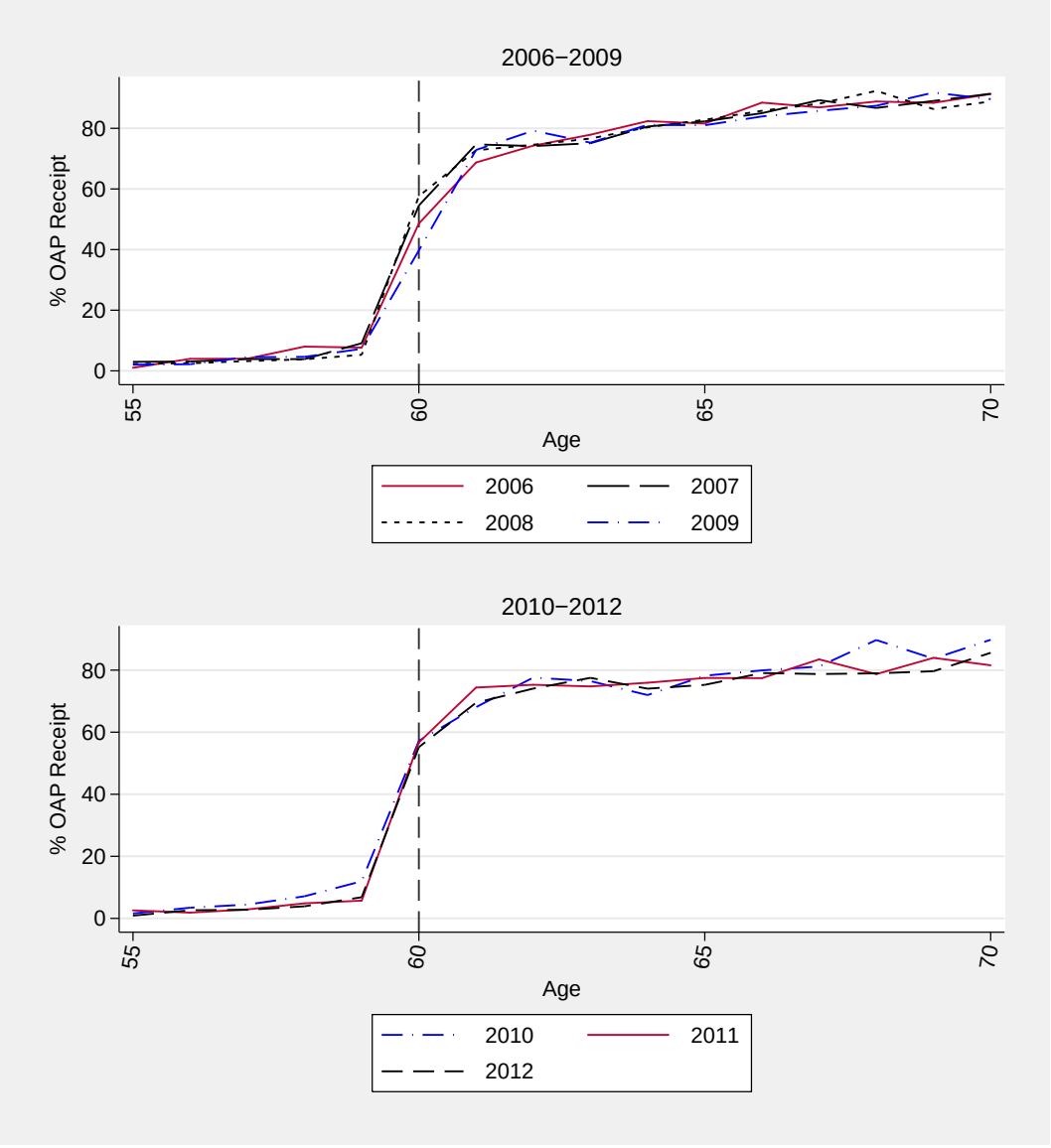
Note: Hours of work increase as you move left to right (A to T)

Figure 3.3: Males' Pension Receipt by Age in 2006-2012



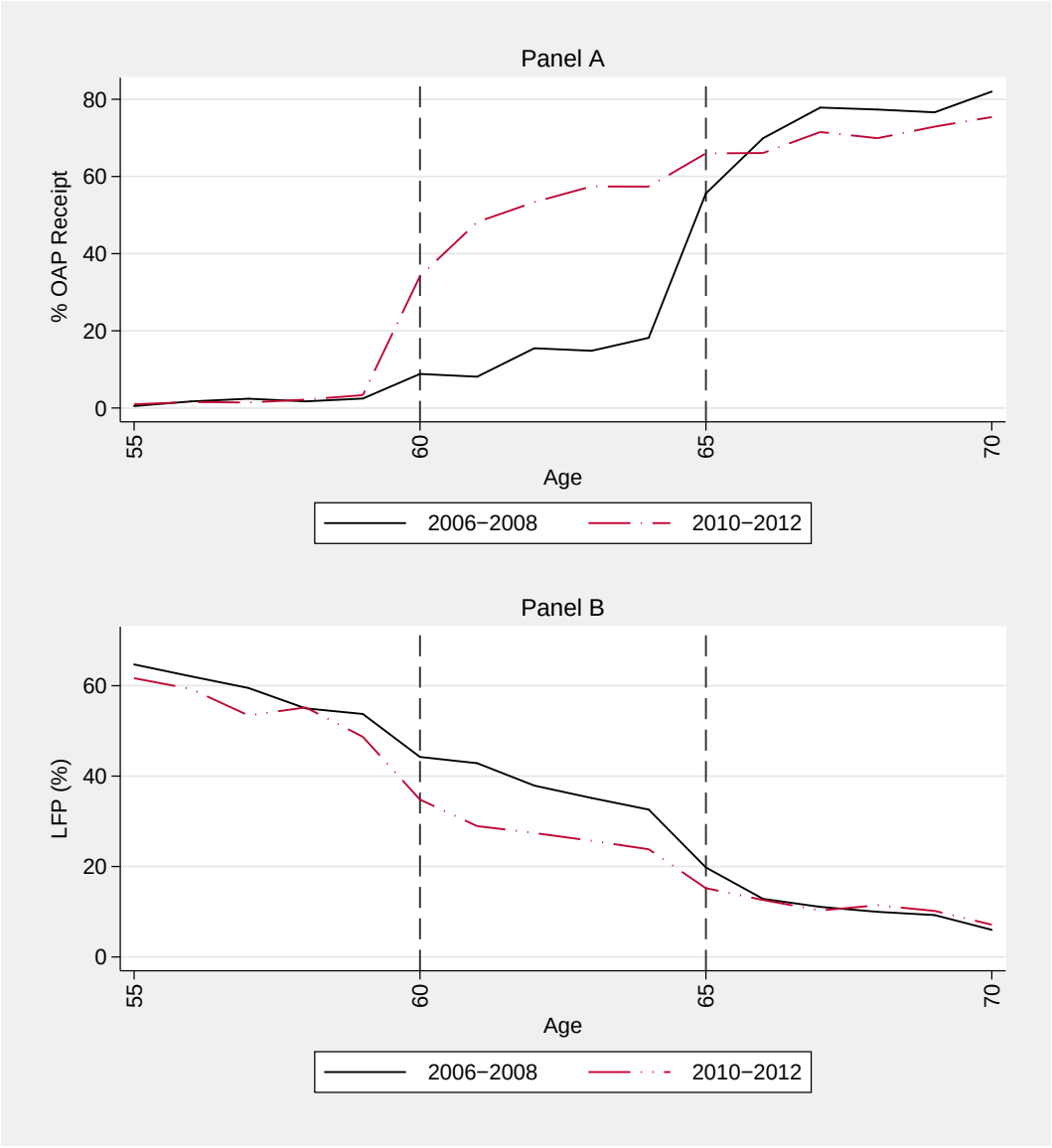
These panels present changes in the fraction of males that report to be on OAP by age. The top panel presents the change before the policy reform (2006-2008) and the transition year (2009). The bottom panel presents the change after the reform (2010-2012). Figures are compiled using the 2006-2012 GHS data.

Figure 3.4: Females' Pension Receipt by Age in 2006-2012



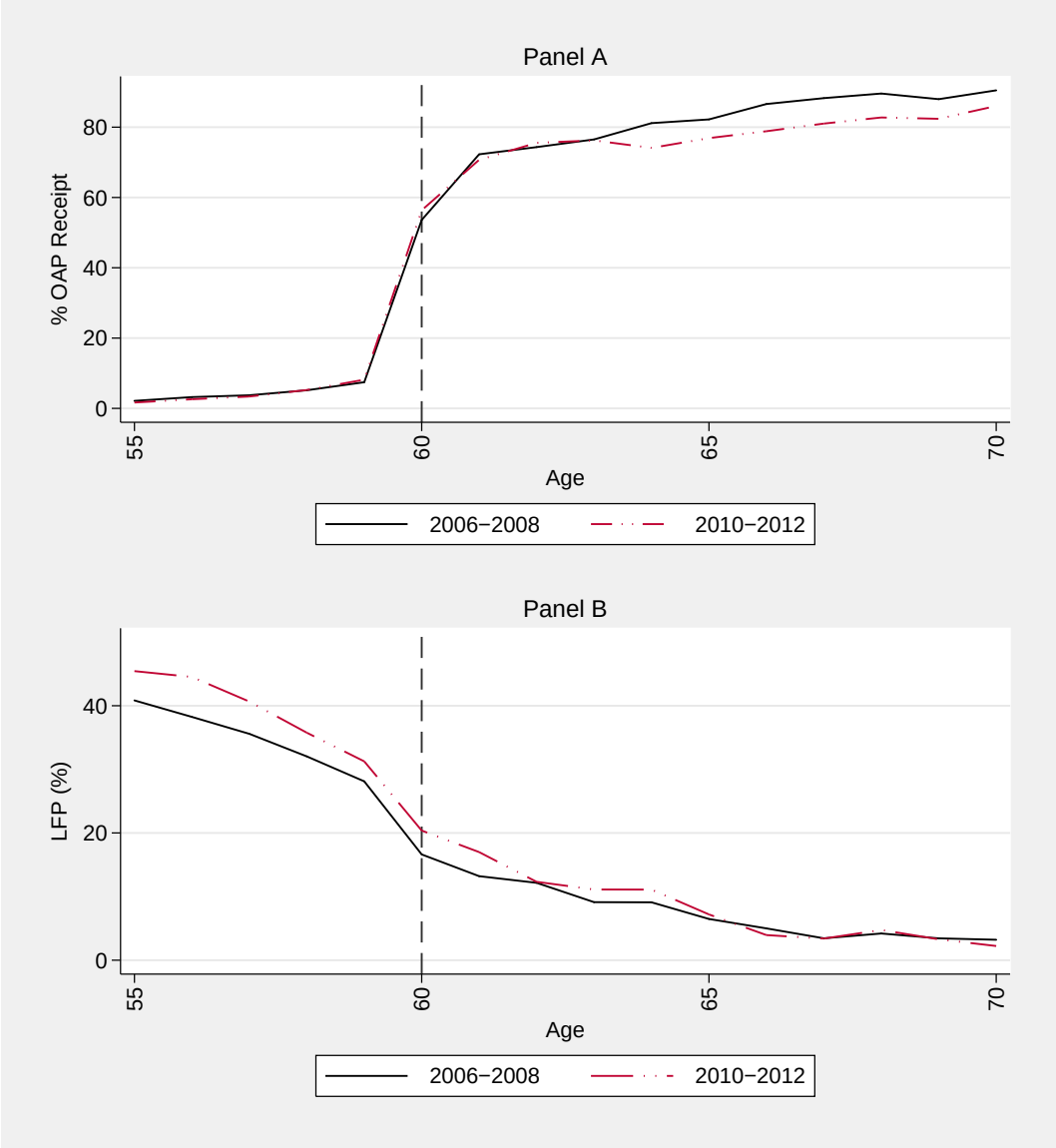
These panels present changes in the fraction of females that report to be on OAP by age. The top panel presents the change before the policy reform (2006-2008) and the transition year (2009). The bottom panel presents the change after the reform (2010-2012). Figures are compiled using the 2006-2012 GHS data.

Figure 3.5: Males' Pension Receipt & Labor Force Participation by Age



Notes: These panels present change in the fraction of males who report to be on pension (Panel A) and labor force participation (panel B) by age, before and after the pension reform. We collapse years before the reform into one graph and years after the reform into another graph. The transition year is omitted. Figures compiled using the 2006-2012 GHS data.

Figure 3.6: Females' Pension Receipt & Labor Force Participation



Notes: These panels present change in the fraction of females who report to be on pension (Panel A) and labor force participation (panel B) by age, before and after the pension reform. We collapse years before the reform into one graph and years after the reform into another graph. The transition year is omitted. Figures compiled using the 2006-2012 GHS data.

3.10 Tables

Table 3.1: Descriptive Statistics

	Males			Females		
Variable	56-59	60-64	65-68	56-59	60-64	65-68
Labor Force Participation	0.64	0.36	0.14	0.40	0.15	0.05
Single (never married)	0.11	0.09	0.07	0.19	0.15	0.13
Married	0.76	0.76	0.76	0.44	0.41	0.34
Divorced/widowed	0.12	0.15	0.16	0.37	0.44	0.53
African/black	0.69	0.68	0.67	0.73	0.72	0.73
Coloured	0.14	0.14	0.14	0.14	0.13	0.11
Asian/Indian	0.03	0.04	0.04	0.03	0.03	0.02
White	0.14	0.15	0.16	0.10	0.12	0.13
Urban	0.48	0.46	0.43	0.44	0.41	0.38
Education	6.67	6.22	5.72	5.99	5.46	4.84
Household size	4.63	4.55	4.45	4.67	4.55	4.45
No. of children	1.42	1.39	1.35	1.58	1.58	1.58
N	7442	7300	4788	9976	10840	6922

Notes: This table summarizes characteristics of the individuals aged 56-68. Data are from survey years 2006-2012 of the General Household Survey (GHS).

Table 3.2: DD and DDD Estimates: Labor Force Participation (Age 58-61)

	Before Reform (2006-2008) (1)	After Reform (2010-2012) (2)	Time Difference (3)
Panel A: Males			
Ages 60-61	0.467	0.352	-0.115
	(0.014)	(0.010)	(0.017)
	[1173]	[1211]	
Ages 58-59	0.586	0.599	0.013
	(0.016)	(0.017)	(0.023)
	[1381]	[1317]	
Difference at a point in time	-0.119	-0.247	
	(0.021)	(0.020)	
DD		**-0.128**	
		(0.029)	
Panel B: Females			
Ages 60-61	0.162	0.200	0.038
	(0.004)	(0.005)	(0.006)
	[1916]	[1970]	
Ages 58-59	0.317	0.372	0.055
	(0.007)	(0.009)	(0.011)
	[1950]	[1921]	
Difference at a point in time	-0.155	0.172	
	(0.008)	(0.010)	
DD		**-0.017**	
		(0.013)	
DDD		**-0.111**	
		(0.032)	

Notes: Data are form Survey years 2006-2008 and 2010-2012 of GHS. We exclude year 2009, the transition period, in order to have a clear before and after estimation. The sample contains men and women between the ages of 58 and 61. Cells contain mean labor force participation rates for men in Panel (A) and women in Panel (B) by age groups as identified on the left axis. Standard errors are given in parenthesis while sample sizes are given in square brackets. Column (1) presents mean labor force participation before the policy reform and column (2) after the policy reform. Difference-in-difference-in-difference (DDD) is the difference-in-difference in panel (A) minus that in panel (B).

Table 3.3: DD and DDD Estimates: Labor Force Participation (Age 63-66)

	Before Reform (2006-2008) (1)	After Reform (2010-2012) (2)	Time Difference (3)
Panel A: Males			
Ages 63-64	0.352	0.272	-0.080
	(0.011)	(0.008)	(0.014)
	[1088]	[1086]	
Ages 65-66	0.167	0.151	-0.016
	(0.005)	(0.005)	(0.007)
	[1141]	[960]	
Difference at a point in time	0.185	0.121	
	(0.012)	(0.009)	
DD		**-0.064**	
		(0.016)	
Panel B: Females			
Ages 63-64	0.095	0.116	0.021
	(0.002)	(0.003)	(0.004)
	[1625]	[1607]	
Ages 65-66	0.062	0.060	-0.002
	(0.002)	(0.002)	(0.003)
	[1681]	[1368]	
Difference at a point in time	0.033	0.056	
	(0.003)	(0.004)	
DD		**0.023**	
		(0.005)	
DDD		**-0.087**	
		(0.017)	

Notes: Data are form Survey years 2006-2008 and 2010-2012 of GHS. We exclude year 2009, the transition period, in order to have a clear before and after estimation. The sample contains men and women between the ages of 63 and 66. Cells contain mean labor force participation rates for men in Panel (A) and women in Panel (B) by age groups as identified on the left axis. Standard errors are given in parenthesis while sample sizes are given in square brackets. Column (1) presents mean labor force participation before the policy reform and column (2) after the policy reform. Difference-in-difference-in-difference (DDD) is the difference-in-difference in panel (A) minus that in panel (B).

Table 3.4: Variables Used in Regressions

Variable	Definition
Age-eligibility	Age-eligibility is defined by age and year. For male it is equals to 1 if: (i) at least 65 years in 2006-2008, (ii) at least 61 years old in 2009, or (iii) at least 60 years old in 2010-2012, otherwise zero. For female, the hypothetical age eligibility follows the same conditions in the analysis, however, in practice it is set at 60 and does not change.
Education	Dummy variables for each level of formal education attainment.
Racial classifications	Dummy variables for race as defined in the General Household Survey (GHS): African/black, white, Indian/Asian and coloured. White is the omitted.
Marital status	Dummy variables for singles (never married), married, divorced/widow. Married is the omitted.
Urban residence	Dummy variables for urban or rural residents. Rural is the omitted.
Number of children	Residents that are under 18 years.
Province of residence	Dummy variables for all the 9 provinces.
Year	Dummy variable for year of survey (2006-2012).
Age	Dummy variables for each year (56-68 years).
Walls and roofs	Dummy variables for the material used for the roofs and walls: bricks or cement, corrugated iron/zinc, mixture of mud and cement, wood or plastic or cardboard, thatching or wattle and daub, and asbestos.
Predicted wage	Estimated using NIDS data.

