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HOW PUBLIC PENSION AFFECTS ELDERLY LABOR SUPPLY AND WELL-BEING: EVIDENCE FROM INDIA

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ABSTRACT

We study the effect of a recent expansion in India's National Old Age Pension Scheme on elderly well-being. Estimates suggest that public pension has a modestly negative effect on the employment of elderly/near elderly men with a primary or lower education but no effect of the employment of similar women. Pension raised family expenditures, lowering poverty, and the effect was smaller on families headed by illiterate persons suggesting lower pension coverage of this most disadvantaged group. Further, households spent most of the pension income on medical care and education. We find some weak evidence that pension raised longevity.

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Introduction

Industrialized countries have been experiencing a gradual aging of populations for several decades. In developing countries, aging is a more recent phenomenon that is outpacing the rise in elderly population in the rich world. The trend is projected to continue such that in 50 years 80 percent of the elderly will be living in developing countries. If this trend is a guide, developing countries are likely to have less time to prepare and adjust to the consequences of aging than did industrialized countries (United Nations, 2010). Yet, there is limited research on how non-contributory programs for the elderly poor affect wellbeing in large developing countries.

The objective of this paper is to investigate the effects of India's Old Age Pension Scheme on a range of outcomes capturing the well-being of the elderly, namely, employment, monthly expenditure and composition, living arrangements, and longevity. India has the second largest population of elderly persons in the world. Although not a relatively large proportion of the nation's population, at 100 million in 2011, as per the provisional 2011 Census estimates, the elderly in India would constitute the 12th largest nation in the world (Ramakrishnan, 2012).

Until recently, social security was non-existent for a vast majority of India's elderly, who predominantly work in the informal sector where there is no mandatory retirement. In the absence of adequate savings and pension plans, most people in the informal sector work past the conventional retirement age (Mathew and Rajan, 2008, World Bank, 2001). Family is the primary mode of social security for those who cannot work or are engaged in unpaid domestic chores. Rapid economic and social changes in recent years, including migration and urbanization of non-elderly adults, however, have weakened the foundations of the joint family system, leaving the elderly in vulnerable economic conditions (Rajan, 2007; Pal and Palacios, 2011).

In response, in 1995, the Indian government launched the National Old-Age Pension Scheme (NOAPS) providing a modest monthly pension of Rs 75 ($8 in 2006 purchasing power parity) to persons aged 65 or above with no regular income or family support with the objective of covering half the elderly poor in the country.[1] In 2006, the government increased monthly public pension to Rs 200 ($22 in 2006 PPP). Further, the program was expanded to cover all elderly persons living in households with incomes below the poverty line set by the federal government, thereby almost doubling the coverage. In the same year, several state governments supplemented federal pension by raising state pension amounts such that in 2006-2007 total pension for the elderly poor ranged from Rs 200 to Rs 1000 ($22 to $108 in PPP) across states. As we document below, the increases in pension amounts across states are unrelated to long-term demographic trends such as trends in dependency ratio, life expectancy at birth and at 60, or employment trends. Further, due to differences in age eligibility for pension across states, the 2006 pension increases varied across age-state categories.

What has been the impact of NOAPS on the employment, monthly expenditure and composition, living arrangements, and longevity of the elderly poor persons? The answer to this question is important to determine the efficacy of the policy and its long term sustainability. Expenditure on NOAPS was raised from Rs 10 billion ($1.1 billion in 2006 PPP) in 2004-2005 to Rs 28 billion ($ 3.1 billion in PPP) in 2007-2008, and further to Rs 52 billion ($5.8 billion in PPP) in 2010-2011. The number of beneficiaries correspondingly increased from 8 million in 2004-2005 to 14 million in 2007-2008. Further, in recent months the government has proposed to expand the program to cover all elderly persons (Ali, 2012; Kaushal, 2012). Such large scale expansion of public pension would not be not justified if it did not improve the wellbeing of the elderly.

[1] PPP exchange rate is $1 =Rs 9.2 in 2006 (World Bank, 2006)

The program's long-term viability is also linked to its impacts. India's elderly population is projected to triple by 2050, a rise greater in proportion than the projected increase in elderly population in the rest of the world (Nayar, 2008; United Nations, 2010). Population aging is imposing unprecedented fiscal challenges in the rich world. In many industrialized countries, social security programs create incentives for early retirement raising social security costs and lowering long term productivity (Gruber and Wise, 2004). To minimize these effects, in recent years, several western governments have cut social security benefits and raised minimum age eligibility (OECD, 2011). Given the experience of the rich world and India's demographic projections, the long term fiscal impact of any social security program is likely to be nontrivial, making it imperative to investigate its full range of impacts.

To briefly review the results, we find that the public pension program in India has had only a modest effect on elderly employment, but a large positive effect on household expenditures, thereby lowering poverty, and most of the increase in expenditure has been in education and medical care. This is in contrast to the documented large negative employment effects of social security and universal pension programs in rich and middle income countries (Gruber and Wise, 2002, 2004; de Carvalho Filho, 2008). We also find some weak evidence that public pension for the elderly poor in India increased longevity. Finally, there is some evidence that illiterate elderly persons were more likely to be left out of pension coverage.

Background and Policy Context

Previous research documents high incidence of poverty and other forms of deprivation (e.g. basic services, social networks) among the elderly in developing countries (Deaton & Paxson, 1997; Barrientos, Gorman, & Heslop, 2003; Jeyalakshmi, Chakrabarti & Gupta, 2011).[2]

[2] Pal and Palacios (2011), on the other hand, find that elderly persons do not necessarily have higher poverty than non-elderly persons, and they attribute this to "survivorship bias" due to lower survival rate of elderly in poor

Rapid demographic transition and concerns about the vulnerability of the elderly have led to a steady increase in the number of countries with public pension schemes: in 1940, only 33 countries had a public pension program, by 2000, the number had risen to 165 (Kinsella and Phillips, 2005).

A rich body of research has grown around how public pension affects the employment and retirement decisions and incomes of older workers in the industrialized world. In a study of 14 OECD countries, Gruber and Wise (2002) document a strong association between pension eligibility age and retirement decisions. In another study of 12 rich countries, Gruber and Wise (2004) find that social security reforms that delay benefit eligibility by three years would reduce the proportion of men aged 56-65 out of the labor force by between 23 and 36 percent. Similarly, de Carvalho Filho (2008) investigate increase in pension and reduction in minimum eligibility age for workers in rural occupations in Brazil and find that old age benefits raised retirement by 38 percentage points. Bloom et al. (2007), who study 51 low and high income countries, however, find the employment effect of pension to be much more modest. They conclude that the introduction of a fully funded pension system will reduce old-age labor supply by around 5 percent. Their study is based on aggregate macro data. There is relatively limited research based on micro-level data on the effects of non-contributory pension schemes on employment and consumption patterns of the poor elderly populations in developing countries and there is no empirical study of the impacts of the NOAPS on the employment, expenditures, living arrangements, and longevity of the elderly in India, the focus of this study.[3]

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families. Similarly, Drèze and Srinivasan (1997) do not find any association between widowhood and poverty in rural India.

[3]Researchers have studied the effect of pension in South Africa on elderly living arrangements (Edmonds, Mammen, and Miller, 2005), on the redistributive and behavioral aspects of transfers (Case and Deaton, 1998; Duflo, 2000), and labor supply of prime-age adults (Ardington, Case, and Hogegood, 2009; Bertrand, Mullainathan and Miller, 2003; Psel, Fairburn, and Lund, 2006). Fan (2010) has investigated the effect of Farmer's Pension Program in Taiwan on private transfers, Glomm et al. (2005) studied the effect of public pension in Brazil on capital

Banerjee and Duflo (2007) create a proxy measure of longevity – the probability that an adult's mother and father are alive and find that mothers of the non-poor are more likely to be alive than mothers of the poor, inferring thereby that poverty kills. Pal and Palacios (2011) find elderly poverty rate in India to be lower in districts with lower average per capita expenditure, which they attribute to "survivorship bias" – meaning that the elderly have lower survival in high poverty districts. However, neither of these studies is able to establish the direction of causality, i.e. whether the elderly are poor because they have poor health which would result in a higher probability of death, or whether they are in poor health because of low incomes. To establish the direction of causality, we would need a sudden change in income that is unrelated to health status. The increase in pension amount under NOAPS in 2006 that varied between states provides an exogenous change in income that we use to test whether income affects elderly living arrangements and to draw inferences about whether income is association with longevity.

India's Old Age Pension Scheme

Traditionally, elderly people in India have lived with their children or grandchildren. Such living arrangements are usually mutually beneficial with the elderly providing childcare and other forms of support in domestic work to their families and receiving emotional and economic support and old age care in return. Public pension, for a vast majority of the nation's population, had been modest or non-existent (Rajan, 2007). While workers in the formal sector, including those working for the state or federal governments, have certain forms of pension from

accumulation, and Juarez (2010) studied the effect of pension in Mexico on the employment of prime age elderly members. Using survey data for 18 Latin American countries, Dethier et al. (2011) found that a universal pension would substantially reduce poverty among the elderly in many countries.

their employers, only 10% of the working age population in the country works in the formal sector. For the remaining 90%, family is the primary support in old age.[4]

Historically, several state governments have provided a modest pension benefit to the elderly with no income and family support. Starting in the mid-1990s, the federal government initiated a number of policies with the objective of improving the wellbeing of the elderly. In 1995, the National Old-Age pension Scheme (NOAPS) was launched to provide a monthly pension of Rs 75 to persons aged 65 or above with little or no regular income or financial support from family members or other sources (Ministry of Rural Development, 2007). The NOAPS imposed a ceiling on the number of beneficiaries, covering half the elderly poor population in each state with an emphasis on covering all elderly persons with no income or family support (Alam, 2004, Planning Commission, 2008). In 1999, the government also began allocating 10 kg of free food grains (rice or wheat) via the Public Distribution System to elderly persons without any family support or income. Seven years later, in 2006, the federal pension amount under NOAPS was raised to Rs 200 per month and eligibility was extended to all persons aged 65 or above in households with incomes below the poverty line determined by the Government of India. This resulted in a 75 percent increase in number of beneficiaries during 2004-2005 to 2007-2008 (Ministry of Rural development, 2008). Further, the federal government requested state governments to provide a matching Rs 200 monthly pension.