Table 3.5: Estimated DD Effects of Pension Age-Eligibility on Labor Force Participation

Specification:	(1)	(2)	(3)
Age Eligibility	-0.1097***	-0.1038***	-0.1039***
	(0.0164)	(0.0203)	(0.0203)
Predicted Wage		0.0012*	0.0012*
		(0.0007)	(0.0007)
Age Eligibility x Predicted Wage		0.0002	0.0003
		(0.0005)	(0.0005)
Spouse (Age Eligibility)		-0.1338***	-0.1383***
		(0.0226)	(0.0228)
Spouse(Predicted Wage)		0.0013**	0.0010
		(0.0006)	(0.0006)
Spouse (Age Eligibility x Predicted Wage)		0.0008	0.0009
		(0.0007)	(0.0007)
Education (Yrs)		0.0110***	0.0105***
		(0.0017)	(0.0017)
Urban		0.0453***	0.0408***
		(0.0113)	(0.0113)
Household Size			-0.0087**
			(0.0037)
No. of Children			-0.0034
			(0.0058)
N	17,141	17,141	17,141
Individual characteristics	No	Yes	Yes
Household characteristics	No	No	Yes

Notes: Logit regressions; marginal effects reported; standard errors in parentheses. Sample is restricted to individuals aged 56-68. Each specification includes controls for province, age and year dummies. Column 1 presents results with controls for only age and year and province dummies, and not any individual nor household level controls; in column (2) we add individuals controls including the predicted wage and the interaction of predicted wage and eligibility; and finally in column (3) we add household controls. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table 3.6: Estimated DDD Effects of Pension Age-Eligibility on Labor Force Participation

Specification:	(1)	(2)	(3)
Age Eligibility x Male	-0.0692***	-0.0591***	-0.0530**
	(0.0179)	(0.0179)	(0.0213)
Age Eligibility	-0.0154	-0.0114	-0.0240
	(0.0131)	(0.0129)	(0.0157)
0b.Male	0.0000	0.0000	0.0000
	(.)	(.)	(.)
1.Male	0.2475***	0.1946***	0.2059***
	(0.0106)	(0.0113)	(0.0143)
Predicted Wage		0.0020***	0.0036***
		(0.0003)	(0.0005)
Education (Yrs)		0.0120***	0.0110***
		(0.0009)	(0.0010)
Spouse (Age Eligibility)		-0.0960***	-0.0844***
		(0.0079)	(0.0164)
Spouse (Predicted Wage)		-0.0001	0.0018***
		(0.0002)	(0.0004)
Urban		0.0319***	0.0261***
		(0.0061)	(0.0061)
Age Eligbility x Predicted Wage			0.0003
			(0.0004)
Predicted Wage x Male			-0.0031***
			(0.0005)
Age Eligibility x Predicted Wage x Male			-0.0001
			(0.0005)
Spouse (Age Eligibility x Predicted Wage)			0.0000
			(0.0005)
Spouse (Age Eligibility x Predicted Wage x Male)			0.0017***
			(0.0006)
Spouse (Predicted Wage x Male)			-0.0039***
			(0.0005)
Spouse (Age Eligibility x Male)			-0.0488**
			(0.0198)
N	42,947	42,936	42,936
Individual characteristics	No	Yes	Yes
Household characteristics	No	No	Yes

Notes: Logit regressions; marginal effects reported; standard errors in parentheses. Sample is restricted to individuals aged 56-68. Each specification includes controls for age and year dummies. Column 1 presents results with controls for only age and year and province dummies, and not any individual nor household level controls; in column (2) we add individuals controls with the exception of predicted wage and the interaction of predicted wage and eligibility; in column (3), we further add predicted wage and the interaction of predicted wage and eligibility: and finally in column (4) we add household controls. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Chapter 4 Social Cash Transfers and Measures of Well-being: A Look at the South African Old Age Pension Program

4.1 Introduction

The concept of social safety nets, especially cash transfer programs, has increasingly gained popularity in developing countries as an important policy for social protection (Fiszbein et al., 2009; Grosh et al., 2008). For example, in the last decade, in particular, this increase has been rapid in Sub-Saharan Africa (Garcia et al., 2012).[1] A host of countries such as Mexico, Nicaragua, Brazil, Turkey and Honduras have also in recent years implemented cash transfer programs such as Conditional Cash Transfers (CCTs) under the support of the World Bank and other international financial institutions. Studies show that, among others, Mexico's *Progresa* (now *Oportunidas*) and Brazil's *Bolsa Familia* have gained extremely popular support in improving school enrollment and retention, and health outcomes for the poor. Evidence from a wide range of studies across countries also find that cash transfers are effective in alleviating cases of chronic poverty (Barrientos, 2006; Farrington and Slater, 2006), helping households to diversify their livelihoods, better manage risk, and protect against shocks (Macours et al., 2012).

South Africa has for many years had a large-scale cash transfer program. This program forms the basis of the country's social assistance program which includes Disability Grant (DG), Childcare Grant (CG), and Old Age Program (OAP). OAP is a non-contributory pension program, and while it is targeted to poor elderly South

[1] Social protection is defined as measures aimed at providing income or consumption transfers to the poor with the intent of enhancing their social status (addressing issues of vulnerability and poverty) (Devereux and Sabates-Wheeler, 2007). Among those requiring social protection are the chronic poor, including the elderly and orphans; those who are economically at risk, such as those living with HIV/AIDS; and people living with disability. Given the dissimilarity in their needs, often times they are administered by different agencies: for instance, social transfer (e.g., disability grant, childcare grant, or Old Age Pension (OAP) in the case of South Africa), and social services (e.g., home-based care, health-care, or education).

Africans, studies find that it enhances school attainment and significantly reduces child labor (Edmonds, 2006), improves children's nutrition (Duflo, 2003), as well as generates positive well-being outcomes, including improved health status (Case, 2004; Schatz et al., 2012).

In developing countries, the relevance of cash transfers is highlighted by the fact that they are predictable and provide recipients with the flexibility to plan their expenditures, meet basic consumption needs, and invest in productive activities, such as agriculture, which in turn has potential to improve their well-being.[2] The impact of these transfers is shown to start with the recipients, then extends to other household members; however, some studies also point out that the impact eventually extended to the community. This observation is based on the idea that it is in small businesses and farms located in their communities that these incomes are spent (Ardington and Lund, 1995; Lund, 1993; Møller and Sotshongaye, 1996; Davies and Davey, 2008).

However, some studies also link some of these cash transfers to negative impacts, such as distortion on labor supply. For instance in Mexico, Juarez (2009) finds that implementation of a non-contributory cash transfer program for residents aged 70 and older, reduces the labor supply of prime-aged men and women who reside with a beneficiary. For South Africa, previous studies on the impact of OAP find that labor force participation rates fall sharply at the eligibility age (Lam et al., 2006; Ranchhod, 2009). Others find that OAP, while targeted to the poor elderly, also affects labor force participation (Bertrand et al., 2003) and hours worked (Edmonds, 2006) of their co-residents.[3]

The growing importance of cash transfers as an anti-poverty instrument high-

[2]Social transfers are either conditional or unconditional (Conditional Cash Transfers (CCT) or Unconditional Cash Transfers (UCT)) and can take various forms, such as cash or vouchers.

[3]The effect of OAP on the labor supply of co-residents is mixed. In more recent work, Posel et al. (2006) and Ardington et al. (2009) find an increase in employment among the prime-aged members when a household members receives the OAP and attribute the difference on how a household is defined.

lights the importance of understanding how it improves the well-being of beneficiaries. We explore this question by examining the impact of the Old Age Pension on some selected household items. Specifically, we consider a wide range of outcomes including food security, housing quality (access to water and toilet facilities), and durable goods (ownership of televisions, radios, and phones). Because the majority of South Africans live in low-income settings, we expect that, in theory, their marginal propensity to consume additional income will be quite high and therefore the cash transfer is expected to have a positive effect.

This paper is structured as follows: the next section briefly describes South Africa's household structure. Section 3 describes the conceptual framework, and section 4 describes the data, and presents the empirical approach. The impact of OAP on food security and other household outcomes are analyzed in sections 5 and 6, respectively. The last section concludes.

4.2 Household Structure

As noted in Case and Deaton (1998) and Ardington et al. (2007), one dimension of South African society that is significant in our analysis, for instance, the analysis on children's food security, is the complex household structure wherein families tend to live in extended family arrangements, such as multi-generation and skip-generation households.[4] Traditionally in South Africa, social protection for older people is provided by both formal and informal programs that have been developed to reduce poverty and vulnerability in old age. However, household structure, especially among black South African households, was historically relied upon for provision of care and food for older people. Lam et al. (2006), however, points out that household structure

[4]Multi-generation and skip-generation household concepts are generally applied to households made up of co-resident grandparents and grandchildren or at least two adult generations (for example, parents and adult children where either adult can be the head of household).

has taken on new importance due to high cases of HIV/AIDS and high unemployment rates that have weakened prime-aged adults' ability to support their families. This in turn has reversed the role so that the elderly now support the younger generation.

It is estimated that more than 50% of elderly adults live with at least one younger woman, and a lower fraction, but still significant, live with at least one younger man. Likewise, a large fraction of the elderly live with children, but this is more common in women than in men. For example, (Case and Menendez, 2007; Ambler, 2015) observe that approximately 40% and 11% of children under 5 years live with women and men above 50 years old, respectively.[5] Therefore, to some extent, the benefits are effectively a contribution to the overall household income in that the income reaches other household members such as children as well as working-age adults (Case and Deaton, 1998; Duflo, 2000, 2003; Edmonds, 2006). In poor households, pension constitutes the largest fraction of the income which as a result makes the OAP a key element in the social safety net not only for the targeted group, but also for the household as a whole (Barrientos, 2005). Additionally, while standard literature on the old age pension emphasizes that it provides the elderly with independence, in the case of South Africa, the presence of other residents who depend on the pension implies that an unusual burden is placed on the elderly.

4.3 Conceptual Framework

In this section, we present a simple model to illustrate how cash transfers relax constraints, such as savings and credit constraints, and as a result generate productive and consumptive impacts for households with low levels of household assets. The model draws extensively on poverty trap literature that attempts to explain why some households are trapped at very low levels of assets and income, following Bar-

[5]Older people live alone in only 6.8 percent of South African households and reside with children in 64.2 percent of the households. South Africa's mean household size is 5.5. (Barrientos, 2005).

rett et al. (2008) and Carter and Barrett (2006). We consider a production function with two technologies, a low-return and a high-return technology that requires an initial fixed cost:

$$f(\alpha_i, k_{it}) = \begin{cases} f_L(\alpha_i, k_{it}) = \alpha_i k_{it}^{\gamma L} \\ f_H(\alpha_i, k_{it}) = \alpha_{it}(k_{it} - \bar{k})^{\gamma H} \end{cases} \tag{4.1}$$

where $0 < \gamma_L < \gamma_H < 1$. $f(.)$ denotes expected income (thus consumption or living standard), individual i is endowed with ability α_i and k_{it} assets at time t. In the case of our analysis, α_i can represent household's characteristics, such as individual skills, social capital (social network and cooperation) which may increase returns. L denotes "low-return" technology while H "high-return" technology subject to a fixed cost, $\bar{k}$. We can assume low-return technology to be, for instance, low-return crops and high-return technology would be high-return crops, or livestocks, or other ventures that require higher fixed costs.[6] Both technologies are capital-using and skill-sensitive, such that in both cases, more-skilled people can produce more (consume more) than less-skilled. Depending on accessible technology, an individual has a steady-state investment value: $k_L^*(\alpha_i)$ for the low technology and $k_H^*(\alpha_i)$ for the high technology. Those investing in low technology remain trapped in the low steady state and remain in a poor standard of living while those investing in the high technology reach the high steady state level and consequently reach a non-poor standard of living.[7]

[6] Presence of initial fixed cost implies that high-return technology is not worth being applied at low amounts of capital.

[7] There exists a threshold level $\widehat{k}(\alpha_i)$ such that $k_L(\alpha_i) = k_H(\alpha_i)$ above which the use of high technology leads to higher production. Nonetheless, if one's initial assets are such that $k_L^*(\alpha_i) < k_{i0} < \widehat{k}(\alpha_i)$, it is unclear whether an individual with the initial capital below k_{i0} will move towards the high- or low-return technology and, therefore, towards the non-poor or poor standard of living associated with it. On one hand, because the individual is above the low-return steady state, additional return to investments are relatively lower and thus discouraging. Will this individual then gravitate towards the low-return steady state and poor standard of living? On the other hand, one might ask whether the individuals will accumulate assets over time, and eventually end up at the high-return steady state and non-poor standard of living?

The problem can be analyzed by use of a dynamic choice model where each period an individual makes consumption and investment decisions to maximize a lifetime utility given by:

$$max E_\tau \sum_{t=\tau}^{\infty} \beta^{t-1} \mu(c_{it}) \tag{4.2}$$

such that

$$c_{it} + i_{it} \leq f_j(\alpha_i, k_{it}), j\epsilon \{L, H\} \tag{4.3}$$

$$k_{it+1} = \theta_t[i_{it} + (1-\delta)k_{it}]$$

$$k_{i\tau} \text{ is given}$$

c_{it} and i_{it} are consumption and investment at time t, such that in every period, households allocate the income they earn between consumption and investments (Equation 4.3). β is the discount factor for future consumption, while θ_t ϵ[0,1] is a random variable. We introduce negative shocks, θ_t<1.[8] δ is the assets' depreciation rate. The cumulative density function of θ_t is denoted as $\Omega(.)$, thus in the presence of negative investment shocks, the investment rule is given by $i^*(k_{it}|\alpha, \Omega)$, where i^* is the policy function associated with the Bellman equation below.

$$V(k_{it}) \equiv max_{it,j} \left\{u\left(f_j(\alpha, k_{it}) - i_{it}\right) + \beta E[V(k_{it+1}|k_{it}, i_{it})]\right\}, j\epsilon \{L, H\} \tag{4.4}$$

where

$$E[V(k_{it+1}|k_{it}, i_{it})] = \int V(\theta_t[i_{it} + (1-\delta)k_{it}]) d\Omega(\theta_t) \tag{4.5}$$

On one end, individuals with low initial value of assets, k_{i0}, will invest or disinvest and consequently converge at $k_L^*(\alpha_i)$. On the other hand, those with a higher initial level of assets or equal to $\widehat{k}(\alpha_i)$ will converge at a higher steady state, $k_H^*(\alpha_i)$. For those with low initial assets, such that $k_L(\alpha_i) < k_{i0} < \widehat{k}(\alpha_i)$, there is a critical

[8] θ_t=1 would indicate no shocks and θ_t>1 in principle would indicate positive shock; however, in our case we do not consider the latter. This model also assumes no borrowing, consistent with Edmonds (2006).

threshold level, $\tilde{k}(\alpha_i)$, above which they choose to make additional investments to reach $\widehat{k}(\alpha_i)$ and consequently switch to the high-return technology (Buera, 2006).[9]

Cash transfer, in this framework, can be seen as a component of assets. When these transfers are low, or when households are facing extreme budget constraints, all the cash is consumed, and a unit increase in cash is more likely to lead to a unit increase in consumption; all the cash would be used immediately for consumption purposes, especially for food, in our case. However, when these transfers are large enough or households are not severely constrained, instead of consuming it all, households may save part of it for investment in areas like livestock production or in food production which leads to a sustainable increase in food consumption in the long run. For example in the case of *Progresa* in Mexico Gertler et al. (2012) and under the Malawi Social Cash Transfer (SCT) scheme Covarrubias et al. (2012) where beneficiary households invest some of the benefits in agricultural assets and livestock thus improving their household's long-term living standards. Therefore in extreme budget constraints, cash transfers would probably not foster much consumption of durable household goods, such as bicycles, televisions, or productive investments for households at the very bottom of the wealth distribution, but may help those very close to the relatively wealthier households to cross over the assets threshold, thus increasing consumption in areas that readily and directly impact their livelihoods. Nonetheless, we should observe a positive impact in areas such as food consumption.

Taking that into account, it makes it important to understand the decision-making process of a household. There is a considerably large volume of empirical studies on household decision-making, which can be classified into 2 broad categories: the unitary model and the non-unitary model (e.g., collective models).

[9]Buera (2006)refers $\tilde{k}(\alpha_i)$ as the Micawber threshold/frontier, below which individuals are under a poverty trap.

4.3.1 Unitary Models

Unitary models treat households as a unit and while the underlying assumption of their various models differ, they generally assume that income within the household is spent in the same way regardless of the identity of the family member who earns or controls it (Becker, 1974; Samuelson, 1956). The simplicity of the model is quite appealing; however, over the years, the unitary model has received theoretical critiques arguing that it contradicts individual rationality in which individuals have heterogeneous preferences (Chiappori, 1992). From the empirical point of view, several studies have rejected the notion of income pooling and have provided evidence that the identity of the income earner influences how income is eventually spent (Schultz, 1990). For instance, Lundberg et al. (1997) analyze a United Kingdom policy change in the late 1970s that changed the mode of allocation of child benefits from the fathers to a direct payment to mothers. Following this change, they observed an increase in consumption for women's and children's goods relative to the men's, a divergence from the unitary model. Similarly, in a study that is more relevant to our analysis, Duflo (2003) analyzes the impact of OAP in South Africa on children's nutritional status and finds that income in the hands of females leads to significant improvement in children's nutrition and health relative to that in the hands of males.

Previous criticisms have given rise to an alternative line of investigation, which takes into account individuals' preferences and represents a household by a pair of or multiple utility functions with different budget constraints. Within this line, the collective model is more prominent and puts less structure on the decision-making process. This model does not impose the income pooling assumption, but assumes that household members' utility depends on their own consumption of goods and leisure subject to individual-specific budget constraints.

4.3.2 Collective Models

To provide a simple description of these models, I draw extensively from Chiappori (1992). In collective models, individuals within a household interact through a bargaining or income-sharing process which is assumed to take two stages. In the first stage, individuals' income share is first determined. Households may simply obtain equal shares, or different shares as determined by a sharing rule. Income sharing thus implies that the identity of the beneficiaries could potentially influence household behavior differently.

Some characteristics may contribute to how pension income is shared. First, cultural norms may obligate the elderly to offer financial support to younger relatives, perhaps to support them in situations like a job search. Secondly, due to their hierarchical position in the household, the elderly may possess more bargaining power, and may consequently be less willing to share their OAP income with others. Lastly, gender has been considered as another possible cause of variation in the sharing rule, with a common belief that women are more altruistic than men. Equally, women (especially the elderly) in an African setting are considered to have relatively lower bargaining powers within a household, primarily due to cultural norms or because they more often do not participate in the labor force and therefore do not have a personal labor income. As a result, pension receipt may significantly improve their standing in the household. The second stage involves individual utility maximization, where one chooses consumption of goods and leisure, subject to an individual budget constraint.

4.4 Data and Empirical Method

We use the General Household Survey (GHS). The survey is specifically designed to measure living circumstances, performance of government programs, as well as

quality of service delivery in various service sectors in the country. It covers six broad areas, namely education, health and social development, housing, household access to services and facilities, food security, and agriculture. Consequently, it is well suited for this study. The main variables of interest are derived from household questionnaires wherein each head of household is asked a series of questions regarding the status of their household. In this paper we focus on the few categories mentioned above, because given that they relate to expenditures and household well-being, are most likely to be impacted by a change in household income.