Response to federal government's request has varied across states: in 2007, 12 states/union territories did not provide any additional amount over the federal pension; 10 states/union territories provided an additional pension ranging from Rs. 35 to Rs 175 per month; eight states/union territories had raised their contribution to Rs 200 per month; and five

[4] Individuals can also save for retirement in savings instruments called Public Provident Funds that provide government guaranteed interest on a minimum annual investment of Rs 500.

states/union territories contributed between Rs 250 to Rs 800 in additional monthly pension. As a result, there is a wide variation in pension for the elderly poor across states (Appendix Table 1).

The second source of variation comes from minimum age for eligibility (Ministry of Rural Development, 2007). The federal minimum age for pension during the period of this study is 65. In 9 states, the eligibility age for state pension is 60 for both men and women. Elderly women in India are generally considered financially more insecure than men. Partly to reduce their vulnerability, in 7 states, the minimum age eligibility is 60 for women, but 65 for men, and in one state, Rajasthan, the minimum eligibility age is 55 for women and 58 for men (Appendix Table 1). As a result of these two sources of variations, the 2006 increase in pension has differed across age-state categories. [5]

What is the impact of these variations in pension over time, across states and age categories on the living standards of the elderly? Theoretically, the 2006 policy change is expected to affect the employment of the elderly population through two channels – income and substitution effects. Increase in pension (income effect) will induce some elderly persons to seek retirement, or reduce hours of work, in particular persons engaged in physically strenuous work, which is often undesirable and even detrimental to health at older ages. Because pension eligibility is conditional on an elderly person having family income below the poverty threshold, it imposes an implicit tax on work, which may lower employment (substitution effect). Reduction in employment due to the income effect is an intended aspect of the policy, whereas reduction in employment due to the substitution effect implies a deadweight loss. While it is not possible to separate these two effects in our analysis, it can be argued that changes in eligibility criterion in the 2006 policy – moving eligibility from those with no income or no regular source

[5] Benefits are uniform within a state and age category in any year.

of income to elderly persons with family incomes below the poverty threshold – is likely to lower the substitution effect of pension on pension earners with very low incomes.

The effect of NOAPS on elderly income will depend on its employment effect. Overall, incomes would increase or decrease depending on the pension amount and earnings change on account of the employment effect. Despite the crowding out effect, pension may improve elderly well-being (e.g. health), in particular of those engaged in physically strenuous jobs. In general, increase in income would be higher for the elderly poor who responded by changing their employment minimally.

The effects of the pension policy are likely to be limited if there is diversion of pension funds to individuals who are not the intended beneficiaries (e.g. non-poor elderly persons). This is a critical issue afflicting many social welfare programs in India. There is also concern about insufficient coverage (Dutta, 2008; Prasad and Salomi, 2009). Most evaluation reports, however, have found diversion or "leakages" from NOAPS to be modest compared to other welfare schemes (Kumar and Anand, 2006). Further, attempts have been made to improve coverage, e.g. by removing the ceiling on number of beneficiaries, and reduce diversion of funds (Ministry of Rural development, 2007). Our investigation of the effects of recent changes in NOAPS would enable us to draw inferences about its efficacy. If the program has not had any employment or expenditure effects on the very poor or had relatively low effects that would be evidence of their exclusion from the pension program.

Data

The study is primarily based on data from two rounds of the National Sample Surveys (NSS): the 61st round conducted in 2004-2005 (Schedule 10: Employment and Unemployment Survey) and the 64th round conducted during 2007-2008 (Schedule 10.2: Employment,

Unemployment and Migration Survey). These surveys were conducted a year before and a year after the 2006 increase in federal and state pensions under NOAPS. Further, we conduct robustness tests of the analysis applying data from the 50th and 55th rounds conducted in 1993-1994 and 1999-2000, respectively. Each round is a nationally representative survey of over half a million persons or about 125,000 households.

These rounds of the NSS provide detailed data on household and individual characteristics, including age, education, sex, marital status, current employment status, household size, caste, urban-rural residence, and state or union territory (UT) of residence. The NSS does not collect data on household income, but provides detailed information on the monthly household expenditure, which we use as proxy for household income. The NSS does not provide data on whether the respondent received pension under NOAPS. We use the educational attainment of household head (or of the elderly person) as an indicator of their poverty status. While most research in India has used monthly expenditure (or income) to determine the poverty status of a family, the same is not appropriate for this study because NOAPS is likely to have affected the incomes or expenditures of the poor elderly families.

The 64th round, schedule 10.2 of NSS also provides expenditures on major items of consumption. The 61st round, schedule 10, however, only provides data on total expenditure. To study the effect of NOAPS on expenditure composition of elderly households, therefore, we combine the 64th round, schedule 10.2 with the 61st round, schedule 1 (Consumer Expenditure Survey conducted in 2004-2005) that provides data by expenditure categories. The 61st round, schedule 1, is also nationally representative and surveyed close to half a million individuals or 125,000 households. We classify expenditures in eight categories: food; pan[6], tobacco, & intoxicants; rent & utilities; clothing, bedding, & footwear; personal care, consumer services, &

[6]Pan is a preparation of betel leaf, areca nut, and tobacco.

entertainment; education; medical expenses; and durables. In both surveys, expenditures on education, durables, and institutional medical care are for the past 365 days and on other items for the past 30 days. For this analysis we convert all items to expenditures in the past 30 days. Households with monthly expenditures less than Rs 100 (5 observations) and more than Rs 100,000 (9 observations) are dropped from the analysis

The data on pension amount, by state, year and gender are taken from the annual reports of the Department of Rural Development. Minimum eligibility age for state pension by gender also comes from the same source. The two together are used to compute the total maximum monthly pension by gender, age, state of residence, and year. Pension amount and expenditures adjust for inflation. We use the Urban Non-manual Employees Consumer Price Index to adjust for inflation in urban areas and the Agriculture Laborers Consumer Price Index to adjust for inflation in rural areas.[7]

Effect of pension on Elderly Employment

Empirical model

We begin with the following baseline model estimated over a sample of individuals aged 55 to 70 with a primary or lower education:

$$(1) \qquad Y_i = X_i\beta + \theta_1 Pen_{as} + \eta_s + \eta_a + \eta_t + u_i$$

Y_i denotes whether the respondent is currently employed and is a function of individual age (η_a - a set of 16 categorical variables denoting each year of age) and other characteristics (X_{it}), namely, marital status (a set of variables indicating: unmarried, married, divorced, or widowed), educational attainment (categories: illiterate, literate with 0-<primary education, primary education), number of persons in the household (household size categories: 1, 2, 3-5, 6-8,>8),

[7] To test if estimates were driven by differences in prices across rural and urban areas, we also conducted all analysis without adjusting for inflation. Estimates were similar to those obtained with the price adjustment.

urban/rural residence, and caste (scheduled tribe, scheduled caste, other lower castes, upper castes), year(η_t), and state/ UT fixed effects (η_s). Equation (1) is estimated using the 61st (2004-2005 data) NSS and the 64th NSS rounds (2007-2008 data), separately.

Pen_{as} is the maximum pension amount by age and state in any year. Pen_{as} is matched to the individual level data by respondent's age, state, and year. Thus, in states that do not provide state level pension, this variable is equal to Rs 75 in 2004-2005 and Rs 200 in 2007-2008 for individuals aged 65 or older and 0 for others; in states that provide supplementary pension to the elderly and have minimum age eligibility of 65 for state pension, it is equal to the state + federal pension amount for 65+ and 0 for others. In states that have a lower age eligibility for state pension, say 60, the variable Pen_{as} is equal to the state pension amount for individuals aged 60 but less than 65, and state +federal pension amount for those 65 or above. To illustrate, in the state of Gujarat, where state and federal pension age eligibility differs, in 2004-2005, Pen_{as} is equal to Rs 200 for individuals aged 60-64 and Rs 275 for individuals aged 65 or more. In 2007-2008, Pen_{as} is Rs 200 for individual aged 60-64 and Rs 400 for those aged 65 or more. In both periods, the pension variable is 0 for individuals aged 59 or less.

The coefficient of interest is θ_1. It estimates the effect of public pension on the employment of low-educated elderly and near-elderly persons. One problem with equation (1) is that demographic and economic factors, across state and age categories, that are correlated with pension are likely to confound our estimates. We address this issue by estimating equation (2) on a combined sample of 2004-2005 and 2007-2008 NSS data:

$$(2) \qquad Y_{it} = X_{it}\tilde{\beta} + \theta_2 Pen_{ast} + \tilde{\eta}_s + \tilde{\eta}_a + \tilde{\eta}_t + \eta_{st} + \eta_{at} + \eta_{as} + \tilde{u}_{it},$$

Equation (2) has three more sets of variables in addition to those in equation (1): η_{as} denotes elderly-state interactions (35 state/UT variables interacted with whether the respondent is aged 65 or older) and captures unobserved factors (e.g. state specific demographic, cultural and economic factors) correlated with pension differences across state-age categories; η_{st} is a vector of state-time fixed effects[8] that control for time-varying state characteristics, e.g. state level economic growth, that may be correlated with differences in pension policy across state-years; and η_{at} denotes age-time interactions (interactions of the 16 age dummies with whether the observation is taken from the post-2006 period) and captures age-specific time varying factors that may be correlated with national level changes in policy. Note that pension amount (Pen_{ast}) in equation (2) varies by age, state, and year.