4.4.1 Descriptive Statistics

Table 4.1 provides summary statistics of key variables broken down by gender and pension age-eligibility status. We note a few differences in several key variables, such as age and education. Not surprisingly, age-eligible individuals are relatively older. In the case of years of schooling, for both males and females, eligible heads of household are more likely to have fewer years of formal education (approximately 6 compared to 7 for males, and 5 compared to 6 for females). They are also more likely to reside in urban areas (67% compared to 59% for males, and 62% compared to 53% for females). Overall, women are more likely to be widowed/divorced and to live alone than men. The differences in marital status are consistent with women's longer life expectancy, as well as men's greater likelihood of remarrying once widowed (Cohen et al., 2006). For both males and females, the average household size is about 5 with a high likelihood of the presence of children (approximately 60% or above with the exception of the age-eligible males). The presence of co-residents in these households also allows for the examination of food security for both adults and children in the household. These differences do not invalidate our specification because, for instance, age-eligible individuals are older by definition than those not yet age-eligible, thus reflecting the age trend in some of these variables. Consequently, we control for the

age trend as well as for the other variables in our regression estimation.

4.4.2 Identification Strategy

Our empirical approach relies on pension age-eligibility. While we do observe whether or not an individual receives pension, we recognize that pension take-up is endogenous whereas an individual's age is not, and that a simple comparison of those that receive the pension with those that do not would confound its impact with systematic differences in key variables between the two groups. We therefore use the age-eligibility requirement which provides an exogenous change in the budget constraint and consequently allows for estimation of the pension's causal impact at the age of eligibility. This analysis is done at the household level and we limit our sample to households with 50-75 year-old heads of household.

The identification strategy relies on the change in males' minimum pension age requirement. In order to validate the use of our identification strategy, we first establish that the individuals responded to the 2008 pension reform that lowered, in steps, males' minimum pension age requirement from 65 to 60 years.[10] We first graph pension receipt by age for men and women. GHS asks adults whether or not they receive the government Old Age Pension (OAP). As shown graphically to be consistent with the data in Figure 4.1, the proportion of males receiving pension benefits has an upward shift at 65 for 2006-2008, the period before the reform, and at 60 for 2010-2012, the period after the reform. For females, the proportion of those

[10]The minimum pension age-eligibility had historically been at 60 years for women and 65 for men; however, a 2008 pension reform lowered, in steps, men's minimum pension age requirement from 65 to 60 years. During that transition period, the government extended pensions to men aged 63 and older in 2008, and later to men aged 61 and older in 2009. It equaled that of women at 60 in 2010 (Ambler, 2015; Lombard and Kruger, 2009). As per the South African Social Assistance Amendment Act, no. 6 of 2008, which made provision for a phased-in change, pension age requirements were amended as follows: one is deemed pension age-eligible if (i) after 1 April 2008, one has attained the age of 63 years; (ii) after 1 April 2009, one has attained the age of 61 years; or (iii) after 1 April 2010, one has attained the age of 60 years.

receiving pension benefits follows a similar trend in both periods with an upward shift at 60 years of age, the age at which they attain the minimum age-eligibility requirement in both periods. Although the fraction of those reporting to receive the pension is not complete after the eligibility age, and there is also some slippage in pension receipt prior to the age of eligibility, the discontinuity is clear. The figure also shows that many people take up the pension when age-eligible.

We note that our identification could be invalidated if there are other factors that could be driving the results. For instance, the existence of another social assistance program implemented for the same population group and with similar eligibility criteria could invalidate our identification. As noted above, there are a number of other social assistance programs implemented by the South African government; however, there are none that are similar to the OAP such that it could invalidate our identification (Duflo, 2003).

Another issue of concern is that receiving a pension may cause households to reorganize, therefore affecting the impact attributed to eligibility. For instance, Edmonds et al. (2005) find evidence of an increase in the number of children and young women in pension-eligible households, and a decrease in the number of prime-age working women in pension-eligible households. Similarly, Hamoudi and Thomas (2005) find similar results and note that those living with pension-eligible adults are also more likely to have low levels of human capital. This household reorganization has also been linked to labor force participation withdrawal. For example, Posel et al. (2006) attribute an increase in the number of unemployed among households with pension-eligible adults to the fraction that is unable or unwilling to work moving in with the pension-eligibles to take advantage of the large guaranteed income, and not from original residents withdrawing from labor force.[11] These studies demon-

[11]This study is a critique of Bertrand et al. (2003)'s study. Bertrand et al. compare households that have an age-eligible household member to those that do not and finds a sharp decline in employment and labor supply responses by prime-age individuals residing in households containing

strate that it is difficult to argue that receiving a pension does not impact household composition, which has potential to impact some outcomes, but while that could be the case, it would imply that our estimation could be understating the impact of eligibility on some outcome measures, such as food security. If, for example, children or non-working family members were to move into the household, any increase in income through the pension would have less impact than it otherwise would in the original household status.

4.4.3 Empirical Model

We estimate the following logit model:

$$\begin{aligned} Y_{h,t} = \alpha_0 &+ \alpha_1 Eligible^M_{i,h,t} + \alpha_2 (X^M)_{i,h,t} + \alpha_3 Eligible^M_{i,h,t} * Married_{i,h,t} \\ &+ \beta_1 Eligible^F_{i,h,t} + \beta_2 (X^F)_{i,h,t} + \beta_3 Eligible^F_{i,h,t} * Married_{i,h,t} \\ &+ \theta_1 H_{h,t} + \mu_{h,t} \end{aligned} \tag{4.6}$$

where $Y_{h,t}$ is the outcome measure of interest, namely, food security, water and sanitation, ownership of durable goods, and aggregated measure of well-being of household h in year t. X is a vector of male, X^M, and female, X^F, head of household's or spouse's controls including education, race, marital status, age (age dummies for males or age quadratic for females), while H is a vector of h's household and geographical controls including time dummies, household size, number of children, a control for rural households, and geographical dummies for the nine South African provinces.[12] $Eligible^M$ is an indicator variable for whether or not a male head of household or spouse i in household h is pension age-eligible while $Eligible^F$ indicates whether or not a female head of household or spouse is pension age-eligible. The coefficients α_1 and β_1 on the

pension-eligible individuals and attribute it to withdrawal from the labor force of the individuals that reside with the pensioners.

[12]We include age dummies for men, but a second order polynomial in age for females. The inclusion of a polynomial control in women is to offset multicollinearity in age, year, and eligibility for women because their eligibility age did not change like that of men.

age-eligibility indicators are the coefficients of interest for single heads of household, while the impact of pension age-eligibility for married heads of household includes the coefficient of $Eligible^M$ x $Married$ and $Eligible^F$ x $Married$, respectively.

4.5 Food Security

Despite some improvement over the last few decades, food security remains a global concern and recent increases in global food prices and limited household purchasing power has drawn attention back to the problem of food security. FAO/WFP/IFAD (2012) estimates that millions of the world's population are food insecure; in particular, the African continent suffers from extreme hunger and malnutrition. For example, the 2015 report of the Food and Agriculture Organization (FAO) on the state of food security in the world estimates that over 780 million people in developing countries are undernourished. Out of these, an estimated 220 million live in Sub-Saharan Africa (which includes South Africa) (FAO, 2015).[13] Unlike most of the other Sub-Saharan African countries, South Africa is politically and economical advanced, but the country is still plagued by high rates of poverty and unemployment which in turn subjects a large number of households to food insecurity (Modirwa and Oladele, 2012).[14] Its seriousness is evidenced by the inclusion of eradication of hunger being part of the country's first Millennium Development Goal. In addition, food security was also a key focus in the 2009 General Election Manifesto of the African National Congress (ANC), a political party that has ruled since the end of apartheid rule. This mani-

[13]Measurements of food insecurity vary, but the most widely cited are the "undernourished" estimates by the U.N. Food and Agriculture Organization (FAO) which is based on country-level food balance sheets and strong assumption on its distribution within a country. Other measures of food insecurity, for instance those reported by the U.S. department of agriculture (USDA) to Congress annually, are based on simulation models based on prices and national accounts and production estimates often vary from the former (Barrett et al., 2010).

[14]According to The World Bank, South Africa's 2010 poverty head count ratio, which is the percentage of the population living below the national poverty line, was 53.8%. Unemployment rates over the last 20 years have averaged over 20% (1996-2000, 2001-2005, 2006-2010, 2011-2015 as 24.7%, 25.0%, 34.6%, and 25.1%, respectively).

festo built onto South Africa's Integrated Food Security Strategy, which was meant to improve the country's food security status (Battersby, 2011).[15]

But what is food security? In its narrowest definition, food security is defined as the availability of enough food at the global, national, community, or household level (Pinstrup-Andersen, 2009).[16] Accordingly, it can be measured at different levels: global, national, regional, household or individual level. Pinstrup-Andersen points out that the term "food security" was originally used to describe food accessibility at the national level, but it was not clear whether self-sufficiency at the national level meant that all citizens were also food secure. Nonetheless, a country with low levels of income would be food insecure; therefore implying households would also be food insecure. In the case of South Africa, studies show that the country is largely deemed food secure at the national level; however, its high cases of household food insecurity are tied to lack of food accessibility by certain groups of people (Vorster et al., 1997; Vogel and Smith, 2002; Steyn et al., 1998, 2007).

Food accessibility is associated with individual and household ability to purchase it. It is also tied to the choice and range of food a person or a household is able to acquire/afford, given their income, prevailing market prices, and available safety nets through which they can acquire food. It reflects the "demand side" implying that even when food is available in the market (supply is met), some individuals or households may not be able to meet their needs. As such, problems associated with adverse shocks such as price spikes, unemployment, death of head of household, or loss of

[15] Integrated Food Security Strategy is meant to attain universal physical, social and economic access to sufficient, safe and nutritious food by all South Africans at all times to meet their dietary and food preferences for an active and healthy life.

[16] The definition of food security has evolved over the years, and one agreed upon at the 2001 World Food Summit, states that:

> "Food security [is] a situation that exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life" (FAO, 2001).

livelihood-producing assets are more likely to heighten food insecurity (Barrett et al., 2010). In the context of South Africa, a survey by Statistics South Africa (GHS, 2009) reported that an estimated 20% of sampled households had inadequate or severely inadequate food access. While this seems to be high, the prevalence of food insecurity has in fact been reduced by more than half since 1999 (Labadarios et al., 2011).

A distinction is often made between chronic and acute food insecurity. The former is characterized by a lack of minimum food for a sustained period of time often due to extended periods of poverty, lack of assets, or lack of access to productive/financial resources. The latter is observed in households that are temporarily unable to access enough food. This could be as a result of instability in food prices, food production, or household incomes, and may also be associated with rare, but acute declines in food access, such as in times of a famine (Chung, 1997). For example, the rapid food price increase during 2007-2008 considerably increased the number of food insecure individuals globally by a 100 million (FAO, 2009). Acute food insecurity can also be divided into temporary and cyclical food insecurity. Temporary food insecurity occurs when sudden shocks such as drought and unemployment occur and affects household food accessibility. Seasonal food insecurity occurs when there is predictable and regular patterns of food inaccessibility. It is often linked to agricultural seasons, especially when households are under budget constraints (Thomson and Metz, 1999). Because majority of the low income households in South Africa spend a higher share of their income on food, households that might be marginally food secure before food price inflation, or famine, or unemployment shock might fall into food insecurity afterwards, highlighting the importance of social protection to counter the spread of hunger.

Experiences involving food insecurity range from the least to the most severe. On the least severe end, it manifests as households worrying about food they can obtain, and their coping mechanism involves a trade off of food quality for quantity

through purchase of less expensive food. There is generally little reduction in quantity of household members' intake, if any. With the increase in the severity of food insecurity, adults may to try to reduce quantity of food intake, or skip meals to an extent that they start to experience hunger. Hunger is defined as "the uneasy or painful sensation caused by a lack of food [or] the recurrent and involuntary lack of access to food" (Hamilton et al., 1997). Since adults tend to shield children from the effects of food insecurity, children often do not experience it at this level. However, in the most severe end, adults as well as children are forced to reduce their food intake such that both adults and children consistently experience hunger (Cook and Jeng, 2009; Klein, 1996). Like hunger, under-nutrition is an outcome of inadequate food intake; however, the former refers to lack of sufficient micro-nutrients, such as key vitamins. In children, a severe lack of adequate nutrition can manifest as being underweight and stunted in growth. The South African National Food Consumption Survey (NFCS) collects information on nutrition, height and weight, as well as household choices in the context of limited income. In its 2005 report, NHCS indicated that approximately 33% of households are at risk for hunger, implying that inflation and loss of income might push them to hunger (Labadarios et al., 2007).

Food insecurity is typically associated with limited resources (Hamilton et al., 1997). Therefore, by definition, it is referred to as a resource-constrained or poverty-related condition, and consequently financial resources available to a household, including earned income, and public and private food assistance programs are crucial in maintaining food resiliency. In South Africa, for example, Case and Deaton (1998) observe that approximately 35% of black South Africans survive on US$1 a day, but suggest that in the absence of the pension income, the figure would be 40%. Likewise, Delgado and Cardoso Jr (2000) compare households with a pension beneficiary to those without in Brazil, and find that the proportion of households below the poverty line is significantly lower in the former.

The importance of food security is well established in the literature. Among children, studies show that their physiological growth and development are sensitive to having sufficient food (food security) and adequate nutrition (Fotso et al., 2012; Casey et al., 2006; Martorell, 1999). This in turn impacts their school success and consequently their labor market productivity. Children who face severe acute malnutrition (low weight for height) in early life are likely to have long term effects on brain development even after malnutrition is addressed thereafter (Grantham-McGregor, 1995). Likewise, other studies observe that better nourished girls are more likely to remain in school and to have more control of their future life choices (Chopra, 2004). The latter observation is of significance in a society where women have historically been discriminated against because investment in human capital among girls has potential to reduce gender inequality. The long run implication of food security thus implies a potentially vicious cycle among nutrition, health and economic growth. Therefore, while many cash transfers, such as OAP in South Africa, are targeted towards addressing contemporary poverty, they indirectly contribute in addressing long term (inter-generational) pathways from poverty through improvement in human capital. As such, improving the nutritional status of small children may have important returns in the long run (Behrman and Hoddinott, 2005).

4.5.1 Cash Transfers and Food Access

In principle, cash transfers have the potential to increase both quantity and quality of food consumed. The poorest households, in particular, are more likely to increase the quantity of food they consume, as measured in calories or number of meals per day. More importantly, these households are less likely to skip meals. We are also likely to observe that once their quantity reaches a threshold, their focus would turn to the quality, such that they would diversify their diet. On a review of studies on cash transfer, Arnold et al. (2011) observe that:

> "one of the strongest and most consistent findings regarding the impact of cash transfer programmes is their contribution to reducing hunger and food insecurity. Regardless of the form of transfer, households receiving transfer average significantly higher spending on consumption of food. The impact of cash transfer on hunger has been most pronounced in LICs [low income countries] where poverty is generally more severe. In these settings, households receiving additional income are particularly likely to prioritize spending on improving the quantity and/ or quality of food consumed." (Arnold et al. (2011):20).

Evidence from southern Africa supports this hypothesis. For instance, the evaluation of Malawi's Food And Cash Transfer (FACT) showed that 75.5% of the cash transfers were generally spent on groceries (Devereux et al., 2006). In Lesotho, Croome and Nyanguru (2007) find that the number of elderly reporting that they never went hungry increased from 19% to 48% after the old age pension program was introduced. Studies specific to South Africa's OAP find that approximately 45% of all black and coloured households report that presence of a pensioner in the household reduces the probability of an adult skipping a meal by 20% on average, and further reduces it by 40% in households with two pensioners (Case, 2002).

Access to the cash transfer can also improve quality of food as well as help diversify a household's diet (Vincent and Cull, 2009). Under Zambia's Social Cash Transfer (SCTs), in addition to a decrease in the number of beneficiary households with one meal a day, or who reported hunger, households that received the cash transfer consumed a richer diet than those that did not; 12% more households consumed proteins and 35% consumed oil every day if they received the cash transfer, compared to those that did not (Vincent and Cull, 2009).[17] In Colombia, Attanasio and

[17] Conditional Cash Transfer in Latin America has similar effects. Evidence from countries such as Ecuador, Colombia, and Nicaragua also shows that beneficiary households tend to have

Mesnard (2006) observe that households that benefited from *Familias en Accion* had a significant increase in protein-rich food, such as meat and milk. Similar findings are observed in Mexico and Nicaragua where the increase in food consumption was driven by an increase in consumption of proteins, fruits, and vegetables (Hoddinott et al., 2000; Maluccio and Flores, 2005).

Studies across a variety of cash transfer programs in developing countries also find that beneficiaries are able to save and invest a fraction of their transfer in agricultural inputs which in turn improves household food production. In Bolivia, for example, a social transfer of US$246 called *Bono Bignidad*, is paid once a year to individuals aged 60 and over. The amount represents a significant amount of income to rural farmers who have lands but are in need of cash or sufficient credit to purchase inputs such as seeds. Analyzing this program, Barrientos (2012) finds that beneficiary households experienced an average increase in food consumption of approximately twice the value of the cash transfer, implying that the transfer facilitated an investment of some portion of the transfer in other household food production.

4.5.2 Measures of Food Security

Researchers use a variety of proxies to measure food security, but generally the choice among indicators are commonly dictated by the objective necessitating a study. That said, measurement choices involve trade offs and more often, each measure captures as well as overlooks different dimensions of food security that are of central importance to food security intervention. Historical estimates focused on food availability at the national or regional levels, and consequently, intervention policies were aimed

higher food expenditure for any given household total expenditure (Holmes and Bhuvanendrah, 2013). Nonetheless, some studies do not find such positive effects. In Ecuador (The Bono de Desarrollo Humano (BDH)) and in Cambodia (Cambodia Education Sector Support Project) do not find improvement in the level of food consumption. Findings in the latter are perhaps due to the fact that the cash transfer is small in size (Fiszbein et al., 2009).

at strategies that were geared towards addressing national-level food availability issues. The focus has, however, changed in the last few decades, shifting more towards individual-specific measures, which in turn emphasizes food security strategies that are based on poverty alleviation, food prices, and social protection policies (Barrett et al., 2010).