The variable θ_2 estimates the effect of public pension on the employment of elderly and near elderly persons after controlling for time-varying state effects, time-varying age effects as well as age-specific state effects that may be correlated with policy. Thus the identifying variation to estimate the pension effect in equation (2) comes from state-age-year variation in pension. Arguably, there may be age specific time varying state factors correlated with Pen_{ast} that would threaten the validity of the specification in equation (2). We conduct a number of tests described in detail in the section on Robustness Check to test the validity of the specification. We also test this by estimating equation (2) on a sample of elderly/near elderly persons with a secondary education, but no degree. They are less unlikely to receive public pension because they are less likely to be poor (Table 1)[9]. In 2004-2005, 17% of our sample of elderly/near-

[8] Throughout the paper we use the term state effects to denote state/UT effects.
[9] Ideally, we would like to conduct this test on a population of persons that is similar to low-educated elderly and near elderly group, but ineligible for pension. Unfortunately, it is not easy to find such a group. We select persons with a secondary education, but no degree, because they are somewhat closer to the low-educated in terms of their

elderly[10] households where the head had secondary education with no degree are poor[11]; the corresponding proportion for elderly/near elderly households where the head had a primary or less education is 40%. Thus, changes in pension amount across age-state-year are likely to have a small effect on the employment of persons with a secondary education, but no degree, and if our research design is valid, estimates of θ_2 for this group should be close to zero.

Prior to 2006, NOAPS was intended to cover only half the elderly poor population: elderly with no regular income or other financial support. In addition to raising the pension amount, the 2006 NOAPS made two other major changes: removed state-specific ceilings on the number of elderly to be covered by pension each year and provided pension to all elderly persons with incomes below the poverty threshold irrespective of whether they had family support or not. Thus inclusion of state-time effects, η_{st}, in equation (2) is important as it captures the effect of coverage expansion so long as such expansion is constant across age categories.

Because labor market experience differs by gender, all analyses are carried out separately for men and women. In several states minimum age for eligibility is lower for women than men. Pen_{ast} is therefore computed separately for the two analyses. In all regressions, standard errors are computed by clustering within the state of residence (White, 1971). We first conduct an all-India analysis spanning over 28 states and 7 Union Territories (UT). To test if results were unduly influenced by the inclusion of the 7 UTs with relatively fewer observations in our sample, we next repeat all analyses by restricting data to states (excluding UTs). Finally following some previous research on India, we repeat the analysis using data for the largest 19 states, namely:

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labor market experience, than say persons with college education, but also less likely to be poor and hence ineligible for pension.

[10] We use the term –elderly/near elderly - households to describe households with at least one 55+ member.

[11] We use the Tendulkar poverty thresholds by state and urban/rural areas to compute poverty rates (Planning Commission, 2009).

Andhra Pradesh, Assam, Bihar, Chhattisgarh, Gujarat, Haryana, Himachal Pradesh, Jharkhand, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Orissa, Punjab, Rajasthan, Tamil Nadu, Uttaranchal, Uttar Pradesh, and West Bengal.

We conduct the analysis on a sample of elderly and near elderly persons with a primary or lower education, who are highly likely to be poor. Even among this sample, men and women who are illiterate are more likely to be poor and therefore more likely to be eligible for public pension (Table 1). There is, however, some concern that illiterate and less educated persons are less likely to be informed of the public pension scheme and more likely to face hurdles in completing the requisite paper work (Dutta, 2008; Prasad and Salomi, 2009). It is therefore an empirical issue whether illiterate persons are more or less impacted by the policy and we study this by estimating models that allow the effect of policy to differ by whether the elderly person is illiterate, literate with 0-<primary education, or has primary education.

Results- Employment analysis

Before presenting estimates of the effect of NOAPS on the employment of the elderly poor, it is worthwhile to review employment trends by age groups. Figure 1 plots the proportion of men currently employed by age and education categories. There are three main points to note.[12] One, across education categories, over 90 percent of the near elderly men aged 50-59 are employed in both years. Two, employment among the elderly falls with age, and the decline is sharper for men with secondary or higher education than for the less educated groups, resulting in a sharp difference in employment across education categories at older ages. Three, the gap in elderly employment across educational categories has increased over the study period such that in 2007-2008, the employment of men aged 60-74 with at least a secondary education is 20 to 34 percentage points lower than of those with a primary or lower education. Figure 2 plots women's

[12]We found similar trends with the NSS Employment and Unemployment surveys for 1993-1994 and 1998-1999.

employment. The levels are modest, but here too there is evidence of a decline with age. Note that for women too the decline in employment with age is steeper among the more educated.

One possible explanation for the sharper decline in the employment of more educated elderly men and, to a lesser degree, women, is that they are more likely to be with jobs with mandatory retirement and pension schemes starting at ages 60 to 65. The more educated also have higher incomes that may result in higher savings, for example savings in Public Provident Fund accounts, to afford retirement.

Our first objective is to study if NOAPS had an impact on the employment of elderly men and women who are likely to be poor and thus eligible for public pension. Table 2 has the results. Estimates in each cell of rows labeled 1 and 3 are from separate regressions. Estimates in each column of rows labeled 2 and 4 are also from separate regressions. All regressions control for age, education, marital status, urban residence, household-size and social caste, and state and year effects. Columns labeled I are based on the 2004-2005 data from the 61st Round of the NSS and columns labeled II are based on the 2007-2008 data from the 64th Round. Columns labeled III use the combined samples from the two rounds, which is our preferred model, as it includes additional controls for age-period effects, state-period effects, and state-age effects. Robust standard errors clustered on state of residence are in parenthesis. 'Pension Amount' is the total maximum pension (state+federal) (expressed in 100s of Rupees) by respondent's age, sex, state of residence, and year of observation.

Estimates suggest that a Rs 100 increase ($11 in purchasing power parity) in pension is associated with a modest one to three percentage points decline in the employment of elderly/near elderly men. The estimates turn statistically insignificant when samples are

restricted to the 19 largest states.[13] In models that allow the effect of policy to differ by the education of the respondent, estimates show that a Rs 100 increase in pension is associated with a one to three percentage points decline in the employment of elderly men, and in most cases statistical tests (indicted by +) fail to reject the hypothesis that the effects are the same for the illiterate and low-educated literate men.

These estimates are likely to be subject to at least two sources of bias. The first source of bias arises from the fact that not all the elderly/near elderly respondents with primary or lower education are eligible for pension. We have used education as an indicator for poverty and in our sample in 2004-2005, about 40% of elderly/near elderly persons with 0-primary education and a somewhat larger (45%) of the illiterate persons are poor. Thus the estimated effect would be about half the true effect.

The second source of bias would arise from the expansion in NOAPS coverage. Inclusion of state-year and age-year effects are expected to control for program expansion. However, if expansion across states is correlated with changes in pension amount, we will over-estimate the effect of pension amount on employment. Thus, overall, to some extent the presence of the second bias would lower the effect of the first bias. We investigated the second source of bias by studying the administrative data on the number of beneficiaries in 2004-2005 and 2007-2008 (Appendix Table 1). There does not appear to be any clear indication that expansion was higher in more generous states. For instance, Uttar Pradesh the largest state in the country with a particularly poor implementation of NOAPS prior to 2006, the number of beneficiaries increased eight times between 2004-2005 and 2007-2008 even though the state component of pension continues to be relatively modest at Rs 100 – half the amount requested in the federal policy.

[13] In regressions that defined the age variable in larger age categories, the estimated effects were similar sized, but statistically significant when models were restricted to the 19 largest states.

The adjoining state of Uttaranchal increased the state component of pension from Rs100 to Rs 200 between 2004-2005 and 2007-2008, but the increase in number of beneficiaries was relatively lower.

Panel 2 presents estimates of the effect of NOAPS on the employment of elderly/near elderly women. All estimates are modest and mostly insignificant.

Robustness Check

It is not clear why some states decided to increase public pension under NOAPS and others did not. The analyses of the combined samples in Table 2 include controls for state-year effects, age-year effects and state-year effects. Further, to test the validity of the research design, we conduct four tests to check if there were any age-state specific trends that may have caused state pension amounts to be different across years.

First, we study if state governments' response was driven by trends in old-age dependency ratio across states. The Indian Census Bureau has provided old-age dependency ratio across states for census years 1991 and 2001. The R-squared of the change in pension amounts, by state, between 2004 and 2007 and changes in old age dependency ratio, by state, between 1991 and 2001 was a modest 0.05. Further, we fail to reject the hypothesis that the regression coefficient of the two variables is different from zero.

Second, we also study if state responses were related with life expectancy at birth or life expectancy at age 60. The Indian Census Bureau provides these data at 5-year intervals for the largest 16-states. For our analysis the relevant years are life expectancy during 1996-2001 and 2001-2006. The R-squared of the change in pension amounts between 2004 and 2007 and change in life expectancy at birth between 1996-2001 and 2001-2006 was 0.037 for men and 0.045 for women. The R-squared of the change in pension amounts and change in life expectancy at 60

between 1990-1995 and 2001-2005 was 0.008. While these tests are crude, they do provide evidence that state-year trends in pension were not driven by long term demographic trends relating to the elderly population across states.