How is household or individual food security measured? Food expenditure, dietary diversity (Arimond and Ruel, 2004), and coping strategies index (Maxwell, 1996) are some proxies used that rely on individuals' or households' responses to past consumption and economic shocks (Barrett et al., 2010). Others include hunger, which is the physical discomfort as a result of lack of food and can be appropriately gathered at the individual level, and anthropometric measures such as weight-for-height or weight-for-age (Duflo, 2003), and malnutrition which refers to micro-nutrition (mineral and vitamin) deficiency, and undernutrition which refers to deficiency in protein energy (University and Organization, 2004). In the context of the last two measures, the 2005 NFCS revealed that 1 out of every 5 children aged between 1-9 years in South Africa had stunted growth and was only a marginal improvement from the 1999 survey findings (Labadarios et al., 2007). These surveys also assist in predicting groups that are more likely to be affected by shocks that could impact food security, such as an increase in food prices and drought.[18]

4.5.3 Vulnerable Groups

In general, the population vulnerable to food insecurity can be defined as economically or socially marginalized. Economically marginalized are those individuals that often

[18] Studies show that while severe food insecurity is often linked to disasters such as war, floods, and drought, most food insecurity is in fact not associated with those episodes; chronic poverty is the major cause of food insecurity. For instance, approximately 92% of hunger-related deaths worldwide were a result of chronic or recurring hunger and malnutrition, while only 8% were a result of humanitarian emergencies [cite FAO 2006 Rome 2006].

do not have land, capital, or formal skills. They make up the 'working poor' or the 'under-employed poor'. The socially marginalized are those vulnerable as a result of disability, illness, gender (women and girls), or age (elderly and children). This group is also economically marginalized and consequently forms a large fraction of the chronically poor sub-population. In South Africa, predisposing factors that lead to food vulnerability differ across groups; some are associated with economic hardships, such as income levels, size of landholdings, and types of crops grown; and some are associated with household demographics status (e.g., gender of the household head, presence of pregnant or lactating women, presence of school-aged children, presence of anyone with a disability, or presence of an elderly person in the household) and issues with distribution of food within households (Thomson and Metz, 1999; Ellis, 2003). Nonetheless, food insecurity is generally linked to poverty because of the dimension of food affordability; the most vulnerable households typically include those that lack productive assets and are dependent on irregular income.

Food security at the household level is probably the most important for researchers, in that the household is essentially the basic unit which dictates the level of consumption for individuals. However, within these households, children (more often girls), women, elderly, widows, divorced women, and individuals with a disability are the most vulnerable (Modirwa and Oladele, 2012; Ellis, 2003). For the elderly, food insecurity is tied to lack of earning opportunities often due to their advanced age or their deteriorating health status, in addition to the burden of care for the young, orphans, and those with HIV/AIDS in their household. In South Africa, the majority of them depend heavily on state welfare in the absence of a private pension, savings, or assets.

Widows, divorced women, and female-headed households are susceptible to food insecurity due to the loss of a previous partner's contribution to household income. This could also be attributed to low labor force participation rates among women,

either due to socio-cultural factors, or due to low earning power for those that do participate in the labor force as noted in Barros et al. (1997) in the context of Brazil.[19] Likewise, in South Africa, like other African countries, social-cultural norms, such as the right to resources by a particular group (often divorced women's or widow's rights to share a husband's wealth or inherit his property) also exacerbate their exposure to food insecurity.

Households with a larger proportion of dependent members, such as children and the elderly, are likely to be more vulnerable to food insecurity compared to those households composed of a larger fraction of the working-age population. Nonetheless, government social welfare programs for children (child care grants and foster care grants) and the elderly (Old Age Pension) provide some safety nets that positively impact food security (Patel and Hochfeld, 2011; Schatz et al., 2012). Households in rural areas may also face food security primarily due to the over-reliance on agriculture as a single source of livelihood. This lack of diversification often makes them vulnerable to food insecurity when crops fail. People with a disability, HIV/AIDS, or chronic illnesses often have less job opportunities or often suffer exclusion from communities and therefore have less/or no labor market income, or assets to cover high medical expenses associated with illnesses.

However, it is important to note that not all members of the aforementioned groups face food insecurity. For example, not all female-headed households are vulnerable (Quisumbing et al., 2001). More often than not, households facing food security challenges cope by employing additional household members, including school-aged

[19]Some studies counter this argument, pointing out that while men earn more than women, in general, female-headed households are no less food secure than their male counterparts. For example, using survey data sets from 10 developing countries, Quisumbing et al. (2001) compare poverty measures for males and females and male-headed and female-headed households and finds only a fifth to a third of the data shows significant differences. They do, however, conclude that the results (where females are consistently worse than males) may driven by cultural and institutional factors.

children, in income-generating activities. This has policy implication in that failure to invest in human capital is more likely to increase the probability of transmitting poverty to the next generation (Modirwa and Oladele, 2012).

4.5.4 Results

Ideally we would prefer to examine whether pension income impacts household food expenditure, but the General Household Survey (GHS) does not provide this information for 2006-2008. However, it collects detailed information at the household and individual level from which we are able to observe a sense of food security for adults and children in a particular household using the following questions as a proxy:

1. For adults: "In the past 12 months, did any adult (18 years and above) in this household go hungry because there wasn't enough food?"

2. And for children: "In the past 12 months, did any child (17 years or younger) in this household go hungry because there wasn't enough food?"

with possible responses being on a 5-grade scale – 'never', 'seldom', 'sometimes', 'often', or 'always'.

As a first step in our analysis, we present average responses across different household types. The rationale for doing this is to compare households with an age-eligible adult to those without. Household types are broken down by that of single males, single females, and married couples. We further breakdown married couple households into those wherein only the husband is age-eligible, those wherein only the wife is age-eligible, those wherein both spouses are age-eligible, and finally those wherein neither the husband nor the wife is age-eligible. See Table 4.2 for adult food security and Table 4.3 for children's food security.

Overall these tables reveal that the majority of sampled households are food secure; however, there are differences based on household types. For single house-

holds, the percentage of those that respond to "never go to bed hungry" ranges from approximately 77-83%, which is relatively lower compared to married households, which ranges from 84-91%, as such it is an indication of relative more food insecurity. We also observe that pension age-eligible households are relatively food secure than households that are not pension age-eligible; households that have an age-eligible adult have higher percentages of favorable responses compared to those that do not have an eligible adult. This observation is roughly consistent across gender. Not surprisingly, married households wherein both spouses are age-eligible are more food secure compared to those that have neither couple being age-eligible, or where only one spouse is age-eligible.

In summary, we observe that households that are pension age-eligible are more likely to be food secure, especially households with age-eligible females – patterns that are further analyzed in a regression framework below.

Regression Analysis

In this section we address the question whether pension age-eligibility and gender of the eligible individual impacts food security in a formal regression framework setting. We use an ordered logit model described in section 4.4.3. The dependent variable, food security, is coded on a four point scale: 0=Always, 1= Often, 2=Sometimes, 3=Seldom, and 4=Never, where higher values represent better status.

The expected patterns given the tabular analysis above are observed in the regression results presented in Tables 4.4 and 4.5 for adults' and children's food security status, respectively. For each sample there are three specifications: column (1) includes only the individual controls. One threat to our results is the possibility that household structure may influence the outcome. We address this issue by controlling for household size and the number of children in the household in column (2), as well as a control for the presence of other non-spousal residents in sampled households in

column (3).

The resulting estimates in column (1) suggests that for single males, age-eligibility is not likely to have a significant impact on adults' food security status in their households; the coefficient on males' eligibility is negative, but insignificant. On the other hand, the coefficient on single females is positive and significant, implying that age-eligibility for single females is likely to have a favorable outcome for their households. The coefficient on married dummy variable is positive and significant. However, the estimated males' eligibility x married dummy variable interaction term coefficient, which captures the difference in the effect between single and married households, while positive, is not significant at the conventional levels. Females' eligibility x married dummy variable interaction term coefficient, on the other hand, is negative but its impact is relatively small and statistically insignificant. The results suggest that female's eligibility status, whether single or married, has a positive impact on their food security status, unlike that of males.

We mentioned above that many children in South Africa reside with elderly family members and that studies find positive impacts on children's outcomes such as health and schooling when residing with the pensioners (Duflo, 2003; Edmonds, 2006). Here we examine the impact of age-eligibility on children's food security, an outcome that is likely to be influenced by pension eligibility status. We note that not all households have children, and therefore, in addition to the above responses to the food security questions, households without children have a "not applicable" option and are consequently excluded from the current analysis. This decreases our estimation sample. Table 4.5 presents the estimates. Once again, in column (1) our estimates indicate that males' age-eligibility status does not have a significant impact on children's food security status in their households. These findings hold whether they are singles or married. In contrast, the impact of females' age-eligibility is positive, significant, and consistent whether married or not.

With the additional controls (columns (2) and (3)) age-eligibility impacts on food security outcomes do not change by much from the first specification, but we observe that households are less likely to be food secure as the number of residents and the number of children increases. Presence of other non-spousal age-eligible residents is positive, as expected, but only significant for adults' food security. Importantly, the similarity in estimated effects on age-eligibility status across the different specifications is reassuring and suggest that our coefficients of interest are not capturing effects that should be attributed to other eligible co-residents.

4.5.5 Discussion

So far these findings provide some evidence that age-eligibility status has very different effects based on gender, in favor of females, and points in the direction of rejecting the unitary model in favor of the bargaining models. The bargaining models, discussed above, that guide our analysis are based on the assumption that control of household resources influences the decision-making process within a household, such that those with more control of the resources are likely to have more decision-making powers as well. In our case, however, while men, like women, exhibit a discontinuous increase in pension receipt at the eligibility age, the impact of age-eligibility for married females is positive and statistically significant on both cases (for adults' and children's food security), but their male counterpart is not. Consequently, if bargaining model theory – that decision-making power increases upon age-eligibility – is to guide our results, the non-results in the case of male's age-eligibility status is puzzling.

Income Share and Control

An important question is whether or not control of income is the channel through which the observed difference in age-eligibility effect is operating. Relevant to our analysis, using NIDS data, Ambler (2015) plots the fraction of household income

earned or received by an elderly adult by age and observes a striking increase in income controlled by females at the eligibility age, but a small and noisy increase for males. Ambler also observes that there is a strong correlation between the percentage of a household's income one controls and the probability that he/she is the primary decision-maker in a household for both men and women, regardless of their pension eligibility status. She notes, however, that while there is an observed increase in individually controlled income, there is little or no evidence of an increase in household total income for either males or females. This is consistent with other studies that find crowding out effects from private transfers, such as remittances previously received by the households (Jensen, 2004), as well as evidence that pension receipt discourages labor force participation (Lam et al., 2006). Therefore, to the extent that decision-making powers within a household are determined through income control, then the pronounced increase in income control observed in women, and less in men, could provide a convincing explanation for why we do observe a positive impact on women's age-eligibility status on food security and not on men's.

Other Potential Explanations

There is a possibility that men do not respond to pension eligibility like women do. To examine this, we plot pension participation against age for men and women, respectively in Panel A of Figures 4.2 and 4.3. Because the age-eligibility requirement for men decreased from 65 to 60 between 2008 and 2010, the solid lines represents the trend before the change and the dashed line represents the trend after. In both figures we observe that pension participation has a visible upward discontinuity at 60 and 65 for men and at 60 for women, as expected. This corresponds with their respective minimum pension age requirement and implies a substantial take-up upon reaching the age of eligibility. In addition, studies show that OAP is generously high by world standards, such that its cash transfers are almost twice the median per

capita African/black income (Ardington et al., 2007), clearly indicating its significance relative to other household incomes. Therefore, given that we observe a sharp increase in pension participation at the eligibility age for both men and women, why do studies fail to observe a corresponding increase in the fraction of household income controlled by males but observe one in females?

A possible explanation for the findings is that the pension income for men is partly offset by loss/reduction in earned income due to labor force withdrawal or reduction in working hours. However, evidence shows both males' and females' withdrawal from the labor force occurs at the age of eligibility (Lam et al., 2006). One way to test this theory is to examine changes in actual labor income by age for both males and females, but our data does not provide that information. Instead, in Panel B of Figures 4.2 and 4.3, we plot employment rates against age for men and women, respectively. Clearly, there is a downward trend in employment with age, and in line with the previous studies, we observe a discontinuity in the fraction of those employed at their respective eligibility age. Interestingly, this discontinuity is more pronounced for males than for females, suggesting that their withdrawal is more rapid than that of females, and may offer evidence as to why men's income is likely to decrease by a larger fraction once they reach the eligibility age.

In addition, evidence shows that men, on average, earn more than women in the labor market and that their income is a significant part of their household budget (Ambler, 2015). Consequently, while we observe that both men and women withdraw from the labor force at the eligibility age, the income that men give up is thus higher than females, and the subsequent pension income may more likely be a larger increase in women's income. We offer an illustration in Figure 4.4. This figure shows how the introduction of a pension shifts the budget constraint of an otherwise unpensioned individual. Income is on the vertical axis and hours worked on the horizontal axis (moving from A to T). Without OAP, the budget constraint is ABH with slope W

and intercept B. AB is individual's non-labor income. With OAP, BC is the pension guarantee (i.e., the maximum amount given to those with zero income or those under the exempted income level), therefore creating the budget segment given by $ACEFH$.

As noted earlier, women's labor force participation is relatively lower than that of men. In addition, women typically earn relatively less than men as well. Consider a case where women are located at point 1 and men at point 3, in the absence of OAP. These women have two types of responses: they either reduce hours (and relocate to point 2) or withdraw from the labor force; however, the change in labor supply depends on their initial location on BF, such that those closer to B are more likely to relocate to C (withdraw from labor force). For simplicity, let's assume they relocate to point 2. Also, for simplicity, and given that men have a flatter income expansion path, assume men relocate from point 3 to 4 upon pension age-eligibility. As observed in the graph, the change in income experienced by women (from a to b) is larger than that experienced by men (c to d). Thus, while we expect individuals to respond by reducing labor supply or exiting the labor force upon pension age-eligibility, these considerations may offer additional support to the argument that the pension income may be a replacement for the lost labor market income for males more than it is for females.

Household Rearrangement

An important concern for our results, as discussed earlier, is household reorganization documented in previous studies (Hamoudi and Thomas, 2005). For instance, some studies find an increase in the number of children and a decrease in women of working-age in households with pensioned females. Others observe that the individuals living with the pensioners are likely to have lower human capital, and therefore less likely to be employable. To that end, we examine whether our results are driven by changes in household size, or specifically the number of children in the household. We, however,

hypothesis that even if these patterns were present in our data, they are more likely to understate our results. We use the same specification used in estimating the impact of age-eligibility on food security, but our dependent variables are household size and the number of children.

Table 4.6 presents the results from these regressions. A decrease in the number of family members would suggest that our positive results are simply due to the household becoming smaller and therefore more resources can be shared among a smaller number. On the other hand, an increase would imply that family members are in fact taking advantage of the pension, and consequently our positive results are indeed understated. We do not find evidence to suggest that either of the above is exhibited in our sampled households. We also note that the basic findings of Tables 4.4 and 4.5 do not change with inclusion or exclusion of family size.

4.6 Other Household Outcomes

4.6.1 Water and Sanitation

Provision of clean water and adequate sanitation facilities plays a considerable role in the improvement of public health. While these two are not necessary areas of concern in the US or other western countries, studies show that in developing countries, water and sanitation services are severely deficient, and are therefore a major public health issue that subjects millions to preventable illness and consequently death every year (WHO/UNICEF, 2004). One constraint for households wanting to connect to improved water supply, especially for poor households, is affordability. Other factors that lead to low rates of connection to improved services include easier accessibility to low quality water that is suitable for other purposes (apart from drinking), desire to be independent from only one single source, and lack of awareness of water quality (Akbar et al., 2007; Spencer, 2007; Hadipuro and Indriyanti, 2009). In this section

we explore the link between pension age-eligibility and access to improved water and sanitation services, two measures that are likely to be associated with an increase in household income (White et al., 2008).

Estimates of access to water and sanitation at the global level are startling. For example, it is estimated that more than 1 billion people (about 15% of the total world population) do not have access to an improved drinking water supply, and even more, an estimated 2.6 billion people (about 35% of the total world population) do not have improved sanitation services. Of the above, the majority reside in Sub-Saharan Africa and in Asia (Montgomery and Elimelech, 2007). It should be noted that these figures could be much higher because in the above case, the term "improved" access to water or sanitation, does not necessarily suggest that the two meet international health standards, such as those set by the World Organization (WHO), but it rather represents water sources that are superior to traditional, unprotected water sources. Table 4.7 breaks down water sources and sanitation facilities as defined by WHO.

The fraction of population, by region, that is without access to improved water and sanitation is illustrated in Figure 4.5. In order to demonstrate how access to both water and sanitation impact health, the figure also shows the number of deaths attributable to diarrheal diseases per 1000 children under 1 year of age. From the figure, it is clear that Sub-Saharan Africa faces the most severe conditions, where approximately 40% of the population is without improved water and over 60% is without improved sanitation. The correlation between lack of improved water and sanitation facilities is also evident; deaths related to diarrheal diseases are much higher in the Sub-Saharan African region than in others. Although not exhaustive, as the connection between water, sanitation, and health is extensive and complex, studies link these adverse health effects to poor drinking water quality or poor sanitation as summarized in Table 4.8. This table highlights various ways in which both water and sanitation play a part in the transmission of diseases caused by pathogenic micro-

organisms, and also indicates how several transmission pathways may lead to similar infection outcomes.

Diseases transmitted through poor quality drinking water or poor human waste disposal, especially for those that are transmitted through the fecal-oral route are well documented in literature (Esrey et al., 1991). Sources of the pathogens (bacterial, viral and parasitic organisms) are often human (sometimes animal) feces which often cause diseases when ingested by a susceptible person, with the shortest route of transmission being poor hygiene (person-to-person contact). The longest route includes transfer of the pathogens to food crops, more often through irrigation using contaminated water, or through drinking contaminated water. However, a common route depends on the characteristics of the specific pathogens and local environmental standards as well as human behaviors (Prüss et al., 2002).

Evidence of Causality

Availability of adequate water supply is linked to reduced cases of sanitation and hygienic diseases. Using distance to water sources as a proxy for access to adequate water supply and its use, Mathur et al. (1970), for example, observe that in India, individuals whose water supply was within 200 meters exhibited 30% fewer cases of trachoma than those who obtained it from sources farther away, while in Malawi there were 26% fewer cases of trachoma among children whose water was obtained from less than 5 minutes away than among those whose water was obtained from 1 hour away (Tielsch et al., 1988).[20] In South Africa, most households have access to some form of piped water; however, this is more than 200 meters away for approximately 14% of households, while also about 8% still utilize rivers, streams or dams, therefore

[20] *Trachoma* is a contagious eye disease and is the leading cause of preventable blindness of infectious origin. It is caused by *Chlamydia trachomatis*. Transmission occurs by several routes, all of which are hygiene-related; for example, through direct contact, shared towels, and clothes and is spread in areas that lack adequate access to water and sanitation.

placing residents at risk for diseases (Lewin et al., 2007).