Three, to study if results in the employment analysis were driven by pre-policy trends, we use four rounds of the NSS data for 1993-94, 1999-2000, 2004-2005 and 2007-2008 and investigate trends in employment across states stratified by their public pension generosity. States that provided less than Rs 200 (state contribution) in pension in 2007 are defined as the low pension states and states that provided Rs 200 or more are defined as high-pension states.[14] Figure 3 plots the employment of men with a primary or lower education living in high and low-pension states during 1993-1994 to 2007-2008 by age categories. Among the low-educated men in three age groups: 50-54, 55-59 and 60-64, the proportion employed is almost identical across the two state categories during 1993-2008. Among the low-educated elderly men (65+), the employment level is somewhat higher in states that were less generous in the post-2006 period, but there is no specific trend, especially during 1993-2004, the pre-NOAPS increase period. These almost flat employment levels across age groups during 1993-2004 thus document that the state responses to NOAPS were not related to any pre-policy trends in employment among elderly and near elderly adults across states.

Finally, Appendix Table 2 (rows 1 and 2) has the effect of pension, based on equation (2), on elderly men and women with a secondary education, but no degree. Members of this group are less likely to be poor and therefore less likely to be eligible for public pension. For the

[14] The 1993-1994 NSS does not provide district level data for urban areas. Thus it is not possible to identity the newly created states of Jharkhand, Uttaranchal, and Chhattisgarh. Chhattisgarh has been carved out of Madhya Pradesh and both are low pension states. In 2007, Jharkhand and Uttaranchal provided Rs. 200 in state pension, but their parent states – Bihar and Uttar Pradesh – provided less. Thus, a part of Bihar and Uttar Pradesh, as defined by the old boundaries, is low-pension and a part is high pension, but it is not possible to identify these regions in the 1993-1994 NSS. This analysis, therefore, excludes Bihar, Jharkhand, Uttar Pradesh and Uttaranchal.

research design in Table 2 to be valid, the estimated effects in Appendix Table 2 should be modest, as they are, providing some validity to the research design.

Effect of Public Pension on Expenditure

Next, we study the effect of NOAPS on expenditures of households with at least one elderly/near elderly person. Ideally, we would prefer to study the effect on income. Because the NSS does not collect income data, we use monthly household expenditure as a proxy for income.[15] We first study the effect of pension on household expenditures, followed by its effect on the eight main expenditure categories. The analysis is done at the household level and the samples are restricted to families where the head has a primary or lower education and there is at least one member aged 55 or older[16]. Equation (3) describes the empirical model:

$$(3)\ C_{it} = F_{it}\tilde{\beta} + \theta_E * (Pen_{hst}) + \pi_{st} + \pi_{at} + \pi_{as} + e_{it}$$

where C_{it} is the monthly expenditure of household i in year t. F_{it} is a set of household characteristics including age of household head (age categories: 20-30, 31-40, 41-50, 51-60, 61-70, 71-80 and >80) [17], household size (household size categories: 1, 2, 3-5, 6-8,>8), number of elderly or near elderly persons in the household (three categories depicting number of persons 55 or older: 1, 2, more than 2), caste, sex and education of household head, and whether the household is in an urban area. Pen_{hst} is the maximum pension (state +federal) amount that household h in state s could get in time t. It is computed as the sum of the maximum total state and federal pension that the near elderly and elderly persons in a household can get.[18] π_{st} denotes

[15] There is no nationally representative dataset in India that provides income data for the study period.
[16] We also conducted the analysis on all families – including those with no elderly member. The results were similar. For brevity, we elected to not present those results.
[17] Analysis is restricted to families where the head of household is at least 20 years of age. There are 67 households in our data where the household head is less than 20, and inclusion of these households did not affect the results.
[18] In our sample of households with elderly and near elderly members, 44 % had only 1 person aged 55 or more, 52% had two persons aged 55+, and 4% had more than 2 persons aged 55+. We conducted all analysis dropping households with more than two persons 55+ and the estimates were similar to models that included them.

state-time interactions (70 state-time interactions- state dummy variables interacted with whether the observation is from the pre-2006 or post-2006 period), π_{as} denotes state-elderly interaction (35 variables indicating interactions of state effects with whether the household has an elderly person aged 65 or above). Further, we allow household-head age effects to vary by whether the observation is taken from the post-2006 period (π_{at}). Equation (3) is estimated on the combined sample of 2004-2005 and 2007-2008 data. To be consistent with the employment analysis, we also estimate models separately for 2004-2005 and 2007-2008, and in these models, $\pi_{st}, \pi_{at}, and\ \pi_{as}$ are replaced by state and year fixed effects.

The identifying assumption in equation (3) is that in the absence of pension policy, the estimated value of θ_E would be zero. We test its validity by estimating equation (3) by restricting samples to elderly and near elderly families where the head of household has secondary education, but no degree. Estimates, presented in Appendix Table 3 (rows 3), are modest and always statistically insignificant.

Results- Expenditure analysis

Table 3 presents estimates of the effect of NOAPS on total expenditure in families with elderly persons. While we present estimates from separate regressions for 2004-2005 and 2007-2008 and for the combined samples, we have elected to discuss in detail results from the combined samples (model III), our preferred model, which is based on equation (3) and includes state-time, state-age and age-time interactions that allow us to control for factors that may be correlated with the pension amount.

Estimates in row 1, model III, suggest that a Rs 100 increase in pension amount was associated with a Rs37 to Rs40 increase in family expenditures. Point estimates in models that allow the effect to differ by the education level of household head suggest a smaller, and

sometimes statistically insignificant, effect on expenditures in households where the head is illiterate. These households have higher poverty, but our results show that they have benefitted less from the pension program, suggesting that this most disadvantaged group has suffered more on account of errors of exclusion.

Expenditure effects are also likely to be afflicted with two sources of bias. Because not all low-educated households are poor and therefore eligible for pension, our estimates are likely to contain a downward bias. About 40 percent of our sample of low-educated elderly/near elderly households is eligible for pension. Assuming that all eligible persons received pension, the true effect could be obtained by dividing the estimated effect by 0.4. Adjusting for this bias would thus suggest that a Rs 100 increase in pension is associated with a Rs 92 to Rs 100 increase in expenditure (or income) of this group. The second source of bias comes from the expansion of the program. Our analysis includes controls for state-year effects to capture the nationwide expansion of the program in 2006. However, to the extent that expansion was correlated with the state-year trend in the pension amount, our estimates will contain an upward bias.

Table 4 provides expenditures in eight large categories of items. Samples are restricted to households with at least one member 55 years or older. In 2004-2005, on average these households spent about half their budget on food, 10 percent on tobacco, pan, alcohol, clothing, and footwear and another 12 percent on rent and utilities. About 14% was spent on personal items and entertainment, seven percent on medical care and about five percent on education and durables. The pattern of expenditure remained largely the same in 2007-2008, after the increase in pension with three exceptions: share of expenditure on education increased from two to three percent, and on medical care from seven to eight percent, and the share on personal items and entertainment fell from 14 to 12%.

Are these trends associated with public pension? Table 5 presents the analyses to answer this question. The presentation and models are similar to those in Table 3. Estimates (model III) suggest a statistically insignificant $4 to $8 increase (1%- 2% over the mean in 2004-2005) in expenditures on food, a statistically significant $5 to $6 increase (26%-31% over the mean in 2004-2005) in expenditure on education, and a $15 increase (24% -27% over the mean in 2004-2005) in expenditure on medical care. Estimated coefficients on education and medical care remain robust in models restricted to 28 states or to the largest 19 states.

Does poverty kill?

Researchers have argued that poor people have shorter life spans and therefore are likely to be missing from the data (Pal and Palacios, 2011). Inclusion of state-age effects in the employment analysis would to some extent address the issue of time-invariant differences in longevity across states. Samples include two years of data, 2004-2005 and 2007-2008, and it is assumed that changes in longevity across states are modest during the four year period of the study. However, it is not possible to rule out that pension policy influenced longevity by improving elderly well-being. If that is the case, the estimated expenditure effects will be due to the interaction of two effects: increase in income from pension and increased chances of survival (changes in sample composition before and after the policy change). While we do not have the methodology to separate the two effects, we conduct a few tests to draw inferences about the effect of policy on elderly longevity

The first outcome we study is: whether the household has an elderly member. Public pension will influence the probability that a household has an elderly member in two ways: by increasing longevity and by changing living arrangements. Public pension is expected to increase financial independence of the elderly and provide them with the wherewithal to live by

themselves. It may also encourage younger family members to move in with the elderly. If the policy encouraged elderly persons to live by themselves, it will increase the number of households without an elderly person and bias the estimated effect towards zero even if there is no change in longevity. The opposite will happen if pension led children or grandchildren to move in with the elderly.

The NSS does not provide data on whether an adult respondent has living parents, unless they are living in the same household. Thus data limitations do not allow us to investigate whether the parents of non-elderly adults are alive. We study the effect of pension on a second outcome, namely, whether the elderly live in elderly only households (no non-elderly member). If pension has no effect on this second outcome that would imply that the estimated changes in the first outcome that are associated with pension are more likely to relate to changes in longevity than to living arrangements. We begin by estimating equation (4) on all households in the combined NSS sample for 2004-2005 and 2007-2008,

$$(4)\ E_{it} = X_i\widetilde{\beta} + Z_{st}\gamma + \delta * Pen_{st} + \gamma_t + \gamma_s + u_{ist},$$

where E_i is an indicator for whether the household has an elderly member (aged≥65), and is specified as a function of family characteristics (X_i): education and sex of household head, their caste, time-varying state characteristics (Z_{st}) namely state GDP. The variable Pen_{st} denotes maximum pension amount (state + federal) by state s and year t. γ_t denotes year effects and γ_s denotes state effects. The coefficient of interest is δ which captures the effect of pension on the probability that a household has an elderly member. To estimate if the policy had a different effect on the presence of elderly men versus women in the household, we study two additional outcomes: whether the elderly person is a male and whether the elderly person is a female.

It is likely that pension increased the number of elderly in a household. If so, a 0-1 outcome would underestimate the true effect of pension on longevity. However, we can address this issue by studying the effect on the number of elderly persons in the household. To study if pension had an impact on elderly living arrangements, we estimate equation (4) with two modifications: one, the sample of analysis is restricted to households with at least one elderly member, and two, the outcome measure is whether the household has elderly members only.

Results- Effect of policy on Elderly Living Arrangements

Table 6 presents the results from this analysis. Model 1 controls for state gross domestic product in year t-1, state and year fixed effects, Model 2 includes additional controls for household characteristics. The sample of analysis in rows 1 and 2 is households where the head has a primary or lower education. Estimates in row 1 and column 1 (model 1) suggest that a Rs 100 increase in pension amount is associated with a 0.8 percentage points (or 4%) increase in the probability that a household has an elderly member. Estimates turn statistically insignificant in column 2 that controls for family characteristics.[19] Similar estimates are obtained (not presented) when the sample is restricted to households where the head has less than a primary education. All estimates turn statistically insignificant when samples are restricted to states (UTs are excluded) or the top 19 states, but the point estimates remain roughly the same. Estimates in row 2, column 1suggest that pension has a positive and sometimes significant effect on the number of elderly persons in the household. Here too estimates turn statistically insignificant in Model 2, but the point estimates remain large. Estimated effects of the association between pension and the probability that there is an elderly male (or elderly female) member in the household, presented in Appendix Table 4, are similar sized, and often statistically insignificant.

[19] Estimates remained the same in models that also controlled for family size.

The bottom panel of Table 6 provides the effect of pension on whether the elderly live in an elderly only household. The sample of analysis is households with at least one elderly member and where the head of household has a primary or lower education. In our sample, approximately 13 to 15% of households with at least one elderly member are elderly only households. Estimates suggest that public pension had a modest and statistically insignificant effect on this outcome. Validity tests presented in Appendix Table 4 (sample: elderly households where the head has at least secondary education) are always negative and sometimes significant (rows 1 and 2) – the opposite of what we would expect if there were state specific trends correlated with pension that increased longevity.

To sum up, our analyses provide weak support for the hypothesis that poverty kills: pension increases the probability that there is an elderly in the household – the point estimates are non-trivial (about 4% of the mean), but often statistically insignificant. We have studied the effect of an increase in income (pension) on the probability that the household has an elderly member approximately 1 year after the increase in pension. Arguably, income is likely to have a much modest effect over a short term period. It is also possible that income has a non-linear relationship with longevity and the increases in incomes that we have investigated are too small to have a strong impact on longevity.

Conclusion

We study the effect of India's National Old Age Pension Scheme on outcomes pertaining to the well-being of the elderly, namely their employment, monthly expenditure and composition, and living arrangements. These outcomes allow us to draw inferences about the effect of public pension for the poor on longevity as well as overall "leakages" in the program.

In 2006, the Indian federal government raised public pension for the poor from Rs 75 to Rs 200 and lifted the earlier ceiling on the number of beneficiaries, thereby nearly doubling their number. Further, the program was expanded to cover all elderly poor and not just those without income or family support, which was a condition for eligibility prior to 2006. In the same year, many state governments supplemented federal pension by raising state pension amounts such that in 2006-2007 across states the total pension for the elderly poor ranged from Rs 200 to Rs 1000 ($22 to $108 in PPP). This combined with difference in minimum age eligibility for pension across states allows us to study the effect of pension across age-state-year categories on employment and family expenditures.

This paper conducts several tests to document that the differences in generosity of pension across states were not associated with past demographic trends (e.g. trends in life expectancy at birth or at age 60 across states, trends in dependency ratio across states) or employment trends among near elderly or elderly populations.

Our estimates suggest that a Rs 100 increase ($11 in purchasing power parity) in pension is associated with a one to three percentage points decline in the employment of men aged 55-70 with primary or less education, but has no effect on the employment of similar women. These estimates control for unrestricted state-time effects, age-time effects as well as elderly-state effects. The average maximum pension per elderly was Rs 300 in 2007-2008. Our analysis thus suggests that NOAPs would lower the employment of low-educated elderly men by three to nine percentage points (or 4 to 12%). These estimates are much smaller than the estimates of the effect of social security in rich and middle income countries, and closer to the estimates in low-income countries (See de Carvalho Filho, 2008; Gruber and Wise, 2004; Bloom et al., 2007). One explanation for the relatively modest employment effects of NOAPs might be that the

pension benefit under NOAPs is not large enough to encourage large scale retirement to attain/maintain eligibility by the very poor – suggesting modest or negligible substitution effect.

We also find that a Rs 100 increase in pension amount is associated with a Rs 37-Rs 40 increase in expenditure (a proxy for income) in families with elderly/near elderly persons where household head has primary or lower education. Adjusting for the fact that only 40% of our sample of low-educated households with at least an elderly or near elderly member is poor, this implies that a Rs 100 increase in pension caused a Rs 92 to Rs 100 increase in family expenditures. These estimates are large and capture the combined effect of increase in pension as well as the expansion of the program to cover all poor elderly persons. Our analysis includes controls for state-year effects to capture the nationwide expansion of the program in 2006. However, to the extent that expansion was correlated with state-year differences in the pension amount, our estimates will contain an upward bias.

In regressions that allowed the effects to differ by the education of household head, the estimated effects were lower and sometimes not statistically significant for the least educated households (with illiterate household head) suggesting that these most disadvantaged households who are more likely to be in poverty suffer from errors of exclusion more than the other groups. This could partly be because the requisite paperwork is too difficult for the uneducated as has been documented in previous studies (Dutta, 2008). If so, rationalization and simplification in procedures for obtaining pension should reduce the bias.

Further, the pension increase is found to be associated with an increased expenditure on medical care and education, indicating that most of the income from pension is invested in human capital for either improving the health or educational outcomes of family members.

In the final analysis we study three outcomes – whether there is an elderly person in the household, their number, and in samples restricted to elderly households, the probability that the household has only elderly members –to capture the effect of public pension on family composition and longevity. Estimates suggest that approximately 1 year after the increase in pension, the policy has a positive and sometimes significant effect on the probability that a household has an elderly person. On the other hand, the effect of pension on the probability that an elderly household has only elderly members is small and insignificant. We conclude that our analysis at best provides some weak evidence that public pension for the poor increases longevity.

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Word Bank. 2006. World Development Indicators, .Table 4.14: Exchange rates and prices. (http://devdata.worldbank.org/wdi2006/contents/Table4_14.htm).

Figure 1a. Proportion Currently Employed
Men by age and education, 2004-2005

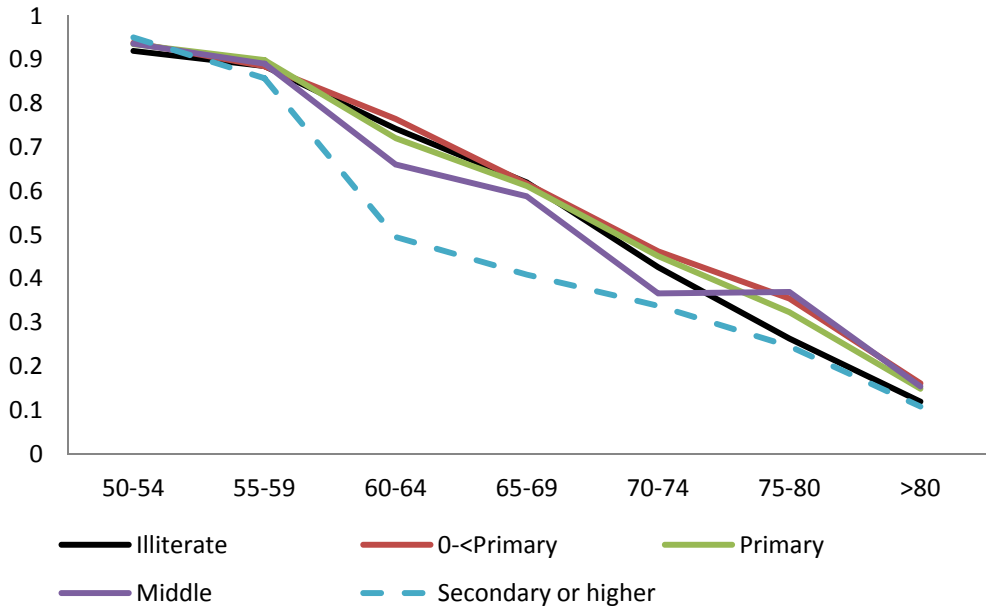
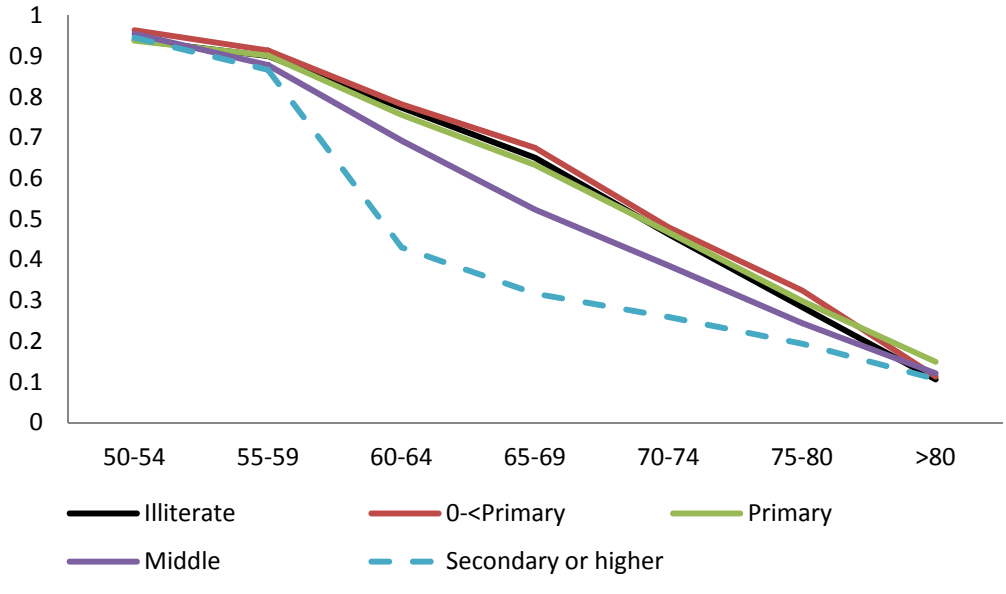