Sanitation (human waste management) also plays a significant role in the isolation/distraction of pathogenic material, thus providing a breakdown in their transmission pathway. For example, in Indonesia, Toma et al. (1999) report a 64% reduction in infection in people who used a latrine compared to those that did not. Other experimental studies, for example Arfaa et al. (1977), have provided evidence of a parallel decrease in both egg counts in the soil and cases of infections with an increase in use of latrines.[21] Other studies, for example Narain et al. (2000), note that family size and lack of sanitation facilities (open defecation) is associated with cases of *Trichuris*. Similarly, Rajeswari et al. (1994) note that among other reasons, its prevalence is associated with factors such as water supply, disposal of feces, social economic status, and family size.[22]

Globally, approximately 60% of infant mortality is linked to infectious diseases, most of them related to water or sanitation. In developing countries, diarrheal diseases are the principal cause of morbidity and mortality and are linked to approximately 4.9/1000 mortality of children under 5 years of age every year (Kosek et al., 2003; Prüss et al., 2002). Relevant to our study, it is estimated that diarrheal diseases account for approximately 3% of total deaths – the eighth largest cause of death in

[21] According to the Center for Disease Control (CDC), *Ascariasis* is caused by the round worms *Ascaris lumbricoids* (sometimes called *Ascaris*). The *Ascaris* live in the intestine and its eggs are passed in the human feces of an infected person if feces are deposited on soil or used as fertilizer. Ingestion of these eggs causes the disease. Transmission is attributed to water, sanitation, or poor hygiene (e.g., when hands or fingers that have touched contaminated surfaces are put in the mouth, or consuming vegetables or fruit that is not carefully washed, peeled, or cooked. Under favorable conditions, the eggs can survive for months or years and, therefore, can pose a health hazard for a long time.

[22] According to the Center for Disease Control (CDC), *Shigella* is a group of bacteria that causes the infectious disease called Shigellosis. Most of those infected with the bacteria develop diarrhea, fever, and stomach cramps starting a few days after the exposure; however, some may not have symptoms at all, but may still pass the bacteria to others. *Trichuris* is caused by the whipworm *Trichuriasis trichiura*. These worms live in the large intestines and their eggs are passed in the feces of an infected person. If defecation is done outside or the human feces are used as fertilizer, these eggs are deposited on the soil. Thus the infection is not from person-to-person, but the mode of transmission is fully attributable to water, sanitation, and hygiene.

South Africa (Bradshaw et al., 2003; Norman et al., 2006) and 11% of all deaths among children under 5 years old, which is the third largest cause of death among this age group (Hutton et al., 2007). [23] Similarly, Lewin et al. (2007) report that 2.6% of all deaths in South Africa were attributed to unsafe water, sanitation and hygiene. The burden was particularly high in children under 5 years, accounting for approximately 9.3% of total deaths.

In developing countries, the issue of water contamination goes beyond its sources; most water is exposed to contamination during distribution and in storage within homes. For instance, in VanDerslice and Briscoe (1993)'s literature review, they point out that a number of observational studies documenting increased concentration of coliform levels (an indicator of an increase in contamination) in household water storage containers than in the original source of water, thus emphasizing the significance of access to running water within the dwelling.

Adverse health effects associated with lack of water extends beyond the burden of the diseases. In many developing countries, water collection, which is often the responsibility of women and children (especially girls), poses an additional burden. In some cases, up to 6 hours a day may be spent in search of water for household needs (WHO/UNICEF, 2005). For girls, the time spent searching or collecting water may increase their probability of dropping out of school, while for the women, it may take time away from opportunities to engage in other household chores or small business opportunities. That said, diseases related to poor quality drinking water and sanitation disproportionately affects poorer members of the community. While reasons behind this are complex and interconnected, wealthier people are more likely to have better access to water (piped water) and sewer systems.

[23] HIV/AIDS (30%) and cardiovascular diseases (16.6%) are the two leading cause-of-death categories (Bradshaw et al., 2003)

Results

To obtain data on a household's main source of drinking water, the survey asks: "What is the household's main source of drinking water?" Possible responses include 'piped (tap) water in dwelling/house', 'piped (tap) water in yard', 'borehole in yard', 'rain-water tank in yard', 'neighbor's tap', 'public/communal tap', 'water-carrier/tanker', 'borehole outside yard', 'flowing water/stream/river', 'stagnant water/dam/pool', 'well', and 'spring'. We recode these categories into a 5-grade scale: 4='Tap water in dwelling, or on site, or in yard', 3='neighbor's tap or public tap', 2='borehole on site or communal borehole, or water-carrier/tanker or rain-water tank on site', 1= 'well or spring', and 0='flowing water, or stream, or river, or dam, or pool, or stagnant water'– with higher values denoting better sources of drinking water. See Table 4.9 for a formal definition.

The GHS survey collects information on the main type of toilet facility used by each household which we use as a proxy for sanitation. The survey asks: "What type of toilet facility is used by this household?", with possible responses ranging from lack of it to the most improved toilet facility– a flushing toilet. Household responses are on a 7-grade scale– 'No toilet on site', 'bucket toilet', 'pit latrine without ventilation', 'pit latrine with ventilation', 'chemical toilet', 'flush toilet that deposits waste to a septic tank', and 'flush toilet that deposits to public sewage'. We define these categories in Table 4.10.

We first present means of households' sources of drinking water and access to toilet facilities in Tables 4.11 and 4.12. We break it down by household type: single male, single female, and married couple households and by age-eligibility status. In terms of water sources, an average of 69% of single households reported to have access to either tap water in the dwelling, or on site, or in the yard, which is lower compared to the proportion of married households who average 73%. Overall, approximately 90% of all households reported to have access to any form of tap water (in dwelling,

on site, in the yard, neighbor's tap or public tap). Across all household groups, we observe that eligible households are less likely to have access to improved water sources; for example, approximately 2% lower for single males, 3% for single females, and 2% for married couples when only the husband is age-eligible.

Access to improved toilet facilities is not as prevalent: approximately 47% of single males, 49% of single females, and 38% of married households do not have access to a flushing toilet or a chemical toilet. Importantly, approximately 9% of single males, 8% of single females, and 4-6% of sampled married households utilize bucket toilets or do not have access to any form of toilet facility.[24]

Regression Results

We examine water sources and access to sanitation facilities further in a regression setting. We estimate an ordered logit model, as described in section 4.4.3, where the dependent variable is a household's main type of toilet facility or main source of water, respectively. We acknowledge that households in rural areas are at a disadvantage because they are less likely to have infrastructure for piped water or sewer systems. We also keep in mind that one of the factors that hinder households, particularly poor ones in rural areas, from having water connection is the initial capital, as indicated above. Therefore, to control for this concern, we add an age-eligibility x urban interaction term.

Results for water sources are presented in Table 4.13. Model 1 regresses the dependent variable on indicator variables for age-eligibility, and a full set of con-

[24]The World Health Organization considers improved sanitation facilities as flush toilets, latrines that flush to a sewer, septic tanks or pits, ventilated pit latrines, pit latrines with the pit well covered by a slab, composting toilets, or chemical toilets, while unimproved sanitation facilities are open pits, latrines without a proper slab to cover the pit, or hanging latrines which deposit untreated waste into water systems or in the open (WHO/UNICEF, 2006) As such, approximately 32% of single households and 23%- 30% of sampled married households do not have access to improved sanitation facilities.

trol variables described in section 4.4.3, with an exclusion of age-eligibility status of co-residents and age-eligibility x urban interaction term. Males' eligibility coefficient is positive, but not significant. Males' eligibility x married is negative, but not significant as well. Females' coefficients are both negative and not significant, as well. Additional controls (presence of non-spousal eligible resident in model 2 and age-eligibility x urban in model 3) do not significantly change the estimates. Put together, these results suggest that pension age-eligibility does not have much influence on a household's source of water. One possible explanation for our results is that the majority (approximately 90%) of sampled households have access to some form of tap water, e.g., in dwelling, on site, in the yard, neighbor's tap, or from a public tap, which are considered relatively better sources, and this could be driving the lack of, or the limited effect.

In the case of sanitation, Table 4.14, we observe that males' age-eligibility coefficient is negative and insignificant, whether single or otherwise. For females, we see that age-eligibility has a positive and significant coefficient and the interaction term for female's age-eligibility x married is also positive, but not significant at the conventional level. When we control for the presence of non-spousal eligibility status in model 2, we observe that estimates do not have noticeable changes in magnitude or significance; however, we note that while not significant, the presence of non-spousal age-eligibility status is positive. With rural households being the group that face tougher challenges in terms of accessing piped water or the sewer system, it is conceivable that the impact of increased income may reduce their budget constraint and provide them with the initial capital. Model 3 adds age-eligibility x urban term to control for this, and as a result, the males' age-eligibility coefficient changes from negative to positive, but remains insignificant for singles, and remains relatively the same (negative and insignificant) for the married, implying that males' age-eligibility status (single or married) is less likely to have a positive impact on their household's

sanitation facilities. On the other hand, females' age-eligibility coefficient is positive and significant across the three specifications. Females' age-eligibility x married is positive, but not significant. Nonetheless, our result suggests that females' age-eligibility increases the probability of better facilities, an impact that is not observed in males' and thus supports the idea that cash in the hands of females is spent in more productive ways than in the hands of men (Thomas, 1990; Duflo, 2003).

4.6.2 Ownership of Consumer Durables

Old Age Pension may also provide recipients with an ability not only to improve their quality of life through day-to-day purchases of daily goods, such as food, but can also afford them an opportunity to invest in larger household goods that also have potential to improve their quality of life. For example, Ambler (2015) and Ashraf et al. (2010) observe that an increase in decision-making powers associated with increased personal income due to pension receipt is often correlated with increased ownership of durable goods. The GHS survey data offers an opportunity to study a similar question, but in a different setting. The survey collects information on ownership of a number of consumer durable goods. Here we consider cellphones, televisions, radios, and land-lines because they are more consistent across the survey. The survey only asks whether a household owns particular durable goods, and therefore we cannot observe how many of the durable goods they own. We also note that households may use pension income to replace goods that they already have. Unfortunately, we cannot observe that as well, thus the dependent variable is whether a household owns a particular durable good or not.

Graphical analysis

To have a basic assessment of the impact of age-eligibility on ownership of consumer durables, Figures 4.6 through 4.9 present averages of these variables by household

type: single male, single female, and married couple households, and by age-eligibility status. First, unlike the single male households, single female households are more likely to own a phone; however, we observe that the likelihood of ownership is not different between age-eligible households and those that are not age-eligible, as observed in the former. See Figure 4.6. For married couples, we do not observe noticeable differences between households where only the husband is age-eligible and where neither spouse is age-eligible. Interestingly, we observe a similar trend when only the wife is age-eligible as was the case for the single female households, such that eligible households have a lower probability of phone ownership. This is also true for the case of both spouses being age-eligible; however, the difference is notably smaller in the latter. See Figure 4.7. These observations are puzzling given that we hypothesize that the worst case scenario for an eligible household would be a no effect. We examine this further in a regression framework below.

An overwhelming majority of sampled households own either a television or a radio, but once again single female households are more likely to own one compared to the single male households (approximately over 90% compared to approximately 85%). We also note that in the case of single male households, age-eligible households are more likely to own one, but we do not observe any noticeable differences for single female households. See Figure 4.8. In the case of married couples, we observe a slight decrease in probability of ownership when only one spouse is age-eligible, and no noticeable difference in the case where both spouses are age-eligible compared to where neither is age-eligible. We would expect a positive effect, but again, as shown in Figure 4.9, a majority of the households own either a television or a radio, which could explain the lack of, or limited, difference between those eligible and those not.

Regression analysis

We examine this further using the same logit model described in section 4.4.3. The dependent variables here are ownership of either a television or a radio, and ownership of either a cellphone or a land-line phone. The binary variable is equal to 1 if a household responds in the affirmative, 0 otherwise. We present the marginal effect in Table 4.15. Columns (1) and (3) regresses dependent variables on an indicator variable for age-eligibility and a full set of individual controls as well as the interaction of urban and pension age-eligibility dummy variables. Columns (2) and (4) add control for household size, as well as presence of non-spousal household members that potentially could impact ownership of these goods.

Focusing on Columns (1) and (2), both males' and females' pension age-eligibility estimates show that, on average, their households are less likely to own household durable goods; however, these estimates are not significant at conventional levels. The coefficient of females' age-eligibility x married dummy variable interaction term is positive and significant. We interpret this as an indication that married women appear to channel some of their pension income towards the purchase of consumer durable goods; on average, their eligibility increases the likelihood of phone ownership by 3%. Consistent with our graphical analysis, it does not seem that pension age-eligibility leads to ownership of either a television or a radio, which we attribute to the fact that the majority of the sampled households own one. We also note that households in urban areas are more likely to own both a television or radio and phones.

4.6.3 Aggregated Measure

While we have explored a number of selected household items separately, an assessment of the overall context would provide a more comprehensive picture of a household's well-being. To this end, we follow Chetty et al. (2010) and Kling et al.

(2007) and construct a summary index that aggregates information over the previous outcomes, namely food security, ownership of consumer durable goods, sanitation, and source of drinking water. We assume the outcomes are closely related and to be moving in the same direction, as a result this aggregation improves our statistical power.

The summary index, Y, is constructed such that it has equal weighted average of the standardized z-score of its 6 components. Each of the 6 outcomes is standardized by subtracting its mean and dividing it by its standard deviation. The resulting standardized score therefore has a mean of 0 and standard deviation of 1. To illustrate this, let Y_n be the n^{th} outcome of N outcomes, μ_n the mean of the outcome, and σ_n its standard deviation. The normalized outcome is then: $Y_n^*=(Y_n - \mu_n/\sigma_n)$. We then sum up the individual standardized scores and divide them by the standard deviation of the sum, $Y^* = \sum_{i=1}^{n} Y_n^*/N$, obtaining an index that has a standard deviation of 1. Henceforth, a higher index represents better outcomes and the summary index is interpreted as a broader measure of a household's well-being.

Results

To assess the impact of pension age-eligibility on household well-being, we estimate a linear model described in section 4.4.3. The dependent variables measure the overall well-being of a household (based on the above 6 aggregated measures). Results are presented in table 4.16. There are three specifications: Column (1) includes only the individual controls; we control for household size and the number of children in the household in Column (2); and finally control for the presence of other non-spousal residents in Column (3). Once again, the coefficient on males' age-eligibility is negative, however insignificant at conventional levels. While its interaction with married dummy variable is positive, the coefficient is insignificant as well, implying that males' age-eligibility, whether single or married, is less likely to have a significant effect on the

overall well-being of their households. On the other hand, single females' estimates are positive and significant across the three specification. Females' age-eligibility x marriage dummy variable coefficient, while negative, is small and insignificant in magnitude, an indication that women do appear to channel their pension income to these household consumption items.

4.7 Conclusion

Cash transfers can empower poor and credit-constrained households through the consumption of selected items, which in turn may improve their overall well-being. This study uses the South African Old Age Pension (OAP) to estimate the program's age-eligibility impact on food security for both adults and the children residing with them, quality of drinking water and access to sanitation facilities, and ownership of household durable goods. In addition, we examine whether the impact of age-eligibility is influenced by gender.

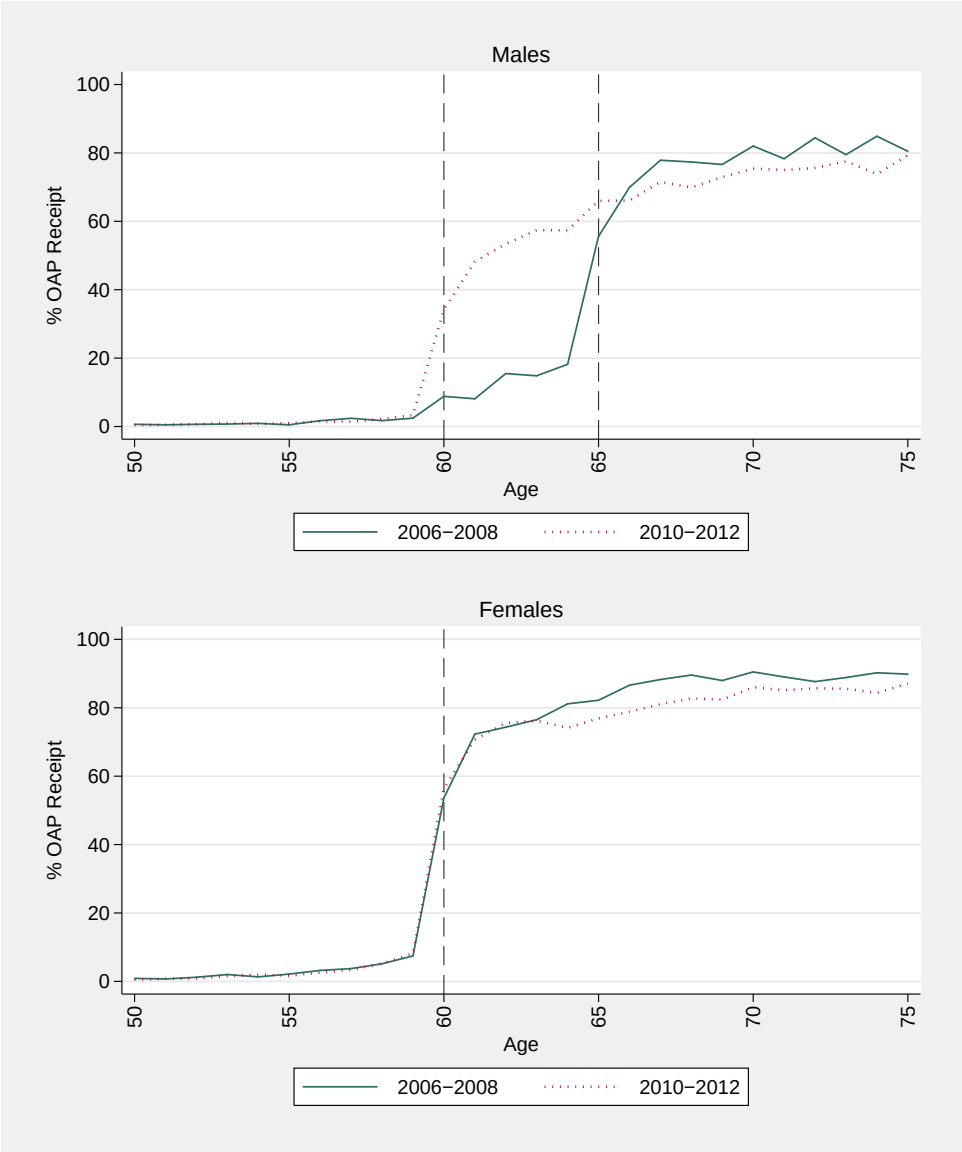
One of the primary goals for the OAP to elderly South Africans is to alleviate poverty, particularly for the elderly that do not have access to a private pension. The significance of OAP is highlighted by the fact that it is a very generous source of income which provides older men and women with a guaranteed income that places them above the median income distribution of the country (Hamoudi and Thomas, 2005). In some cases, this can be the only source of income for certain households. A number of studies have also shown that the majority of the elderly reside with younger individuals (e.g., working-age population and grandchildren), and as a result, their pension potentially reaches other residents as well.