Figure 1b. Proportion Currently Employed
Men by age and education, 2007-2008



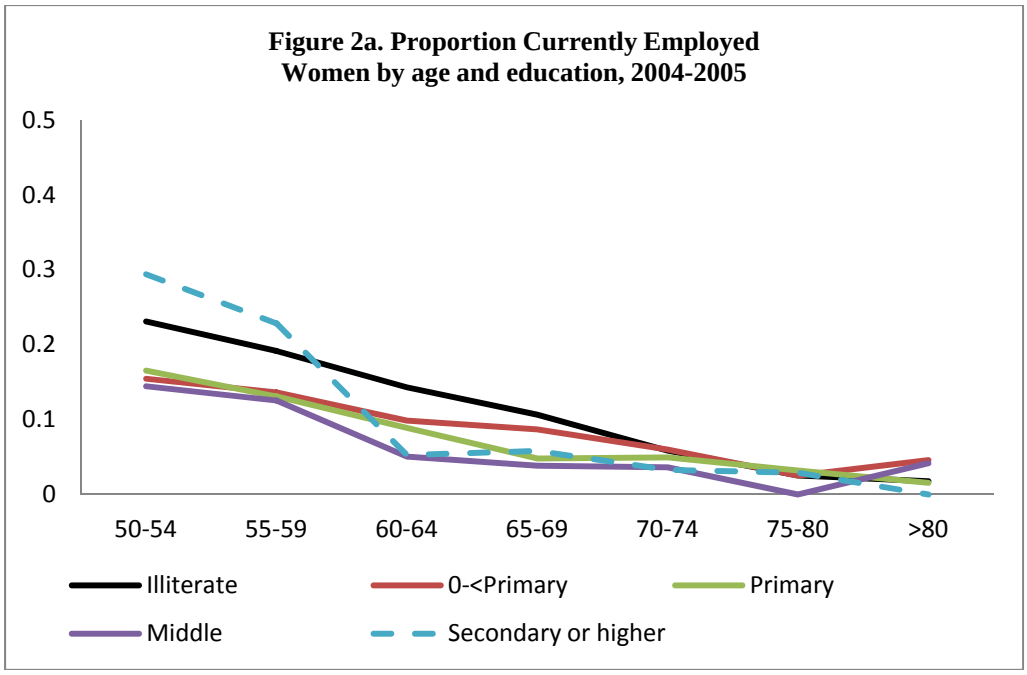


Figure 2a. Proportion Currently Employed
Women by age and education, 2004-2005
0.5
0.4
0.3
0.2
0.1
0
50-54
55-59
60-64
65-69
70-74
75-80
>80
Illiterate
0-<Primary
Primary
Middle
Secondary or higher

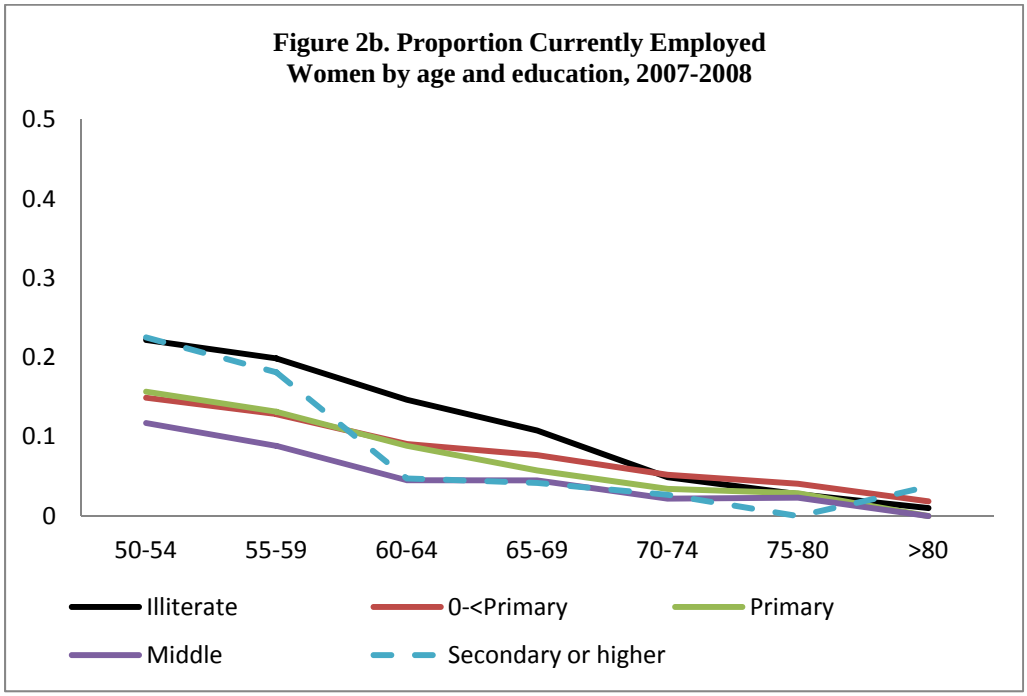
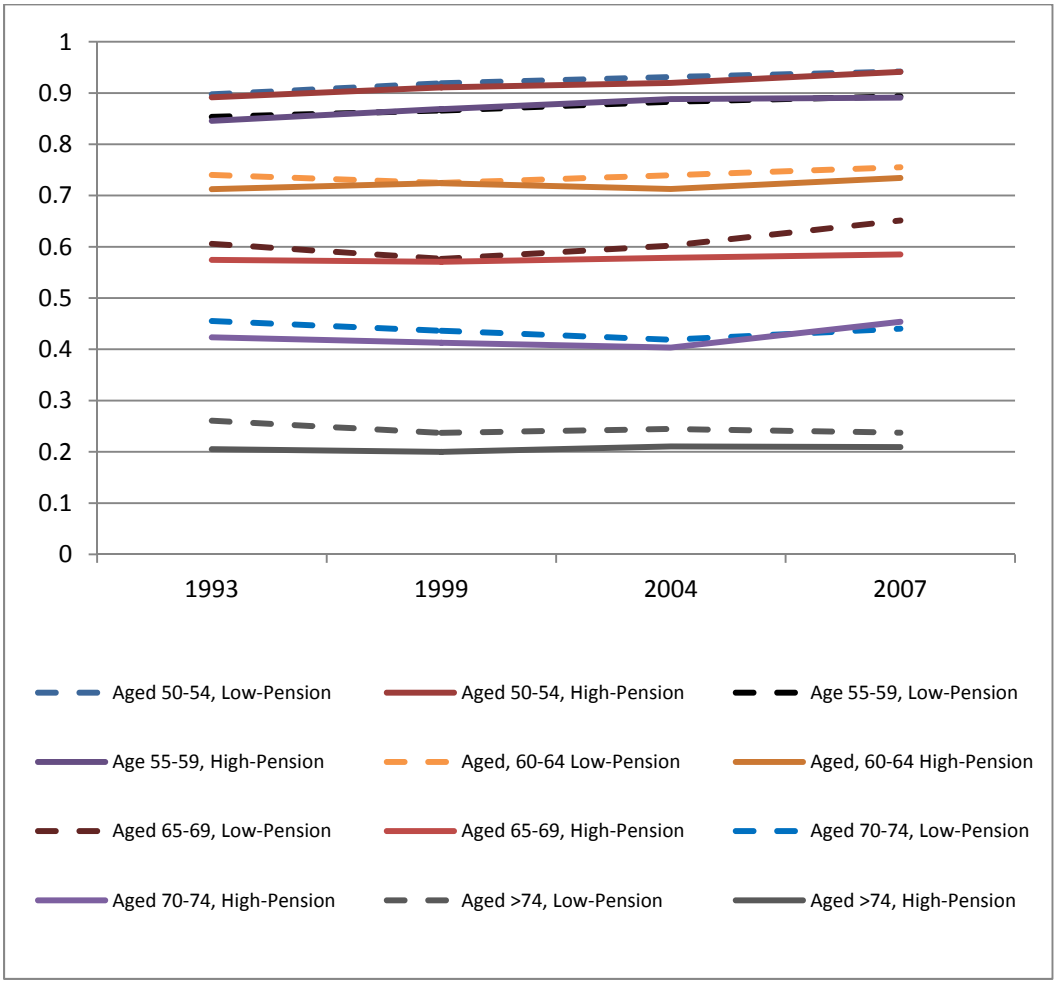


Figure 2b. Proportion Currently Employed
Women by age and education, 2007-2008
0.5
0.4
0.3
0.2
0.1
0
50-54
55-59
60-64
65-69
70-74
75-80
>80
Illiterate
0-<Primary
Primary
Middle
Secondary or higher

Figure 3: Trends in Male Employment in High- and Low-Pension States, (Men with primary or lower education by age categories)



Note: All India sample excluding Bihar, Jharkhand, UP and Uttaranchal because NSS 1993-1994 does not contain district level data to define these states.

Table 1: Monthly Per Capita Expenditure and Poverty Level, by Education of Household Head, 2004-2005

	Households with at least one elderly/ near elderly member[1]			Households with no elderly or near elderly members		
Education of the household head/	N	Monthly Per Capita Expenditure (in Rupees)	Poverty rate	N	Monthly Per Capita Expenditure (in Rupees)	Poverty rate
Illiterate	35014	595.64	44%	43972	538.46	52%
Literate, 0-< than primary education	12049	682.71	38%	22566	637.27	40%
Primary Education	12233	749.86	32%	18723	708.82	36%
Primary or less	**59296**	**646.67**	**40%**	**85261**	**606.52**	**45%**
Middle school	11507	819.26	29%	25424	815.88	28%
Secondary school without high-school degree	9486	1083.14	17%	16785	1005.63	19%
High school or more	13429	1473.30	10%	26750	1510.82	10%
Middle School or more	**34422**	**1140.87**	**19%**	**68959**	**1136.41**	**19%**

Persons aged 55-64 are near elderly and 65 or above are elderly.
N corresponds to the combined sample for 2004-2005 and 2007-2008.

Table 2: Estimates of the Effect of NOAPS on the Employment of Elderly and Near Elderly Persons (age 55-70)

Sample	All States & UTs			All States			19 Large States		
Panel 1: Men with Primary Education or Less	61st Round I	64th Round II	Combined III	61st Round I	64th Round II	Combined III	61st Round I	64th Round II	Combined III
1. Pension amount	-0.01	-0.028***	-0.025***	-0.009	-0.021**	-0.017**	-0.005	-0.013	-0.009
	(0.009)	(0.010)	(0.007)	(0.010)	(0.010)	(0.007)	(0.011)	(0.012)	(0.010)
2. Pension amount*illiterate	-0.014	-0.029***	-0.028***	-0.013	-0.022**	-0.019**	-0.011	-0.013	-0.011
	(0.011)	(0.011)	(0.007)	(0.011)	(0.011)	(0.007)	(0.010)	(0.012)	(0.009)
Pension amount*less than primary education	0.013	-0.027***	-0.013+	0.015	-0.023**	-0.006	0.01	-0.016	-0.003
	(0.014)	(0.009)	(0.009)	(0.013)	(0.010)	(0.009)	(0.017)	(0.011)	(0.014)
Pension amount*primary education	-0.021+	-0.031**+	-0.030***	-0.02	-0.022	-0.021*	-0.006	-0.017	-0.012
	(0.015)	(0.014)	(0.010)	(0.015)	(0.014)	(0.011)	(0.018)	(0.018)	(0.015)
N	17637	18795	36432	17336	18467	35803	15066	16143	31209
Panel 2: Women with Primary Education or Less									
3. Pension amount	-0.005	-0.009	-0.007	-0.006	-0.010	-0.008	0.000	-0.008	-0.004
	(0.008)	(0.010)	(0.005)	(0.008)	(0.012)	(0.006)	(0.009)	(0.014)	(0.007)
4. Pension amount*illiterate	-0.006	-0.012	-0.009*	-0.006	-0.013	-0.010	-0.001	-0.011	-0.007
	(0.008)	(0.010)	(0.005)	(0.008)	(0.012)	(0.006)	(0.009)	(0.014)	(0.007)
Pension amount*less than primary education	-0.006	-0.007	-0.01	-0.007	-0.008	-0.010	0.000	-0.007	-0.011
	(0.013)	(0.014)	(0.006)	(0.014)	(0.015)	(0.007)	(0.017)	(0.020)	(0.009)
Pension amount*primary education	-0.005	-0.016	-0.010*	-0.005	-0.014	-0.009	-0.009	0.000	-0.007
	(0.012)	(0.015)	(0.006)	(0.012)	(0.016)	(0.006)	(0.018)	(0.022)	(0.008)
N	24134	24383	48517	23678	23880	47558	21140	21244	42384

Note: Estimates in each cell of rows labeled 1 and 3 are based on separate regressions. Estimates in each column in rows labeled 2 and 4 are from separate regressions. All regressions control for: age, education, marital status, urban residence, household-size, social caste, maximum pension amount (state+federal), by age, state, and year, and state effects. Column headings describe the sample. Regressions in column labeled Combined III are based on the combined sample of 2004-2005 and 2007-2008 data (61th and 64th rounds) and include additional controls for state-period interactions and age-time interactions. They also allow state effects to differ by whether the respondent is 65 or more. Robust standard errors clustered by state are in parenthesis. Pension amount (expressed in 100s of Rupees) is matched by respondent's age, sex, state of residence and year of observation. *$0.05 < p \leq 0.1$, **$0.01 < p \leq 0.05$, ***$p \leq 0.01$. + indicates if the estimated effects for persons who are illiterate and persons who have less than primary (or persons with primary education) differ at a 90% confidence interval.

Table 3: Estimates of the Effect of NOAPS on Monthly Expenditure in Low-educated Households (Household level analyses)
(Household Head's Education: Primary or Less)

		All States & UTs			All States			19 Large States		
		61st Round I	64th Round II	Combined III	61st Round I	64th Round II	Combined III	61st Round I	64th Round II	Combined III
1.	Pension amount	52.215**	21.574*	36.652**	50.613**	23.530*	39.597**	51.557**	22.248	37.789**
		(21.290)	(11.959)	(14.554)	(21.612)	(12.272)	(15.036)	(24.418)	(13.156)	(17.267)
2.	Pension amount* Illiterate	38.122**	16.925	27.541*	35.268**	21.042*	31.334**	35.035*	19.405*	28.333
		(16.401)	(11.700)	(14.480)	(16.463)	(11.563)	(14.763)	(19.113)	(11.121)	(16.727)
	Pension amount * less than primary	56.541	29.643	44.527*	61.133*	33.081	51.010**	70.766*	24.488	49.567*
		(33.704)	(21.551)	(22.457)	(34.106)	(22.077)	(23.459)	(38.118)	(24.618)	(27.647)
	Pension amount* Primary	66.862*	29.954	49.463**	64.364*	22.803	46.271*	59.948	31.756	48.264*
		(33.687)	(24.639)	(23.868)	(34.145)	(24.117)	(24.181)	(39.186)	(26.860)	(26.991)
	N	29224	30072	59296	28676	29544	58220	25276	26119	51395
	Includes controls for:									
	State effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	State specific time effects and state-specific age effects	No	No	Yes	No	No	Yes	No	No	Yes

Note: The dependent variable is monthly household expenditure in rupees expressed in 2007-2008 prices. The reported figures are coefficients on the variable on maximum pension (federal+state, expressed in 100s of Rupees) amount that a family in state s in year t can receive and varies by the number of pension eligible adults, by age, in a household. Estimates in each cell of row 1 are from separate regressions. Estimates in each column of row labeled 2 are from a separate regression where the estimated effect of pension is allowed to vary by the education level of household head. Column headings describe the sample that are restricted to households where the head of household has a primary or lower education and the household head is 20 years or older. Further, samples are restricted to households with at least 1 person 55 or older. All regressions control for age of household head and their gender, household size, caste, urban/rural residence, number of persons 55 or older in the household, and state and year fixed effects. Regressions in column labeled Combined III are based on the combined sample of 2004-2005 and 2007-2008 data (61th and 64th rounds) and include additional controls for state-year fixed effects, elderly-state effects (interactions of whether the household has a 65+ person and state effects), and age-time effects (interaction of age of household-head categories with whether the observation is post-2006 period. Robust standard errors clustered on state of residence are in parenthesis.
*$0.05 < p \leq 0.1$, **$0.01 < p \leq 0.05$, ***$p \leq 0.01$.

Table 4: Pattern of Household Per Capita Expenditure
(Sample restricted to households where head of household has a primary or lower education and the household has at least one 55+ member; amounts are expressed in Rupees, 2007-2008 prices)

		2004-2005		2007-2008	
		Amount	Share	Amount	Share
1.	Food	428.44	0.52	417.16	0.52
2.	Tobacco, pan, & alcohol	23.47	0.03	23.30	0.03
3.	Clothing, bedding, & footwear	60.04	0.07	51.61	0.06
4.	Rent & utilities	97.26	0.12	96.95	0.12
5	Personal items, consumer Services, & entertainment	112.60	0.14	97.07	0.12
6.	Education	18.82	0.02	20.86	0.03
7.	Medical	58.60	0.07	64.35	0.08
8.	Durables	28.69	0.03	22.71	0.03
	N	28291		30078	

[1] Personal items, consumer services, and entertainment includes expenditures on personal effects, toilet and sundry articles, entertainment, and consumer services including conveyance.