The results of this study demonstrate that pension age-eligibility has a positive impact on the majority of the measured outcomes; however, this has been observed on selected items for females, not males. Since pensioned households are more likely to be severely budget constrained, any increase in household income, as in the case of

receiving the OAP, is more likely to be spent on more pressing needs, like food. This could explain why we observe positive and significant effects on food security and less on other measured outcomes. Also, the bargaining model of the household predicts that the increase in the share of income experienced by women when they become age-eligible leads to an increase in their bargaining power within their household and consequently causes the observed results. These positive improvements in measured household outcomes for female age-eligibility, but not that of males, is consistent with previous results (Duflo, 2003; Lundberg et al., 1997) that have been used to argue that social programs aimed at women result in more productive uses. Nonetheless, the interpretations in this study should be taken with caution because they are based on a reduced form analysis and more understanding of complex intra-household income dynamics is needed.

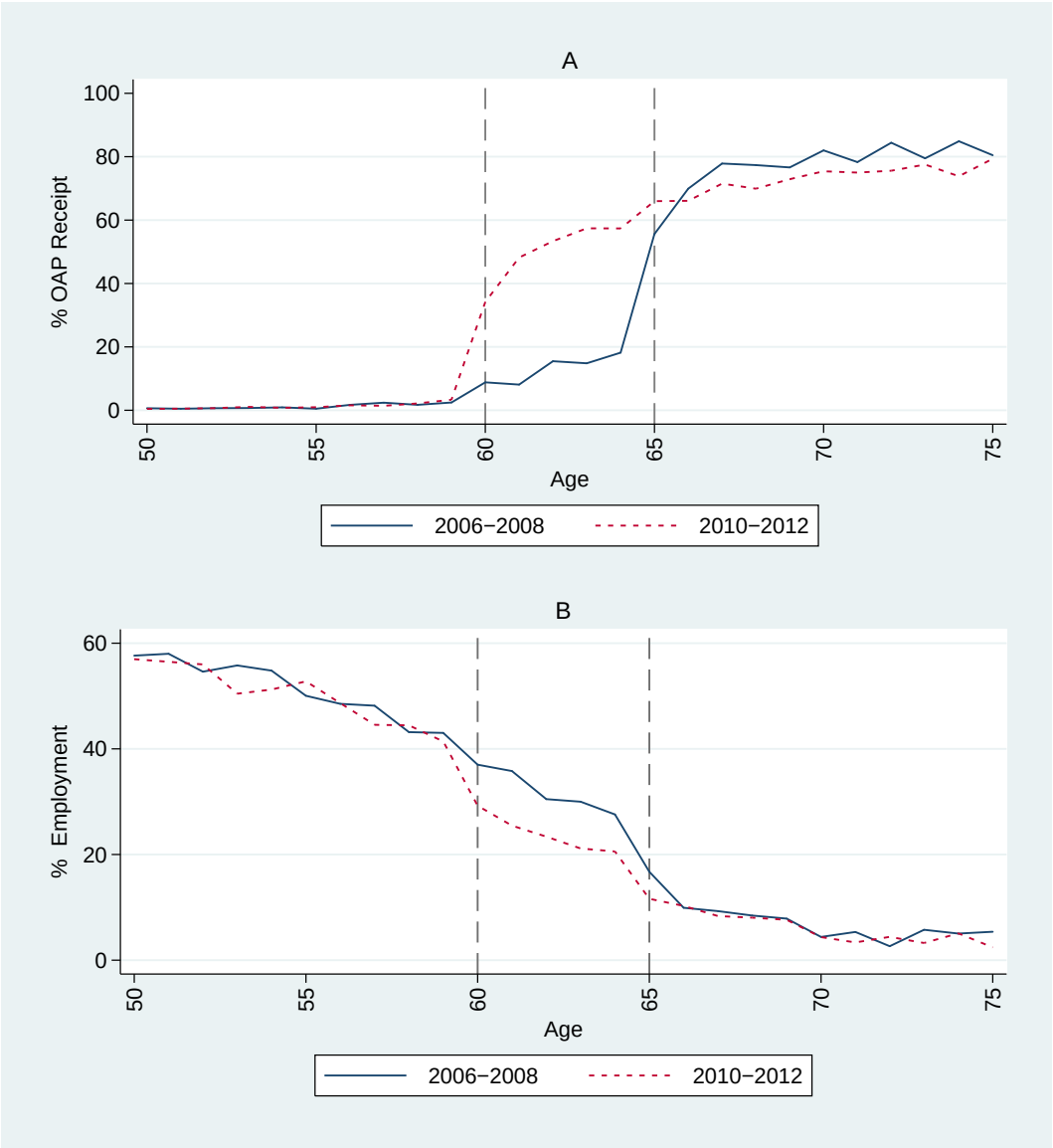
4.8 Figures

Figure 4.1: Pension Receipt by Gender



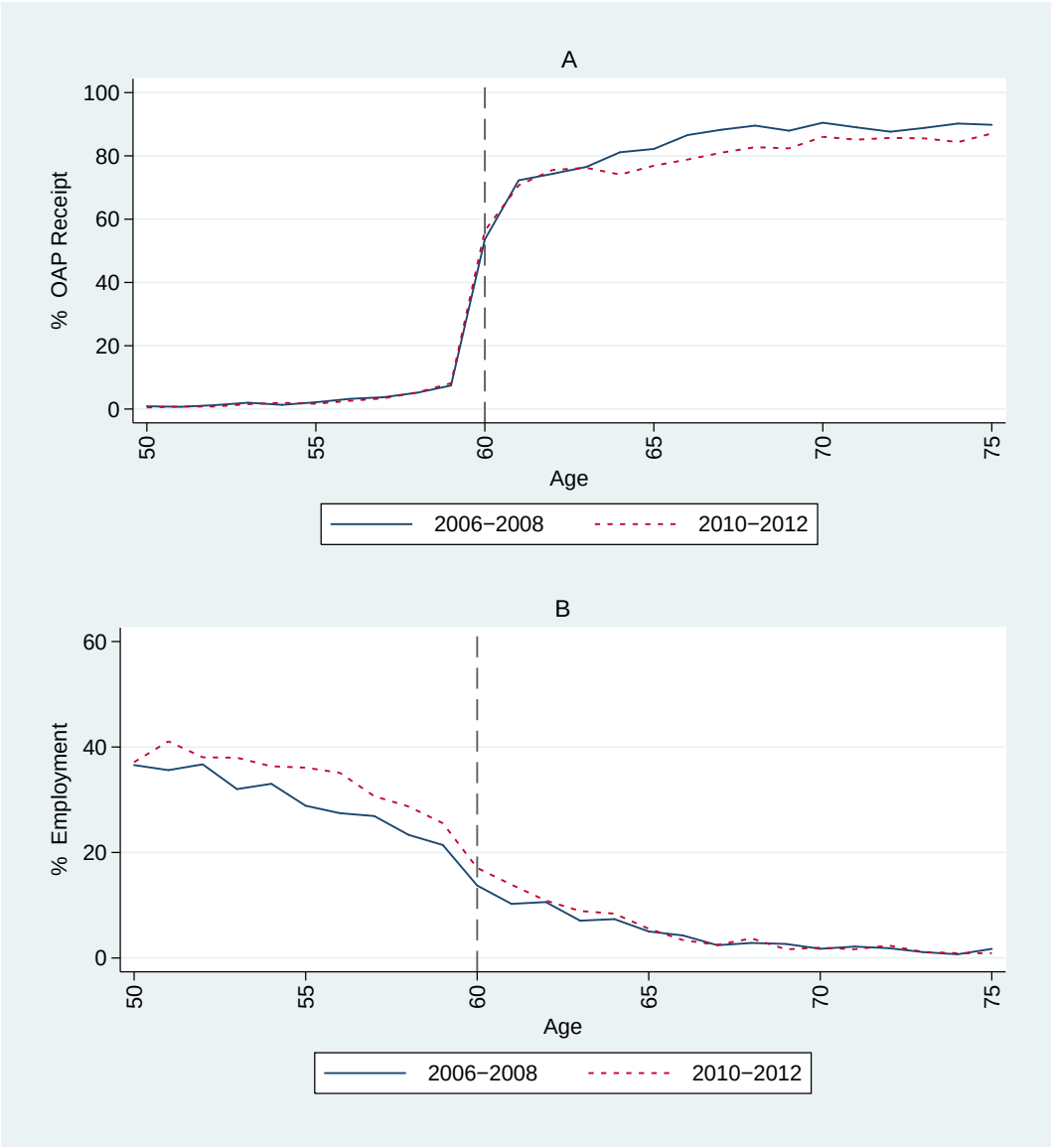
Note: These panels present changes in the fraction of males and females that report to be on OAP by age. Figures are compiled using the 2006-2012 GHS data.

Figure 4.2: Males: Pension Receipt and Employment by Age



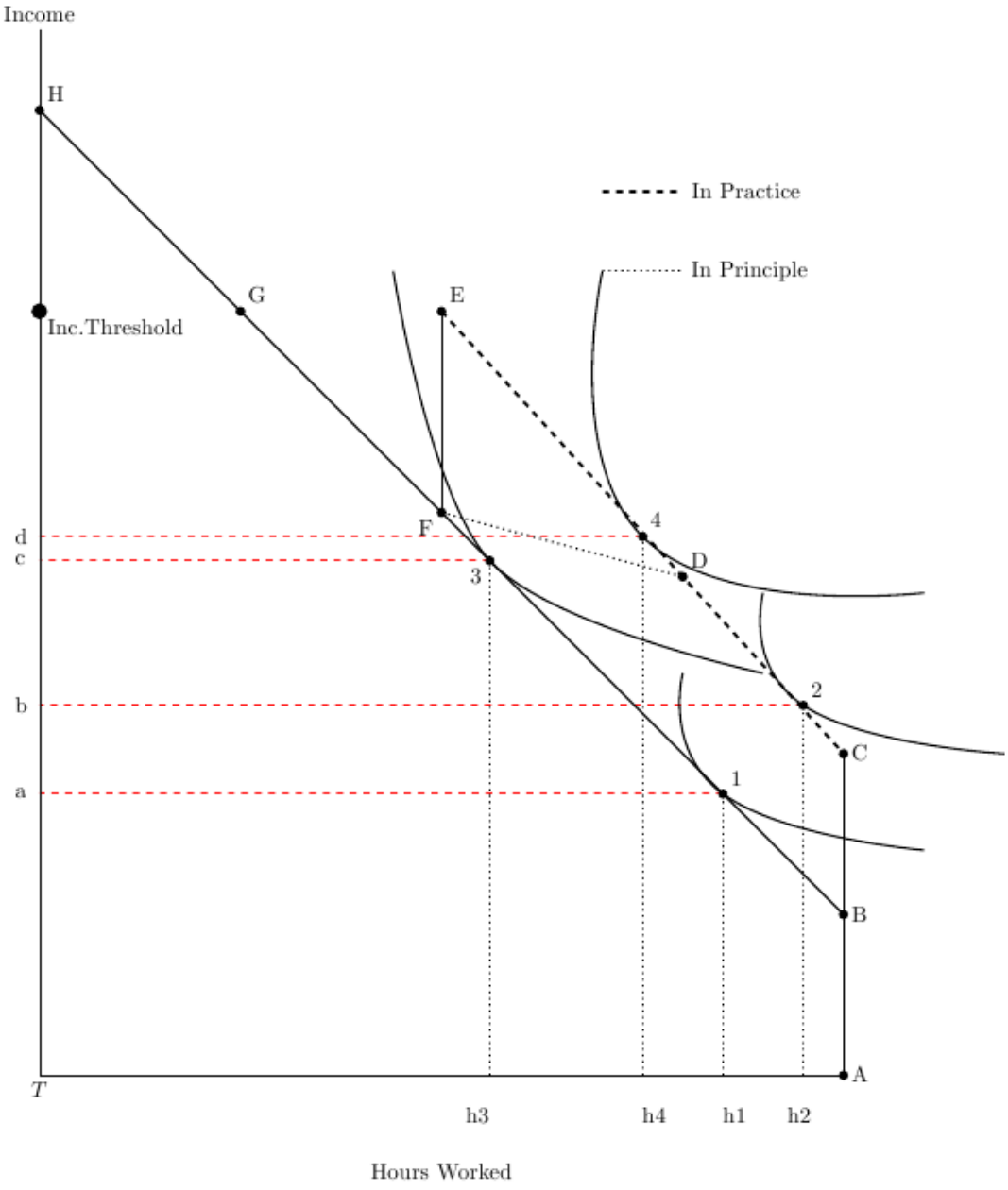
Note: These panels present change in the fraction of males who report to be on pension (Panel A) and employment rates (panel B) by age, before and after the pension reform. We collapse years before the reform into one graph and years after the reform into another graph. The transition year is omitted. Figures compiled using the 2006-2012 GHS data.

Figure 4.3: Females: Pension Receipt and Employment by Age



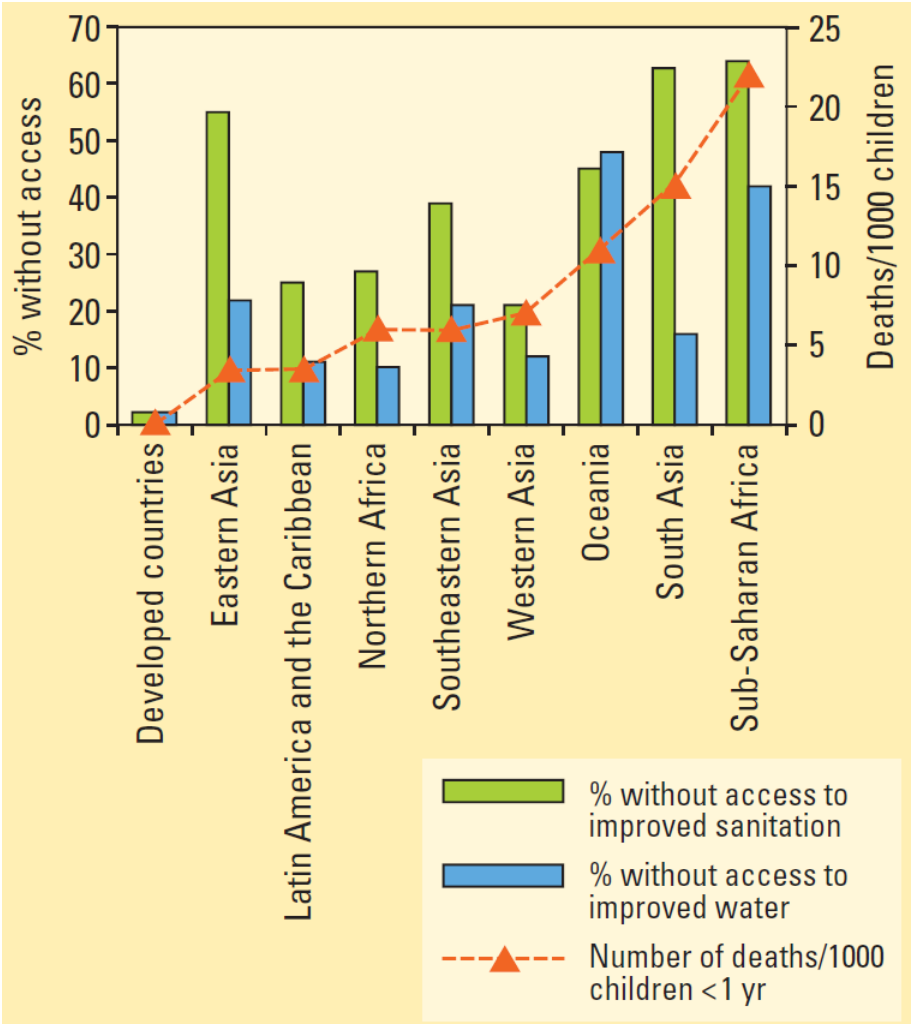
Note: These panels present change in the fraction of females who report to be on pension (Panel A) and employment rates (panel B) by age, before and after the pension reform. We collapse years before the reform into one graph and years after the reform into another graph. The transition year is omitted. Figures compiled using the 2006-2012 GHS data.

Figure 4.4: Stylized Budget Constraint: Difference in Income Expansion Paths between Males and Females



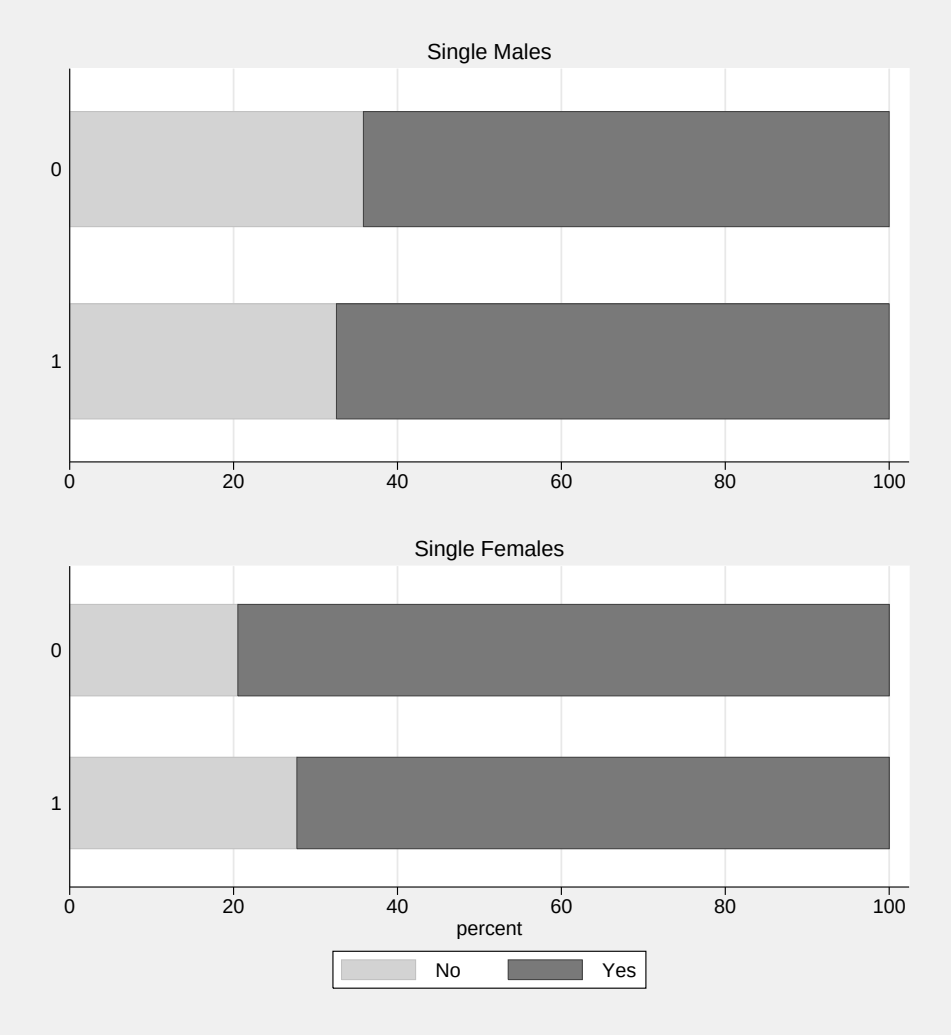
Note: Hours of work increase as you move left to right (A to T)

Figure 4.5: Lack of Access to Improved Water and Sanitation and Death due to Diarrheal of Diseases: A Comparison Across Regions.



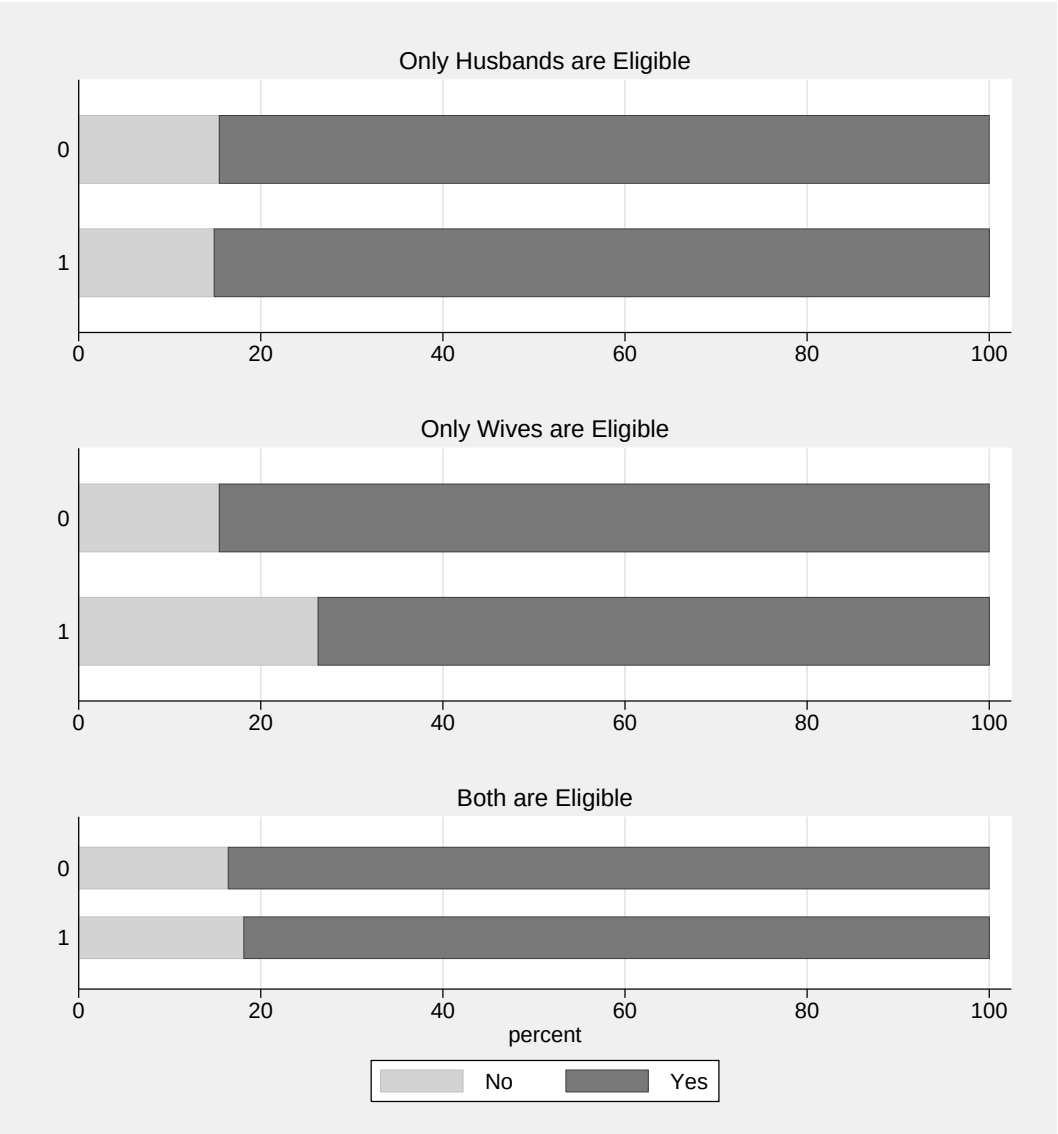
Adapted from: (Montgomery and Elimelech, 2007).

Figure 4.6: Singles: Consumer Durable Goods (Phones)



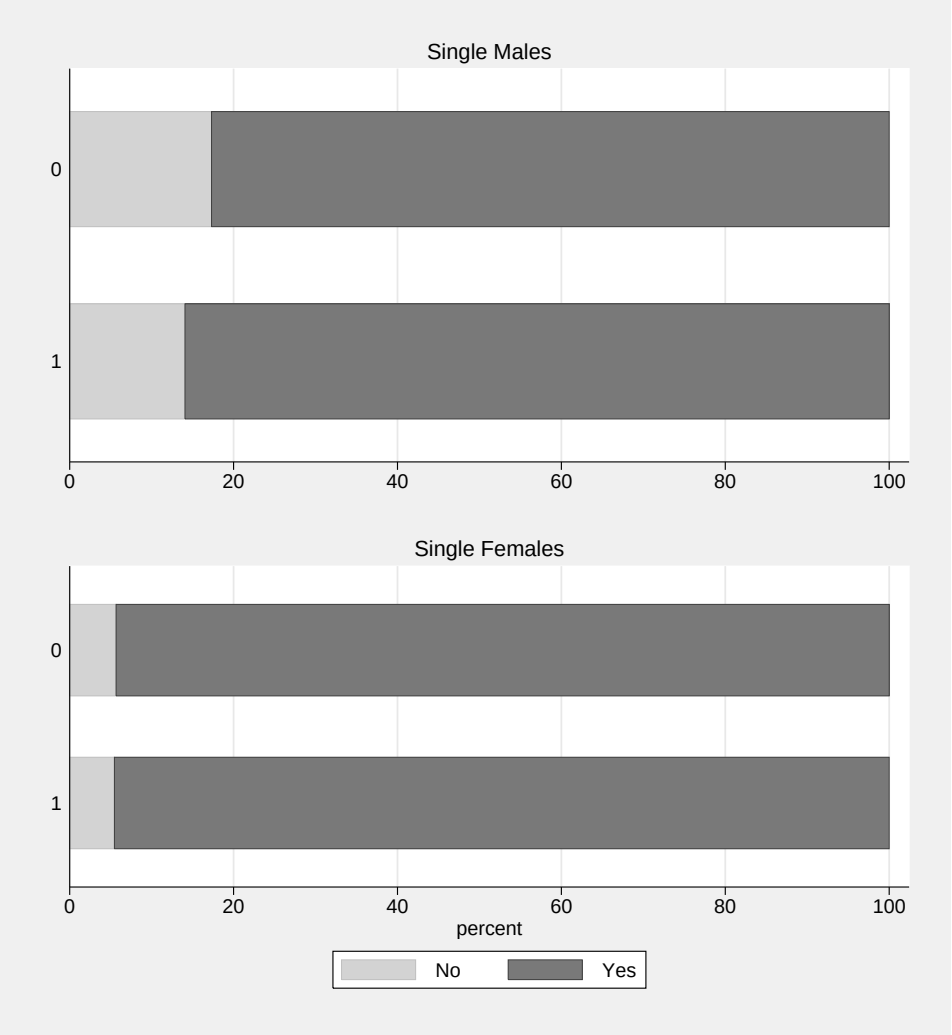
Note: On the Y-Axis: 0= Not Pension Age-Eligible, and 1=Pension Age-Eligible. YES=Owns at least one; No=Does not own any.

Figure 4.7: Married: Consumer Durable Goods (Phones)



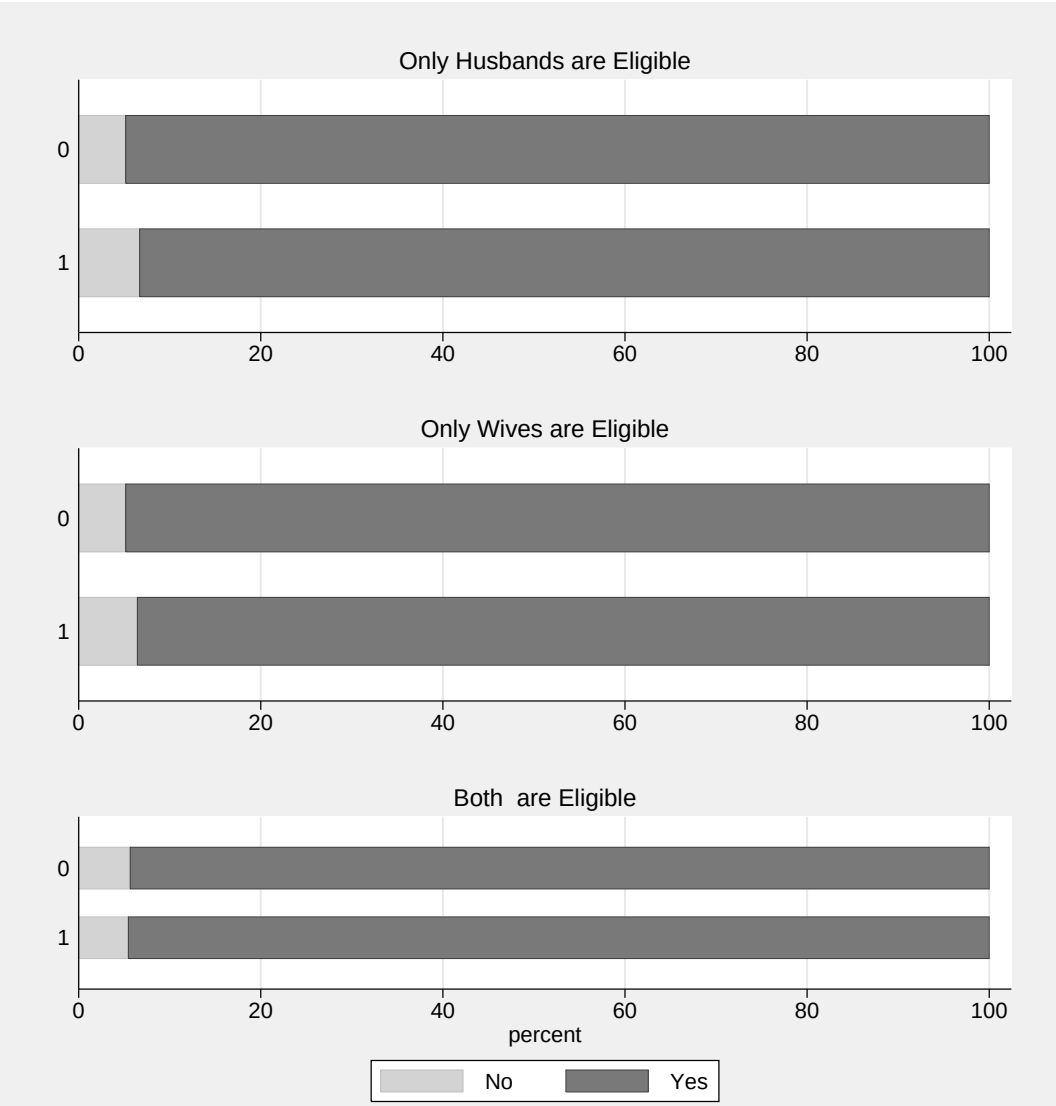
Note: On the Y-Axis: 0= Not Pension Age-Eligible, and 1=Pension Age-Eligible. YES=Owns at least one; No=Does not own any.

Figure 4.8: Singles: Consumer Durable Goods (Television or Radio)



Note: On the Y-Axis: 0= Not Pension Age-Eligible, and 1=Pension Age-Eligible. YES=Owns at least one; No=Does not own any.

Figure 4.9: Married: Consumer Durable Goods (Television or Radio)



Note: On the Y-Axis: 0= Not Pension Age-Eligible, and 1=Pension Age-Eligible. YES=Owns at least one; No=Does not own any.

4.9 Tables

Table 4.1: Descriptive Statistics

	MALE				FEMALE			
	Not Eligible		Eligible		Not Eligible		Eligible	
	Mean	sd	Mean	sd	Mean	sd	Mean	sd
Age	55.36	3.82	67.19	4.19	54.24	2.88	66.37	4.52
Education (Yrs)	6.87	4.88	5.83	4.98	6.42	4.73	4.80	4.62
%White	0.13	0.34	0.17	0.38	0.10	0.31	0.12	0.32
%African	0.68	0.47	0.67	0.47	0.72	0.45	0.74	0.44
%Asian/Indian	0.04	0.19	0.03	0.18	0.03	0.17	0.02	0.15
%Single	0.08	0.27	0.04	0.20	0.17	0.37	0.12	0.32
%Married	0.82	0.38	0.79	0.41	0.51	0.50	0.36	0.48
%Divorced/widowed	0.10	0.31	0.17	0.38	0.32	0.47	0.53	0.50
Household Size	4.47	2.60	4.33	2.87	4.60	2.65	4.37	2.72
Presence of a child	0.59	0.49	0.51	0.50	0.64	0.48	0.61	0.49
# of children	1.40	1.67	1.30	1.79	1.58	1.75	1.56	1.80
Urban	0.67	0.47	0.59	0.49	0.62	0.49	0.53	0.50
N	13,857		10,801		12,312		15,116	

Note: Author's calculations from 2006-2012 General Household Survey (GHS)

Table 4.2: Adult Food Security Responses by Age-Eligibility Status and Gender

	Single Males		Single Females		Married			
	Not Eligible	Eligible	Not Eligible	Eligible	Both not Eligible	Only Husband Eligible	Only Wife Eligible	Both are Eligible
Never	76.94	82.41	76.76	82.58	85.74	83.56	86.10	90.45
Seldom	5.72	4.66	5.31	4.80	3.75	4.93	2.54	3.10
Sometimes	12.05	9.80	13.57	10.32	8.18	9.44	9.15	5.66
Often	3.69	2.11	2.94	1.56	1.57	1.67	1.78	0.50
Always	1.61	1.02	1.43	0.74	0.77	0.41	0.42	0.29
N	5,155	2,939	12,318	15,117	7,522	2,700	1,180	5,162

Note: Author's calculations from 2006-2012 General Household Survey (GHS)

Table 4.3: Children's Food Security Responses by Age-Eligibility Status and Gender

	Single Males		Single Females		Married			
	Not Eligible	Eligible	Not Eligible	Eligible	Both not Eligible	Only Husband Eligible	Only wife Eligible	Both are Eligible
Never	79.05	81.07	76.52	81.42	83.14	81.42	83.26	88.06
Seldom	5.23	4.81	5.06	5.00	4.40	5.77	2.59	3.41
Sometimes	11.91	11.45	14.47	11.06	9.88	10.10	11.11	7.49
Often	2.79	1.76	2.67	1.69	1.80	2.08	2.59	0.74
Always	1.02	0.92	1.29	0.83	0.78	0.63	0.46	0.30
N	2,258	1,310	8,840	10,543	7,095	1,733	657	2,697

Note: Author's calculations from 2006-2012 General Household Survey (GHS)

Table 4.4: Estimated Effects of Pension Age-Eligibility on Adults' Food Security

Specification:	Model 1	Model 2	Model 3
Males' Eligibility	-0.143	-0.156	-0.159
	(0.163)	(0.163)	(0.163)
Males' Eligibility X Married	0.064	0.080	0.084
	(0.160)	(0.161)	(0.161)
Married	1.849**	1.944**	2.081**
	(0.880)	(0.944)	(1.023)
Females' Eligibility	0.265**	0.267**	0.266**
	(0.104)	(0.104)	(0.104)
Females' Eligibility X Married	-0.031	-0.043	-0.041
	(0.114)	(0.115)	(0.115)
Household Size		-0.065***	-0.068***
		(0.012)	(0.012)
No. of children		0.005	0.008
		(0.019)	(0.019)
Presence of Eligible Co-residents			0.247**
			(0.108)
N	45,431	45,431	45,431
Household Controls	No	Yes	Yes
Province Effects	Yes	Yes	Yes
Year Effects	Yes	Yes	Yes

Note: Dependent variable is food security status for adults in the household. Estimates are produced using ordered logit on a four point scale: 0=Always, 1= Often, 2=Sometimes, 3=Never, and 4=Never go hungry because there was not enough food. Standard errors are shown in parentheses. Sample is restricted to male and female head of households aged 50 to 75. Control variables are education (yrs), rural/urban status, year dummies, age dummy for males and a quadratic for females, household size, number of children, population groups (White, Black, Coloured, Asian/Indian), and presence of other eligible co-residents (non-spousal members)*** p<0.01, ** p<0.05, * p<0.1.

Table 4.5: Estimated Effects of Pension Age-Eligibility on Children's Food Security

Specification:	Model 1	Model 2	Model 3
Males' Eligibility	-0.319	-0.351	-0.351
	(0.263)	(0.265)	(0.265)
Males' Eligibility X Married	0.234	0.271	0.272
	(0.256)	(0.257)	(0.257)
Married	0.273	0.298	0.303
	(1.377)	(1.383)	(1.382)
Females' Eligibility	0.257**	0.251**	0.251**
	(0.114)	(0.114)	(0.114)
Females' Eligibility X Married	-0.014	-0.026	-0.025
	(0.139)	(0.139)	(0.139)
Household Size		-0.046***	-0.047***
		(0.014)	(0.014)
No. of children		-0.050**	-0.049**
		(0.021)	(0.021)
Presence of Eligible Co-residents			0.071
			(0.125)
N	28,149	28,149	28,149
Household Controls	No	Yes	Yes
Province Effects	Yes	Yes	Yes
Year Effects	Yes	Yes	Yes

Note: Dependent variable is food security status for children in the household. Estimates are produced using ordered logit on a four point scale: 0=Always, 1= Often, 2=Sometimes, 3=Never, and 4=Never go hungry because there was not enough food. Standard errors are shown in parentheses. Sample is restricted to male and female head of households aged 50 to 75. Control variables are education (yrs), rural/urban status, year dummies, age dummy for males and a quadratic for females, household size, number of children, population groups (White, Black, Coloured, Asian/Indian), and presence of other eligible co-residents (non-spousal members)*** p<0.01, ** p<0.05, * p<0.1.

Table 4.6: Estimated Effects of Pension Age-Eligibility on Household Size

Specification:	Household Size	No. of Children
Males' Eligibility	-0.086	-0.073
	(0.153)	(0.085)
Males' Eligibility X Married	0.101	0.087
	(0.151)	(0.083)
Married	1.046	1.031
	(1.016)	(0.775)
Females' Eligibility	0.047	0.084
	(0.104)	(0.068)
Females' Eligibility X Married	-0.152	-0.123*
	(0.113)	(0.073)
N	45,431	45,431
Province Effects	Yes	Yes
Year Effects	Yes	Yes

Note: Dependent variable is Column 1: household size and Column 2: number of children in the household. Estimates are produced using OLS Standard errors are shown in parentheses. Sample is restricted to male and female head of households aged 50 to 75. Control variables are education (yrs), rural/urban status, year dummies, age dummy for males and a qudratic for females, population groups (White, Black, Coloured, Asian/Indian), and presence of other eligible co-residents (non-spousal members)*** p<0.01, ** p<0.05, * p<0.1.