Table 5: Estimates of the Effect of NOAPS on Expenditure Patterns of Households with Elderly Members

	All States & UTs			All States			19 Large States		
	61st Round I	64th Round II	Combined III	61st Round I	64th Round II	Combined III	61st Round I	64th Round II	Combined III
1. Food	23.243**	4.307	7.287	23.540**	5.4	8.067	20.218*	4.385	4.475
	(10.104)	(5.078)	(5.398)	(10.275)	(5.198)	(5.566)	(10.624)	(5.307)	(5.253)
2. Tobacco	-0.801	-0.669	-0.575	-0.636	-0.349	-0.155	-0.502	-0.046	-0.045
	(0.960)	(0.685)	(0.970)	(0.976)	(0.699)	(0.993)	(1.034)	(0.716)	(1.076)
3. Clothing, bedding, & Footwear	4.607*	-0.002	0.203	4.710*	0.16	0.393	3.532	-0.147	-0.874
	(2.421)	(0.926)	(1.170)	(2.485)	(0.951)	(1.232)	(2.390)	(0.998)	(1.007)
4. Rent & utilities	3.326	-1.27	-1.576	3.153	-0.667	-0.672	3.744	-0.228	-0.294
	(3.138)	(1.179)	(1.574)	(3.186)	(1.128)	(1.504)	(3.694)	(1.216)	(1.668)
5 Personal items, consumer services,& entertainment	6.088	3.51	4.79	6.444	3.376	3.985	2.524	3.476	1.796
	(7.176)	(4.491)	(6.744)	(7.303)	(4.554)	(6.918)	(6.002)	(4.926)	(7.516)
6. Education	10.581***	3.424**	4.913**	10.426***	3.984***	5.688**	9.853***	4.182***	4.902**
	(2.966)	(1.282)	(2.210)	(2.970)	(1.206)	(2.110)	(3.320)	(1.202)	(2.080)
7. Medical	15.079**	14.933***	15.477***	15.330**	14.493***	15.677***	9.495**	15.030***	14.403***
	(6.203)	(3.626)	(4.080)	(6.322)	(3.706)	(4.193)	(4.078)	(4.112)	(4.796)
8. Durables	1.905	2.927	0.054	0.802	3.001	-0.157	-3.183	2.392	-3.583
	(4.661)	(2.602)	(4.044)	(4.706)	(2.666)	(4.210)	(3.400)	(2.987)	(4.044)
Includes controls for:									
State effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State specific time effects and state-specific age effects	No	No	Yes	No	No	Yes	No	No	Yes
N	28281	30074	58355	27716	29546	57262	24574	26121	50695

Note: Estimates in each cell are from separate regressions. The dependent variable is monthly household expenditure, in rupees expressed in 2007-2008 prices, on the item listed as row heading. See notes to Table 3 for model specification. *$0.05 < p \leq 0.1$, **$0.01 < p \leq 0.05$, ***$p \leq 0.01$.

Table 6: Estimated Effect of Public Pension on Household Composition
(Sample restricted to households where the head has a primary or lower education)

	All States and Union Territories		All States		19 Large States	
Dependent variable	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Sample: All Households						
1. Household has an elderly member	0.008**	0.006	0.007	0.005	0.007	0.005
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
2. Number of elderly members in Household	0.012*	0.009	0.009	0.006	0.009	0.005
	(0.006)	(0.006)	(0.007)	(0.006)	(0.007)	(0.007)
N	144881	144873	142577	142569	125446	125442
Sample: Households with at least one elderly member						
3. Elderly only household	-0.004	-0.005	0.002	0.000	0.001	0.000
	(0.006)	(0.005)	(0.006)	(0.005)	(0.006)	(0.005)
N	29241	29241	28861	28861	25838	25838

Note: Each cell is estimated from a separate regression. Dependent variable is listed as row heading. The sample of analyses in each cell in rows 1 and 2 is all households where the household head has a primary or lower education. The sample of analyses in each cell in row 3 is restricted to households with at least one elderly member and where the household head has a primary or lower education. Reported coefficients are the estimated effects of a Rs 100 increase in pension on the dependent variable. Standard errors are clustered on state-year. Regressions in Model 1 control for state domestic product in state s in year t-1, state/UT effects and year effects. Model 2 includes additional controls for the following household characteristics: education of household head, their gender, household caste, and whether the household is in an urban area or rural area.

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

Appendix Table 1: Descriptive Data on National Old Age Pension Scheme

State Name	Pension Amount (Federal +State) in Rupees		Minimum Age for Eligibility for State Pension[1]	Number of Beneficiaries	
	2004-2005	2007-2008		2004-2005	2007-2008
Andhra Pradesh	75	200	65	466000	919230
Arunachal Pradesh	150	200	60	12923*	14500
Assam	75	250	65 (m) 60(f)	299005	628949
Bihar	100	200	60	493696	1415179
Chhattisgarh	150	275	65	165730	451066
Goa	750	1000	60	3731	5013
Gujarat	275	400	60	62558*	62691
Haryana	200	300	65	99476	130306
Himachal Pradesh	150	200	65	22700	83678
Jammu & Kashmir	75	200	65	64708*	72038
Jharkhand	100	400	65	166236	623654
Karnataka	100	400	65(m) 60(f)	477409	811726
Kerala	110	235	65	131346*	141956
Madhya Pradesh	150	275	65	448363	1222212
Maharashtra	250	375	65(m) 60(f)	819523	828193
Manipur	75	200	65(m) 60(f)	43619*	63412
Meghalaya	100	200	65(m) 60(f)	34063	32740
Mizoram	100	250	65(m) 60(f)	10525	15516
Nagaland	100	300	65	28053	28053
Orissa	100	200	65	493090	643400
Punjab	200	450	65(m) 60(f)	45853*	61371
Rajasthan	200	400	58(m) 55(f)	547700	631040
Sikkim	200	400	65	10104	15169
Tamil Nadu	200	400	65	471129	636384
Tripura	125	200	65	69469	136592
Uttar Pradesh	125	300	65	299019	2426481
Uttaranchal	125	400	65	42326	65752
West Bengal	300	400	65	291671	1046470
Union Territories					
Andaman & Nicobar Island	75	500	60	528*	702
Chandigarh	200	200	65	4497*	5619
D&N Haveli	75	200	65	1086*	6956
Daman & Diu	75	200	60	372*	630
Delhi[1]	350	600	60	150000*	94000
Lakshadweep	100	300	60	32*	142
Pondicherry	125	600	60	NA	3566

Source for pension data: Ministry of Rural Development Annual Reports and response to parliament questions.
[1] m: male; f: female
Source for number of beneficiaries: IndiaStat Tables.

*indicates figures for 2005-2006; NA: Not available; [1]Data for 2004-2005 pertains to National Capital Territories of Delhi.

Appendix Table 2: Validation tests of the research methodology

	NSS data: 2004-2005 and 2007-2008		
	All States & UTs	All States	19 Large States
	III	III	III
Panel 1: Association between Pension Amount and Employment			
Sample: Men with secondary education, no degree; aged 55-70			
Pension Amount	-0.002	0.013	0.024
	(0.013)	(0.014)	(0.023)
N	5700	5505	4930
Sample: Women with secondary education, no degree, aged 55-70			
Pension Amount	0.012	0.011	-0.002
	(0.008)	(0.009)	(0.012)
N	1915	1843	1645
Panel 2: Association between Pension Amount and Family Expenditure			
Sample: Elderly/near elderly households; household head with secondary education, no degree			
Pension Amount	-5.565	-12.648	-24.279
	(40.291)	(38.583)	(43.769)
N	9486	9200	8282

Notes: See notes to Table 2 for model specification and definition of pension amount in Panel 1 and notes to Table 3 for model specification and definition of pension amount in Panel 2. *$0.05 < p \leq 0.1$, **$0.01 < p \leq 0.05$, ***$p \leq 0.01$

Appendix Table 3. Estimated Effect of NOAPS on the Probability of Having an Elderly Male or Female in the Household

Dependent variable/	HH has an elderly male member						HH has an elderly female member					
Sample/	All States and UT		All States		Largest 19 states		All States and UT		All States		Largest 19 states	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
HH Head's Education :												
Primary or less	0.005*	0.004	0.004	0.002	0.004	0.002	0.005*	0.003	0.005	0.003	0.004	0.003
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Dependent variable/	Number of elderly male members in HH						Number of elderly female members in HH					
HH Head's Education:												
Primary or less	0.005*	0.004	0.004	0.003	0.004	0.002	0.005*	0.003	0.005	0.003	0.005	0.003
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)

Note: Each cell is estimated from a separate regression. Dependent variable is listed as column heading. The sample of analyses is households where the head has a primary or lower education. Reported coefficients are the estimated effects of a Rs 100 increase in pension on the dependent variable. Standard errors are clustered on state-year. Regressions in Model 1 control for state domestic product in state s in year t-1, state/UT and year effects. Model 2 includes additional controls for the following household characteristics: education of household head, their gender, household caste, and whether the household is in an urban area or rural area.

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

Appendix Table 4. Validity Test of Models Estimating the Effect of Public Pension on Household Composition
(Sample restricted to households where the head has a secondary or higher education)

	All States and Union Territories		All States		19 Large States	
Dependent variable	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Sample: All Households						
1. Household has an elderly member	-0.004	-0.004	-0.007	-0.005	-0.008*	-0.006
	(0.004)	(0.003)	(0.004)	(0.004)	(0.005)	(0.005)
2. Number of elderly members in household	-0.011	-0.008	-0.016**	-0.011	-0.019**	-0.013
	(0.007)	(0.006)	(0.008)	(0.007)	(0.009)	(0.008)
N	66623	66623	63904	63901	54489	54488
Sample: Households with at least one elderly member						
3. Elderly only household	-0.001	-0.001	0.001	0.002	0.001	0.003
	(0.005)	(0.005)	(0.006)	(0.006)	(0.006)	(0.007)
N	10852	10852	10513	10513	9543	9543

Notes: See notes to Table 6. *$0.05 < p \leq 0.1$, **$0.01 < p \leq 0.05$, ***$p \leq 0.0$