Table 4.7: Definitions of Unimproved and Improved Water Supply and Sanitation

Status	Water Supply	Sanitation
Unimproved/basic	(1) Unprotected well (2) Unprotected spring (3)Tanker/truck water (4) Rivers, canals, ditches	(1) No toilet facilities (2) Bucket latrines (waste is manually removed) (3) Public latrines (4) Latrines with an open pit (5) Hanging latrines
Improved	(1) Household connection (2) Public standpipe (3) Borehole (4) Protected well (5) Rainwater collection (6) Protected spring	(1) Connection to a public sewer (2) Connection to a septic system (3) Pour-flush latrine (4) Covered pit latrine (5) Ventilated pit latrine

Source:(WHO/UNICEF, 2000)

Table 4.8: Variable Definitions: Categories of Water-, Sanitation-, and Hygiene-Related Diseases

Category	Definition
Waterborne:	caused by the ingestion of water that is contaminated by human or animal wastes (excreta or urine) containing pathogenic bacteria or viruses. Associated with this includes typhoid, amoebic and bacillary dysentery, cholera, and other diarrheal diseases.
Water-based:	caused by parasites that are found in intermediate organisms that live in water. Examples of the associated diseases include schistosomiasis and dracunculiasis.
Water-related:	caused by organisms whose life cycle is associated with insects that breed or live in water; includes malaria, yellow fever, dengue fever, and lymphatic filariasis.
Excreta-related:	caused by direct or indirect contact with the pathogens associated with excreta carriers breeding in excreta. Associated diseases include trachoma.
Water collection and storage:	caused by contamination of water that occurs during collection of water or after, often because of poor water collection, or use of open containers, or poor handling and storage.
Toxin-related:	associated with toxic (example, cyanobacteria), which are linked to eutrophication of surface-water; causes diseases, such as gastrointestinal and hepatic illnesses.

Sources: Eisenberg et al. (2001), Maier et al. (2009), Chorus et al. (1999), and Montgomery and Elimelech (2007)

Table 4.9: Variable Definitions: Categories of Drinking Water Sources

Category	Definition
Piped water:	It is also referred to as household connection in the dwelling. It is a water service pipe connected with in-house plumbing. Piped water in the yard is also referred to as yard connection and is defined as piped water connection to taps placed in the yard (outside the house).
Public tap:	Consists of multiple taps in a public water station where people can collect water.
Borehole:	Is described as a deep hole that has been bored or drilled, with the intention of reaching groundwater supplies. These boreholes are constructed with casings, or pipes to prevent small diameter holes from collapsing in and also to protect the water sources from infiltration by run-off water.
	Water is delivered though pumps, which are powered by human, wind, electric, or diesel power. More often they are protected by a platform to lead spilled water away from the boreholes and also to prevent run-off water from infiltrating back.
A well:	A type of well that is common is the dug well. It is an excavation with a diameter large enough to accommodate one or more people with shovels digging down to reach the water table. Water is often drawn up using containers, such as buckets that are raised mechanically or by hand.
	It can either be protected, such that there is a cover on it, or a well lining or casing that is raised above the ground to divert spilled water from it. Some wells, however, are not covered.
Spring:	Is a result of surface water that has infiltrated to the earth's surface.
Rainwater:	Rainwater refers to rain that is harvested from surfaces such as a roof or a ground collection area and stored in containers/tank.
Tanker:	Water that is trucked into communities for sale using tanker trucks.
Stream/river/dam/pool:	These are forms of surface water located above ground.

Sources: http://www.wssinfo.org/definitions-methods/watsan-categories/

Table 4.10: Variable Definitions: Sanitation (Toilet Types) Categories

Category	Definition
Flush toilet:	There are two distinct types of flush toilets: one that uses a holding tank (cistern) for flushing water and has a water seal (a U-shaped pipe below the seat) which prevents the passage of odor; and the other (pour flush toilet) that does not have a holding tank and uses water poured by hand for flushing. They are either connected to a piped sewer system or to a septic tank. A piped sewer system/sewerage is a system of sewer pipes designed to collect and remove human waste from the household environment for disposal/treatment. It consists of facilities for collecting, pumping, treating and disposal of the waste. A septic tank is a collecting place for waste. It consists of a watertight settling tank, normally located underground and away from the house or the toilet. The treated effluent is either discharged into a sewer system or seeps into the ground through a leaching pit. In an unimproved case, human waste is instead flushed to the street, a ditch, or an open sewer.
A pit latrine:	It can either be ventilated or not. A ventilated pit latrine is a dry latrine that is ventilated with a pipe that extends above the roof of the latrine. The top end of the ventilation pipe is often covered with a netting or a gauze mesh, while a non-ventilated pit latrine does not have the ventilation pipe. Pit latrine with/without cover: This is also a dry pit latrine where either the pit is fully covered by a slab or platform that is fitted with a squatting hole or a seat. The platforms are often made from solid material such as concrete, cement or logs with earth or mud, such that the pit's contents are not exposed other than through the squatting hole or seat. On the other hand, a pit latrine without a cover is just a rudimentary hole in the ground for waste collection.
A bucket toilet:	Involves the use of a bucket (or any other container) for collection of human waste, which is periodically removed for treatment or disposal.
None/offsite:	This implies lack of toilet facilities. More often human waste is deposited on the ground and covered with a layer of earth, or is wrapped in a bag and thrown into the garbage, or defecation is done into surface water such as rivers, streams or on the beach.

Sources: http://www.wssinfo.org/definitions-methods/watsan-categories/

Table 4.11: Water Sources by Age-Eligibility Status and Gender

	Single Males		Single Females		Married			
	Not Eligible	Eligible	Not Eligible	Eligible	Both not Eligible	Only Husband Eligible	Only wife Eligible	Both are Eligible
Tap in dwelling, or on site, or in yard	68.94	67.61	70.59	66.51	75.92	67.11	75.29	73.60
Neighbor's tap or public tap	22.17	22.42	21.06	22.99	15.27	21.52	15.08	15.25
Borehole on site or communal, or water -carrier/tanker, or rain-water tank on site	1.73	2.28	1.66	2.39	2.34	2.70	2.63	3.10
Well or spring	6.77	7.38	6.41	7.78	6.11	8.30	6.27	7.36
Flowing water /stream/river/dam/pool/ or stagnant water	0.41	0.31	0.28	0.33	0.36	0.37	0.42	0.70
N	5,155	2,939	12,318	15,117	7,522	2,700	1,180	5,162

Note: Author's calculations from 2006-2012 General Household Survey (GHS)

Table 4.12: Toilet Facilities by by Age-Eligibility Status and Gender

	Single Males		Single Females		Married			
	Not Eligible	Eligible	Not Eligible	Eligible	Both not Eligible	Only Husband Eligible	Only wife Eligible	Both are Eligible
Flush toilet (public sewage)	51.31	50.26	49.79	44.68	59.96	48.11	61.50	58.68
Flush toilet(septic tank)	4.34	3.48	3.48	2.63	4.95	4.34	5.71	4.18
Chemical toilet	0.49	0.65	0.68	0.73	0.46	0.71	0.34	0.43
Pit latrine with ventilation	12.51	15.46	14.38	16.63	10.76	15.91	7.84	12.54
Pit latrine without ventilation	22.71	22.41	23.75	27.67	18.56	24.93	19.51	20.30
Bucket toilet	1.67	1.17	1.55	1.32	1.35	1.09	0.94	0.80
No toilet on site	6.97	6.57	6.37	6.35	3.71	4.90	4.17	3.07
N	5,155	2,939	12,318	15,117	7,522	2,700	1,180	5,162

Note: Author's calculations from 2006-2012 General Household Survey (GHS)

Table 4.13: Estimated Effects of Pension Age-Eligibility on Water Quality

Specification:	Model 1	Model 2	Model 3
Males' Eligibility	0.054	0.053	0.073
	(0.167)	(0.167)	(0.168)
Males' Eligibility X Married	-0.208	-0.205	-0.208
	(0.163)	(0.163)	(0.163)
Married	-7.711	-7.691	-7.679
	(4.805)	(4.807)	(4.802)
Females' Eligibility	-0.033	-0.034	-0.049
	(0.110)	(0.110)	(0.111)
Females' Eligibility X Married	-0.106	-0.106	-0.104
	(0.117)	(0.117)	(0.117)
Urban	1.157***	1.156***	1.141***
	(0.050)	(0.050)	(0.071)
Presence of Eligible Co-residents		0.134	0.135
		(0.117)	(0.117)
Males' Eligibility X Urban			-0.096
			(0.107)
Females' Eligibility X Urban			0.075
			(0.090)
N	45,431	45,431	45,431
Province Effects	Yes	Yes	Yes
Year Effects	Yes	Yes	Yes

Note: Dependent variable is household source of drinking water. Estimates are produced using ordered logit on a five point scale: 4=Tap water in dwelling, or on site, or in yard, 3= neighbor's tap or public tap, 2= borehole on site or communal borehole, or water-carrier/tanker or rain-water tank on site, 1= well or spring, 0=flowing water /stream/river/dam/pool/ or stagnant water – with higher values denoting better drinking water sources. Standard errors are shown in parentheses. Sample is restricted to male and female head of households aged 50 to 75. Control variables are education (yrs), rural/urban status, year dummies, age dummy for males and a quadratic for females, household size, number of children, population groups (White, Black, Coloured, Asian/Indian), and presence of other eligible co-residents (non-spousal members)*** p<0.01, ** p<0.05, * p<0.1.

Table 4.14: Estimated Effects of Pension Age-Eligibility on Sanitation

Specification:	Model 1	Model 2	Model 3
Males' Eligibility	-0.032	-0.032	0.025
	(0.111)	(0.111)	(0.113)
Males' Eligibility X Married	-0.147	-0.147	-0.157
	(0.105)	(0.105)	(0.105)
Married	0.074	0.108	0.088
	(0.904)	(0.917)	(0.958)
Females' Eligibility	0.111*	0.111*	0.113*
	(0.065)	(0.065)	(0.067)
Females' Eligibility X Married	0.019	0.019	0.020
	(0.078)	(0.078)	(0.078)
Urban	1.058***	1.057***	1.107***
	(0.043)	(0.043)	(0.061)
Presence of Eligible Co-residents		0.052	0.053
		(0.086)	(0.086)
Males' Eligibility X Urban			-0.197**
			(0.087)
Females' Eligibility X Urban			-0.012
			(0.074)
N	45,431	45,431	45,431
Province Effects	Yes	Yes	Yes
Year Effects	Yes	Yes	Yes

Note: Dependent variable is household toilet facility. Estimates are produced using ordered logit on an eight point scale: 0=No toilet on site, 1=bucket toilet, 2=pit latrine without ventilation, 3=pit latrine with ventilation, 5=chemical toilet, 6=flush toilet that deposits waste to a septic tank, 7=flush toilet that deposit to the public sewageh. Standard errors are shown in parentheses. Sample is restricted to male and female head of households aged 50 to 75. Control variables are education (yrs), rural/urban status, year dummies, age dummy for males and a quadratic for females, household size, number of children, population groups (White, Black, Coloured, Asian/Indian), and presence of other eligible co-residents (non-spousal members)*** p<0.01, ** p<0.05, * p<0.1.

Table 4.15: Estimated Effects of Pension Age-Eligibility on Ownership of Consumer Durable Goods

Specification:	Phones	Phones	TV/Radio	TV/Radio
Males' Eligibility	-0.031	-0.031	-0.001	-0.001
	(0.019)	(0.019)	(0.010)	(0.010)
Males' Eligibility X Married	0.011	0.011	-0.004	-0.004
	(0.019)	(0.019)	(0.010)	(0.010)
Married	-0.410	-0.369	-0.260	-0.248
	(0.513)	(0.495)	(0.319)	(0.317)
Females' Eligibility	-0.017	-0.015	-0.000	0.001
	(0.013)	(0.013)	(0.007)	(0.007)
Females' Eligibility X Married	0.030**	0.028**	-0.005	-0.006
	(0.014)	(0.014)	(0.008)	(0.008)
Urban	0.019**	0.017**	0.011***	0.010**
	(0.007)	(0.007)	(0.004)	(0.004)
Males' Eligibility X Urban	-0.028**	-0.027**	-0.012*	-0.011*
	(0.012)	(0.012)	(0.006)	(0.006)
Females' Eligibility X Urban	0.000	-0.001	-0.002	-0.003
	(0.009)	(0.009)	(0.005)	(0.005)
Presence of Eligible Co-residents		0.006		0.007
		(0.014)		(0.007)
N	45,431	45,431	45,431	45,431
Province Effects	Yes	Yes	Yes	Yes
Year Effects	Yes	Yes	Yes	Yes

Note: Dependent variable is ownership of household durable goods. Estimates presented are marginal effects produced using a logit model where 1=ownership of at least one of the named household goods, otherwise 0. Standard errors are shown in parentheses. Sample is restricted to male and female head of households aged 50 to 75. Control variables are education (yrs), rural/urban status, year dummies, age dummy for males and a quadratic for females, household size, number of children, population groups (White, Black, Coloured, Asian/Indian), and presence of other eligible co-residents (non-spousal members)*** p<0.01, ** p<0.05, * p<0.1.

Table 4.16: Estimated Effects of Pension Age-Eligibility on Aggregated Measures

Specification:	Model 1	Model 2	Model 3
Males' Eligibility	-0.089	-0.092	-0.093
	(0.068)	(0.067)	(0.067)
Males' Eligibility X Married	0.017	0.016	0.017
	(0.064)	(0.063)	(0.063)
Married	0.004	0.016	0.044
	(0.231)	(0.225)	(0.232)
Females' Eligibility	0.100***	0.106***	0.105***
	(0.038)	(0.037)	(0.037)
Females' Eligibility X Married	-0.044	-0.043	-0.042
	(0.038)	(0.038)	(0.038)
Males' Eligibility X Urban	-0.156***	-0.147***	-0.148***
	(0.026)	(0.025)	(0.025)
Females' Eligibility X Urban	-0.050**	-0.052**	-0.052**
	(0.023)	(0.023)	(0.023)
Household Size		0.081***	0.080***
		(0.005)	(0.005)
No. of children		-0.091***	-0.090***
		(0.007)	(0.007)
Presence of Eligible Co-residents			0.073**
			(0.033)
N	45,431	45,431	45,431
Household Controls	No	Yes	Yes
Province Effects	Yes	Yes	Yes
Year Effects	Yes	Yes	Yes

Note: Dependent variable is an aggregated measure that includes, food secuity, water source, sanitation, and ownership of duarble goods. Estimates are produced using a linear model . Standard errors are shown in parentheses and clustered at the household level. Sample is restricted to male and female head of households aged 50 to 75. Control variables are education (yrs), rural/urban status, year dummies, age dummy for males and a quadratic for females, household size, number of children, population groups (White, Black, Coloured, Asian/Indian), and presence of other eligible co-residents (non-spousal members)*** p<0.01, ** p<0.05, * p<0.1.

Chapter 5 Conclusion

In this dissertation, we study the impact of a large cash transfer on a number of selected outcomes using the South African State Old Age Pension (OAP). The second chapter of this dissertation highlights the significance of the pension to South African households and also discusses a 2008 OAP reform that reduced, in steps, the minimum pension eligibility age. This reform provided us with a natural experiment and an opportunity to evaluate potential effects of such a large cash transfer based on a policy intervention rather than relying on cross-individual variation in eligibility/pension receipt, which is likely to be biased by unobserved characteristics. In chapter 3, we examine the impact of OAP age-eligibility on the labor force participation of older men. We acknowledge that it would be ideal to evaluate the impact of pension receipt, itself, on labor force participation. Unfortunately pension take-up conditional on age-eligibility is endogenous, but the eligibility is not because it is imposed by the government.

Using the General Household Survey (GHS), we find that, while pension eligibility does not stipulate that recipients should not work, pension age-eligibility has a strong negative impact on labor force participation at the eligibility age. We conclude that this observation is an indication that OAP creates incentives for older workers to withdraw from labor force and that the reform in particular made it easier for younger workers to withdraw from the labor force.

Chapter 4 uses the South African Old Age Pension (OAP) to estimate the program's age-eligibility impact on consumption of selected items, namely food security, quality of drinking water and access to improved sanitation facilities, and ownership of household durable goods. Our results demonstrate that pension age-eligibility does have a positive impact; however, we observe this positive impact on selected outcomes for females, not for males. We find these results to be consistent with the bargaining

models of the household which predict individuals' bargaining power increases with an increase in the fraction of household income. In the context of this dissertation, the increase in women's income share relative to men's when they become age-eligible, more likely increases their bargaining power within the household and as a result causes the observed results. This positive impact is consistent with other studies, such as Duflo (2003), that have been used to argue that cash transfers in the hands of women are used more productively than those in the hands of males.

One of the shortcomings of our data is that we do not observe hours worked. With the availability of information on hours worked, further research can be conducted to explore the impact of OAP on both labor force participation as well as the number of hours of work. In addition, findings from chapter 4 could be explored further with a panel data where we would observe households before and after a household head becomes pension age-eligible.

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Vita

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Education

- B.A. Economics, Eastern Kentucky University, 2006.
- M.B.A. Eastern Kentucky University, 2010.
- M.S. Economics, University of Kentucky, 2012.

Employment

- Instructor, University of Kentucky 2012-2016.
  - Economics and Business Statistics (7 sections)
  - Principles of Macroeconomics (3 sections)
- Teaching Assistant, University of Kentucky 2011-2014
  - Principles of Microeconomics
  - Principles of Macroeconomics
  - Economics and Business Statistics
  - Intermediate Microeconomic Theory

Conferences

- Southern Economic Association Conference Annual Meeting (presenter, discussant), November 2015
- St. Louis FED Professors Conference (presenter), November 2015
- Kentucky Economic Association Conference (presenter), October 2015
- Lilly International Conference on College Teaching (presenter), October 2014

Professional Development

- University of Kentucky Economics Teaching Workshop, 2012-2016
- Quantitative Initiative for Policy and Social Research (QIPSR) Stata Graphing Workshop, University of Kentucky, January 2014
- QIPSR ArcGIS Workshop, University of Kentucky, February, 2014

- Teaching Methods in Business and Economics Seminar, University of Kentucky, Fall 2012

Scholarships and Awards

- Virgil L. Christian, Jr. Scholarship (2011-2012)
- Max Steckler Fellowship, University of Kentucky (2011-2012)
- Gatton Doctoral Fellowship, University of Kentucky (2013-2014)
- Lyman T. Johnson Academic Year Fellowship, University of Kentucky (2012-2016)